

Fiscal Policy, Stabilization, and Growth

PRUDENCE OR ABSTINENCE?

Edited by
Guillermo E. Perry
Luis Servén
Rodrigo Suescún



THE WORLD BANK

*Fiscal Policy, Stabilization,
and Growth*

*Fiscal Policy,
Stabilization,
and Growth*

Prudence or Abstinence?

Edited by

Guillermo E. Perry, Luis Servén,
and Rodrigo Suescún



THE WORLD BANK
Washington, D.C.

© 2008 The International Bank for Reconstruction and Development/The World Bank
1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org
E-mail: feedback@worldbank.org

All rights reserved
1 2 3 4 10 09 08 07

The findings, interpretations, and conclusions expressed in this volume do not necessarily reflect the views of the Executive Directors of The World Bank or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgement on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The International Bank for Reconstruction and Development/The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, USA; telephone: 978-750-8400; fax: 978-750-4470; Internet: www.copyright.com.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2422; e-mail: pubrights@worldbank.org.

ISBN: 978-0-8213-7084-1
eISBN: 978-0-8213-7085-8
DOI: 10.1596/978-0-8213-7084-1

Library of Congress Cataloging-in-Publication Data

Fiscal policy, stabilization, and growth : prudence or abstinence? / edited by Guillermo Perry, Luis Servén, and Rodrigo Suescún.

p. cm.—(Latin American development forum series)
Includes bibliographical references and index.
ISBN: 978-0-8213-7084-1
eISBN: 978-0-8213-7085-8

1. Fiscal policy—Latin America. 2. Finance, Public—Latin America. 3. Economic stabilization—Latin America. 4. Latin America—Economic policy.

I. Perry, Guillermo. II. Servén, Luis. III. Suescún, Rodrigo.

HJ799.53.F574 2008
336.3098—dc22

2007034287

Cover design: Ultra Designs.

Latin American Development Forum Series

This series was created in 2003 to promote debate, disseminate information and analysis, and convey the excitement and complexity of the most topical issues in economic and social development in Latin America and the Caribbean. It is sponsored by the Inter-American Development Bank, the United Nations Economic Commission for Latin America and the Caribbean, and the World Bank. The manuscripts chosen for publication represent the highest quality in each institution's research and activity output and have been selected for their relevance to the academic community, policy makers, researchers, and interested readers.

Advisory Committee Members

Inés Bustillo, Director, Washington Office, Economic Commission for Latin America and the Caribbean, United Nations

José Luis Guasch, Senior Adviser, Latin America and the Caribbean Region, World Bank; and Professor of Economics, University of California, San Diego

Santiago Levy, General Manager and Chief Economist, Research Department, Inter-American Development Bank

Eduardo Lora, Principal Adviser, Research Department, Inter-American Development Bank

José Luis Machinea, Executive Secretary, Economic Commission for Latin America and the Caribbean, United Nations

Guillermo E. Perry, Chief Economist, Latin America and the Caribbean Region, World Bank

Luis Servén, Research Manager, Development Economics Vice Presidency, World Bank

Augusto de la Torre, Chief Economist, Latin America and the Caribbean Region, World Bank

Other Titles in the Latin American Development Forum Series

New Titles

Innovative Experiences in Access to Finance: Market-Friendly Roles for the Visible Hand? (2008) by Augusto de la Torre, Juan Carlos Gozzi, and Sergio L. Schmukler

China's and India's Challenge to Latin America: Opportunity or Threat? (2008) by Daniel Lederman, Marcelo Olarreaga, and Guillermo E. Perry, editors

Raising Student Learning: Challenges for the 21st Century (2007) by Emiliana Vegas and Jenny Petrow

Remittances and Development: Lessons from Latin America (2007) by Pablo Fajnzylber and J. Humberto López, editors

Published Titles

Investor Protection and Corporate Governance: Firm-Level Evidence across Latin America (2007) by Alberto Chong and Florencio López-de-Silanes, editors

The State of State Reform in Latin America (2006) by Eduardo Lora, editor

Emerging Capital Markets and Globalization: The Latin American Experience (2006) by Augusto de la Torre and Sergio L. Schmukler

Beyond Survival: Protecting Households from Health Shocks in Latin America (2006) by Cristian C. Baeza and Truman G. Packard

Natural Resources: Neither Curse nor Destiny (2006) by Daniel Lederman and William F. Maloney, editors

Beyond Reforms: Structural Dynamics and Macroeconomic Vulnerability (2005) by José Antonio Ocampo, editor

Privatization in Latin America: Myths and Reality (2005) by Alberto Chong and Florencio López-de-Silanes, editors

Keeping the Promise of Social Security in Latin America (2004) by Indermit S. Gill, Truman Packard, and Juan Yermo

Lessons from NAFTA: For Latin America and the Caribbean (2004) by Daniel Lederman, William F. Maloney, and Luis Servén

The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America (2003) by William Easterly and Luis Servén, editors

Globalization and Development: A Latin American and Caribbean Perspective (2003) by José Antonio Ocampo and Juan Martín, editors

Is Geography Destiny? Lessons from Latin America (2003) by John Luke Gallup, Alejandro Gaviria, and Eduardo Lora

About the Contributors

Carlos Hamilton Vasconcelos Araújo is a staff member of the Research Department (Departamento de Estudos e Pesquisas) of the Banco Central do Brasil.

Olivier Blanchard is the Class of 1941 Professor of Economics at MIT, research associate at the National Bureau of Economic Research, and fellow of the Econometric Society.

Antonio Fatás is the Portuguese Council chaired professor of European Studies, professor of economics and dean of the MBA program at INSEAD, in France, and a research fellow at the Centre for Economic Policy Research.

Pedro Cavalcanti Ferreira is professor of economics at the Graduate School of Economics of the Getulio Vargas Foundation in Brazil.

Francesco Giavazzi is professor of economics at Bocconi University in Milan and a regular visiting professor at MIT. He is a research fellow and a trustee of the Centre for Economic Policy Research and a research associate of the National Bureau of Economic Research.

Timothy Irwin is senior economist in the Infrastructure Economics and Finance Department at the World Bank.

Ilian Mihov is professor of economics at INSEAD in France and a research fellow at the Centre for Economic Policy Research.

Jack M. Mintz is professor of business economics and director of the International Tax Program at the Rotman School of Management, University of Toronto.

Guillermo E. Perry is chief economist for the Latin America and the Caribbean Region at the World Bank.

Luis Servén is research manager for macroeconomics and growth in the Development Research Group of the World Bank.

Michael Smart is professor of economics at the University of Toronto and research fellow at the C. D. Howe Institute in Canada.

Federico Sturzenegger is professor of economics at the Universidad Torcuato Di Tella in Argentina and visiting professor of public policy at the Kennedy School of Government, Harvard University.

Rodrigo Suescún is senior economist in the Office of the Chief Economist of the Latin America and the Caribbean Region at the World Bank.

Rogério L. F. Werneck is professor of economics at the Pontifícia Universidade Católica do Rio de Janeiro (PUC-RIO) in Brazil.

Contents

Acknowledgments	xvii
Acronyms and Abbreviations	xix
1 OVERVIEW: FISCAL POLICY, ECONOMIC FLUCTUATIONS, AND GROWTH	1
<i>Guillermo E. Perry, Luis Servén, Rodrigo Suescún, and Timothy Irwin</i>	
PART I: PROCYCLICAL FISCAL POLICY AND VOLATILITY	
2 FISCAL DISCIPLINE, VOLATILITY, AND GROWTH	43
<i>Antonio Fatás and Ilian Mihov</i>	
3 THE SIZE AND EFFECTIVENESS OF AUTOMATIC FISCAL STABILIZERS IN LATIN AMERICA	75
<i>Rodrigo Suescún</i>	
4 FISCAL FEDERALISM AND PROCYCLICAL SPENDING: THE CASES OF ARGENTINA AND BRAZIL	121
<i>Federico Sturzenegger and Rogério L. F. Werneck</i>	
5 FISCAL RULES AND PROCYCLICALITY	159
<i>Guillermo E. Perry</i>	
PART II: FISCAL POLICY AND GROWTH	
6 FISCAL DISCIPLINE, PUBLIC INVESTMENT, AND GROWTH	195
<i>Luis Servén</i>	
7 INCENTIVES FOR PUBLIC INVESTMENT UNDER FISCAL RULES	225
<i>Jack M. Mintz and Michael Smart</i>	
8 IMPROVING THE STABILITY AND GROWTH PACT THROUGH PROPER ACCOUNTING OF PUBLIC INVESTMENT	259
<i>Olivier Blanchard and Francesco Giavazzi</i>	

9	ACCURAL ACCOUNTING, LONG-TERM FISCAL PROJECTIONS, AND PUBLIC INVESTMENT	273
	<i>Timothy Irwin</i>	
10	GROWTH AND FISCAL EFFECTS OF INFRASTRUCTURE INVESTMENT IN BRAZIL	297
	<i>Pedro Cavalcanti Ferreira and Carlos Hamilton Vasconcelos Araújo</i>	
	Index	319
FIGURES		
1.1a	Latin America: Debt and Fiscal Balance	
1.1b	Debt and Fiscal Balances in Selected Latin American Countries, 2005	3
1.2	Debt Determinants in Selected Latin American Countries	4
1.3	Latin America: General Government Structural Balance and Primary Expenditure	6
1.4	Latin America: Primary Deficit and Public Infrastructure Investment	7
1.5	Discretionary Fiscal Policy Reaction Function	10
1.6	Response of Automatic Stabilizers to Cyclical Conditions	13
1.7	The Stabilizing Role of Government Size	14
1.8	Latin America: Total Investment in Major Infrastructure Sectors	19
1.9	Sub-Saharan Africa: Overall Deficit and Public Infrastructure Investment	20
1.10	European Union: Primary Deficit and Public Investment	21
1.11	Fiscal Procyclicality and Public Investment Performance	22
2.1	Volatility and Investment	64
2.2	Policy-Induced Volatility and Investment	64
3.1	The Stabilizing Role of Government Size	78
3.2	Cyclical Sensitivity of the Fiscal Position	84
3.3	Automatic Stabilizers' Response to Cyclical Conditions	86
3.4	Simulation Results: Relative Output Volatilities with Only Ricardian Households	105
3.5	Simulation Results: Tax Structure and Relative Output Volatilities	106

3.6	Automatic Revenue Stabilizers and Business Cycle Volatility	108
3.7	The Stabilizing Role of Government Size in a Broader Sample	110
4.1	Procyclicality of Fiscal Policy	122
4.2	Procyclicality of Fiscal Results	125
4.3	Cross-Plots of Local Output Growth and Fiscal Variables in Argentina	139
4.4	Cross-Plots of Output Growth and Fiscal Variables in Brazil	149
5.1	Volatility of Real GDP Growth	162
5.2	Causes of Latin America's Excess Volatility over OECD and East Asian Countries, 1975–99	163
5.3	Fiscal Procyclicality and Public Investment	167
5.4	Procyclicality and Asymmetry of Public Investment Responses: Models I and II	171
5.5	Fiscal Procyclicality and Asymmetry of Public Investment Responses: Model III	172
5.6	Real Primary Expenditures during the 1998–2002 Slowdown	173
5.7	Spreads and Business Cycle	175
5.8	Chile: Structural and Actual Balances, 1997–2006	183
5.9	Estimates of Structural Primary and Overall Balance, Latin America	185
5.10	Real Current Expenditures, 1990–2005	186
5.11	Structural and Actual Fiscal Balances in Argentina, 1994–2001	187
6.1	Latin America: Fiscal Adjustment and Public Investment	197
6.2	European Union: Primary Deficit and Public Investment	199
6.3	Fiscal Targets and Public Expenditure Composition	211
9.1	Elements of the Long-Term Fiscal Projection for New Zealand	290
10.1	Ratio of Public Investment to GDP	300
10.2	Public Investments as a Proportion of GDP	301
10.3	Growth Rate of Power-Generating Capacity	302
10.4	New Paved Roads and Investment	303
10.5	GDP, Public Structures, and Public Equipment	304
10.6	Response of per Capita GDP and KPe to a One-Unit Shock to KGs	308
10.7	Simulated Paths of the Debt-to-GDP Ratio	313

TABLES

1.1	Benefits and Drawbacks of Three Sources of Fiscal Indicators	31
2.1	Summary Statistics for Volatility, Elasticity, and Persistence	51
2.2	What Determines Volatility of Fiscal Policy?	56
2.3	What Determines the Persistence of Government Spending?	57
2.4	Do Institutions Affect Policy Responsiveness?	59
2.5	Output Volatility and Fiscal Policy Characteristics	61
2.6	Growth and Fiscal Policy	63
3.1	Calibrated Parameter Values	99
3.2	Cyclical Properties of the Representative Latin America and the Caribbean and Model Economies	100
3.3	Latin America and the Caribbean: Standard Deviations (Volatilities) Relative to Output	110
3.4	Latin America and the Caribbean: Output Correlations	113
3.5	Latin America and the Caribbean: Persistence of Macroeconomic Aggregates	115
4.1	Procyclicality in the Twentieth Century: Argentina	136
4.2	Cyclical Response of Fiscal Policy: Argentina 1992–2002	137
4.3	Procyclicality of Provincial Resources in Argentina, 1992–2002, Growth Rates	141
4.4	Procyclicality of Provincial Resources in Argentina, 1992–2002, Ratios to GDP	142
4.5	Testing Procyclicality at the Subnational Level	144
4.6	Procyclicality by Province in Argentina, 1992–2002	145
4.7	Sources of Procyclicality	146
4.8	Correlation between Output and Fiscal Variables of Subnational Governments in Brazil	148
5.1	Indicators of Cyclical Sensitivity of Fiscal Aggregates	165
5.2	Public Investment Trends and Procyclicality of Fiscal Policies	168
5.3	Public Investment Levels and Procyclicality of Fiscal Policies	168
7.1	Survey of Accounting Practices	236
7.2	Survey of Fiscal Rules in the OECD	240
8.1	Admissible Deficit under the Modified Stability and Growth Pact Rule	267
9.1	Debt-Financed Investment in Cash and Accrual Accounting	279

9.2	Infrastructure Items in the Accrual-Based Financial Statements of the New Zealand Government	280
9.3	Excerpts from GFSM 2001 Accounts for the Central New Zealand Government	282
9.4	Excerpts from the Central Government of El Salvador's 2003 Balance Sheet, according to GFSM	283
A9.1	Fiscal Information Provided by Three Kinds of Fiscal Reports	293
10.1	Regressions of Stock Change on Investment Flows	303
10.2	Correlation Matrix, Structures and Machinery	305
10.3	Correlation Matrix, Physical Assets	305
10.4	Cointegration Equations, Variables per Worker	306
10.5	Cointegration Equations, Variables per Capita	307
10.6	Net Worth as Proportion of GDP	310

Acknowledgments

This book is mainly the result of research conducted under the auspices of the Regional Studies Program of the World Bank's Latin America and the Caribbean Region, headed by Guillermo E. Perry. The primary objective of the program is to offer analysts and policy makers a solid analytical basis for the understanding and formulation of policies through a collaborative effort that brings together a diverse team of researchers from within and outside the Bank. This volume compiles a series of pieces produced under two regional studies: one on fiscal space and the other on procyclical fiscal policy, task managed by Luis Servén and Rodrigo Suescún, respectively.

The editors wish to extend their thanks for the invaluable contributions of numerous individuals who participated in the program. Special thanks go to professors Olivier Blanchard and Francesco Giavazzi, both of whom kindly agreed to publish their work in this book.

Acronyms and Abbreviations

AR	autoregressive
CES	constant elasticity of substitution
EMBI	Emerging Markets Bond Index
EMU	Economic and Monetary Union
EPG FGV	Escola de Pós-Graduação da Fundação Getúlio Vargas
EU	European Union
FEIREP	Fund for Stabilization, Social and Productive Investment and Reduction of Public Debt
FRL	Fiscal Responsibility Law
GDP	gross domestic product
GFSM	<i>Government Finance Statistics Manual</i>
HP	Hodrick-Prescott [filter]
IBGE	Instituto Brasileiro de Geografia e Estatística
ICMS	Impostos Sobre Circulação de Mercadorias e Prestação de Serviços
IFI	international financial institution
IFRS	International Financial Reporting Standards
IFS	<i>International Financial Statistics</i>
IMF	International Monetary Fund
IPCA	Índices de Preços ao Consumidor
IPEA	Instituto de Pesquisa Econômica Aplicada
IPI	Imposto Sobre Produtos Industrializados
IPSAS	International Public Sector Accounting Standards
IPVA	Imposto Sobre a Propriedade de Veículos Automotores
IV	instrumental variable
LECOP	Letras de Canelación de Obligaciones Provinciales
LEI	Latin American Eurobond Index
O&M	operation and maintenance
OECD	Organisation for Economic Co-operation and Development

OECS	Organization of Eastern Caribbean States
OFA	Ontario Financing Authority
OLS	ordinary least squares
PAYG	pay-as-you-go
PBG	produto bruto geografico
PI	Pechman's indicator
PPP	purchasing power parity
PSNB	public sector net borrowing
PSNCR	public sector net cash requirement
PUC-RJ	Pontificia Universidade Católica do Rio de Janeiro
SBB	sensitivity of the budget balance
SGP	Stability and Growth Pact
SUR	seemingly unrelated regression
VAR	vector autoregression
VAT	value added tax
VECM	vector error correction model
WDI	<i>World Development Indicators</i>
WEO	<i>World Economic Outlook</i>

Overview: Fiscal Policy, Economic Fluctuations, and Growth

Guillermo E. Perry, Luis Servén, Rodrigo Suescún, and Timothy Irwin

I. Introduction

This volume covers the conduct of fiscal policy in Latin America, and its consequences for macroeconomic stability and long-term growth. Without losing sight of intertemporal solvency concerns, the book focuses on the procyclical and anti-investment biases embedded in the region's fiscal policies—their causes, their consequences for macroeconomic performance and growth, and their possible remedies.

The volume's chapters examine different aspects of these problems, ranging from the purely economic to the institutional and political economy dimensions. Importantly, the essays in the book show that these fiscal policy biases are exacerbated by the excessive focus of authorities, markets, and international financial institutions on short-term indicators of fiscal health—such as government debt and cash flows—that capture liquidity trends but can be misleading for tracking intertemporal solvency. Moreover, flawed policies reflect perverse political economy incentives. Correcting these incentives requires not only political leadership but also institutional solutions, including well-designed fiscal rules—as the example of Chile in recent years illustrates. This volume offers policy and institutional recommendations to help overcome the procyclical and anti-investment biases of fiscal policy, and we hope it will be of interest to academics and practitioners.

The book is organized as follows. This chapter offers an integrated overview of the themes covered in the rest of the volume. The chapter guides

the reader through the rest of the volume, but it has been written as a self-standing essay for the benefit of those readers who may not have the time to indulge in the details of every chapter. The rest of the volume is organized in two parts. The first part deals with the procyclical bias of fiscal policy, and the second part with the anti-investment bias of fiscal discipline—popularly (albeit somewhat confusingly) known as the “fiscal space” problem.

The rest of this introductory chapter consists of four sections. Section II examines recent trends in fiscal policy in the region and introduces the two main themes of the book. Sections III and IV present an overview of the topics covered in the two parts of the book, as well as the conclusions of the corresponding chapters. Section V summarizes the implications for future fiscal analysis and policy management.

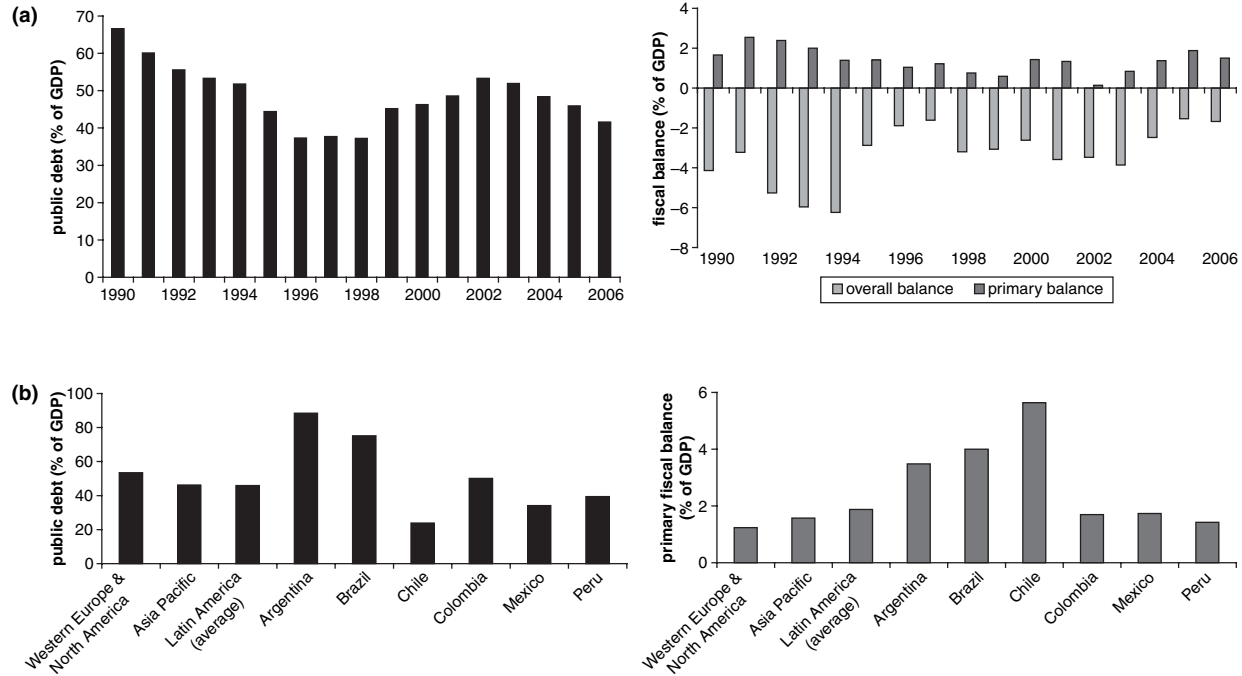
II. Are Latin America’s Old Fiscal Problems Over?

Latin America has made significant progress with fiscal policy management since the infamous days of the debt crisis of the 1980s that led to the so-called lost decade. By 2006, the region’s public debt to gross domestic product (GDP) ratio was around 40 percent, well below the 60 percent or higher reached at the end of the 1980s, during which time several countries had to undergo a debt restructuring. The region’s average primary surplus exceeds 1.5 percent of GDP, and the overall deficit is around 2 percent of GDP (see panel A of figure 1.1). Large variations are evident across countries (as shown in panel B of figure 1.1); however, in most of them, these standard indicators of fiscal health show a significant improvement. The natural question arises: Are Latin America’s fiscal policy concerns a thing of the past?

Perhaps not. To start with, the improvement in debt and fiscal balance ratios in the most recent years have a lot to do with allegedly temporary events: booming world economic activity, exceptionally high commodity prices, and low international interest rates and country risk spreads. A reversal in these conditions could bring back fiscal stability concerns to center stage in many countries. Revenue/GDP ratios could take a plunge, while current expenditures would probably show their usual resilience, and currency depreciation could again reveal problems in public debt composition.

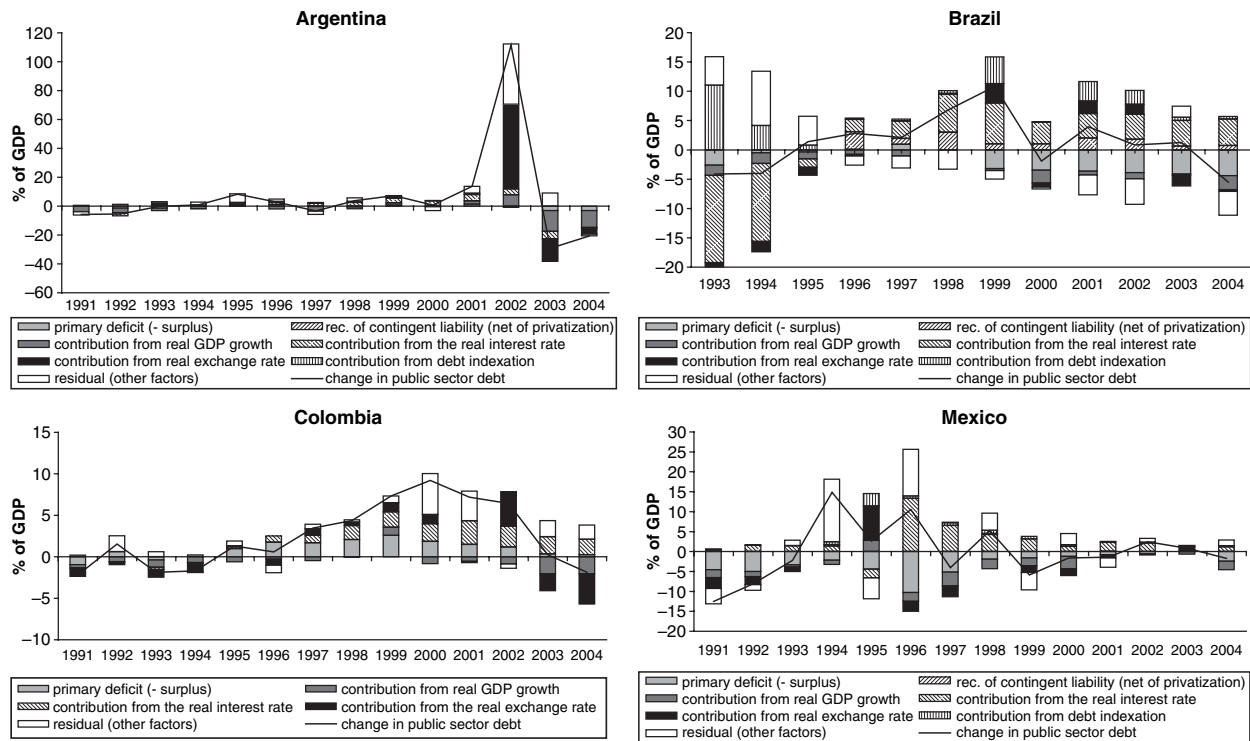
After all, standard indicators of fiscal health were also reasonably good by 1996–97, before the Russian and East Asian crises led to a major retrenchment of capital flows to the region. Ensuing increases in interest rate spreads, along with currency depreciation and recession, revealed the underlying fragility of the fiscal position, which eventually led to fiscal crises and debt restructurings in such countries as Argentina and neighboring Uruguay—until then an investment grade country. Indeed, figure 1.2 shows that the large increases in debt ratios experienced by the region

Figure 1.1 (a) Latin America: Debt and Fiscal Balance. (b) Debt and Fiscal Balances in Selected Latin American Countries, 2005



Source: FITCH database and authors' calculations.

Figure 1.2 Debt Determinants in Selected Latin American Countries



Source: Budina and Fiess 2004, based on data from the World Economic Outlook (WEO), central banks, and ministries of finance.

in the past have had little to do with primary deficits and instead were the result of currency depreciation, real interest rate increases, growth declines, and a variety of other factors, including the recognition of hidden and contingent liabilities in several countries. The same has held true in other emerging countries (see Budina and Fieiss 2004).

Moreover, estimates of structural fiscal balances indicate that the improvement in fiscal conditions has not been as large as suggested by standard indicators (figure 1.3, panel A).¹ In many countries, windfall revenues due to high commodity prices and the boom in economic activity have been used in large part to increase primary current expenditures (figure 1.3, panel B), suggesting that discretionary fiscal policies continue to be procyclical.

Furthermore, much of the fiscal adjustment achieved by most countries in the late 1980s and early 1990s was based on a compression of public infrastructure investment (see figure 1.4), which was not offset by increases in private investment. The ensuing decline in infrastructure capital accumulation had an adverse impact on growth, and hence the apparent improvement in fiscal health shown by standard deficit and debt indicators was, to a significant extent, only an illusion.²

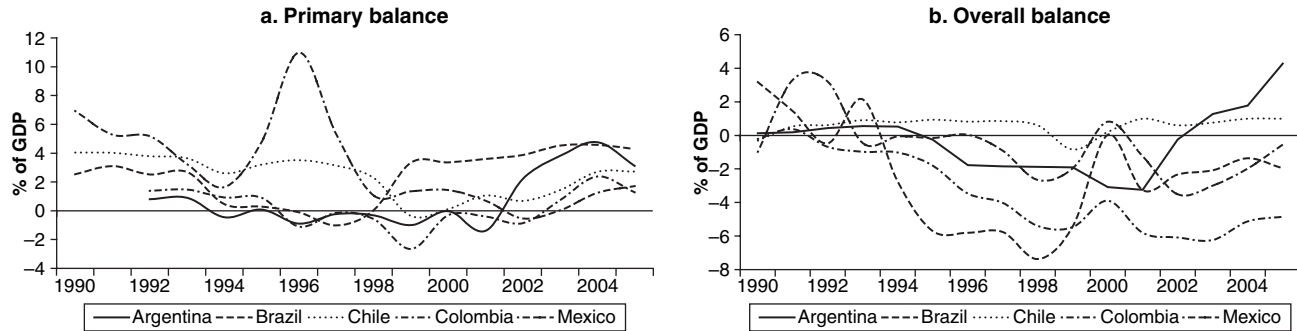
Thus, the evidence suggests, first, that Latin America's fiscal policies may be unduly procyclical—with a potentially destabilizing effect on macroeconomic aggregates—and, second, that the region may have adopted a flawed approach to fiscal discipline, biased against public infrastructure investment. We next explore these two issues.

III. Fiscal Policy and Macroeconomic Volatility: Dealing with the Procyclical Bias

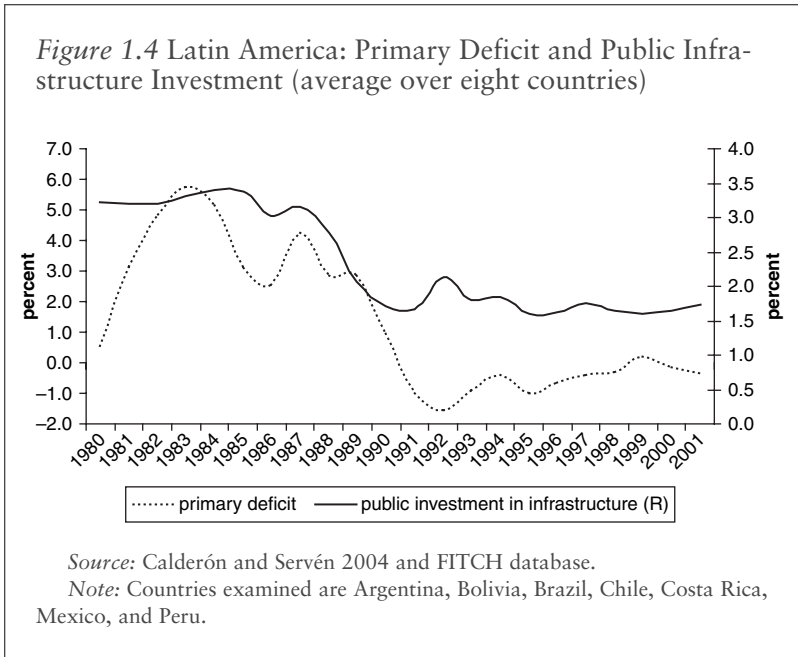
Macroeconomics textbooks teach that fiscal policy should be countercyclical: fiscal balances should increase in booms and decrease in recessions to smooth out fluctuations in aggregate income. Previous research, however, suggests that in most Latin American economies, unlike in most industrial countries, fiscal policy behaves in a procyclical manner (see Agénor, McDermott, and Prasad 1999; Gavin, Hausmann, Perotti, and Talvi 1996; Gavin and Perotti 1997; Stein, Talvi, and Grisanti 1999; Talvi and Végh 2000; Tornell and Lane 1999). Regarding fiscal policy in industrial countries, see, for instance, Lane (2003) and Wyplosz (2002). Procyclical fiscal policy amplifies economic fluctuations, and a significant fraction of Latin America's excess volatility relative to industrial economies is due to fiscal policy volatility (see De Ferranti, Perry, Gill, and Servén 2000).³

Part I of this book clarifies the extent to which fiscal policies in Latin America are procyclical and examines their contribution to economic fluctuations. It explores the underlying causes and possible solutions. A key question is whether Latin American countries should just attempt to avoid the procyclical bias of *discretionary* fiscal policies, and thus

Figure 1.3 Latin America: General Government Structural Balance and Primary Expenditure



Source: WEO database. World Bank staff calculations.



“let automatic stabilizers work,” as some authors have recently recommended for the United States and Europe, particularly given the difficulties found in conducting effective countercyclical discretionary policies (see Auerbach 2002; Auerbach and Feenberg 2000; Romer and Romer 1994). Furthermore, some authors suggest that monetary policy should take charge of cyclical stabilization, taking as given the workings of automatic stabilizers (Taylor 2000). The comparative advantage of monetary policy over fiscal policy is attributed to its shorter implementation lags, greater flexibility, and lower political constraints. This position seems to be supported by the work of Fatás and Mihov (2003), who find that fiscal policy discretion has harmed macroeconomic stability and led to a deterioration of long-term growth in a sample of member countries of the Organisation for Economic Co-operation and Development (OECD).

So, should Latin American countries give up the use of discretionary fiscal policy and focus solely on improving automatic stabilization? If countries were to give up discretionary policies, the question is whether the automatic stabilization embedded in the cyclical position of the government budget would suffice to smooth out economic fluctuations. If automatic stabilizers are weak or ineffective, a number of economies in the region would be left at the mercy of domestic and external shocks, with no fiscal stabilization instrument at their disposal. This would be the case of fully dollarized economies such as Ecuador, El Salvador, and

Panama, as well as the member countries of the Organization of Eastern Caribbean States (OECS)—which are grouped around a monetary union and therefore lack control over monetary policy. Furthermore, numerous de facto highly dollarized countries (including Bolivia, Costa Rica, Guatemala, Jamaica, Nicaragua, Paraguay, Peru, and Uruguay) would have to depend heavily on a feeble monetary policy to dampen business cycle fluctuations. Even other countries in the region with the potential to run independent monetary policies could eventually find themselves in a similar situation because of procyclical capital flows, financial sector inefficiencies, banking crises, illiquid domestic capital markets, or cost pushes.

Effects and Determinants of Discretionary Fiscal Policies

In chapter 2 of this volume, Fatás and Mihov use government spending data in a regression analysis to disentangle three characteristics of discretionary fiscal policy: procyclicality proper, persistence, and pure volatility. Their reliance on government spending alone, rather than both spending and revenue, is dictated by practical considerations. Most of the yearly fluctuations on the revenue side of the budget come from automatic reaction of tax revenues to the state of the economy. And in spite of the observed tax policy activism practiced by governments in Latin America, as measured by the frequency of tax reforms, the lead times required for their approval by legislatures, and the lags between enacted legal changes and their effects on actual revenues, make *discretionary* tax policy largely ineffective for cyclical stabilization purposes. In contrast, spending reacts much less automatically to the cycle in Latin America (as unemployment insurance payments are an insignificant fraction of budgets) and, as a result, most of the observed changes are *discretionary* in nature.⁴

This analysis shows high heterogeneity across countries in terms of the procyclicality, persistence, and volatility of their public spending outcomes. Latin American countries appear to have highly volatile and procyclical spending policies, with some exceptions such as the Dominican Republic's low procyclicality. In contrast, industrial countries tend to have more countercyclical and less volatile policies.

Fatás and Mihov then proceed to examine how these characteristics of public expenditure policies (volatility, persistence, and procyclicality) affect business fluctuations and economic growth in a cross-section of countries, using a multivariate regression framework. They find that macroeconomic volatility is significantly affected by discretionary fiscal policy volatility, but not by fiscal procyclicality. In turn, output growth is negatively related to macroeconomic volatility. In summary, discretionary fiscal policy volatility increases output volatility, which in turn reduces growth prospects.

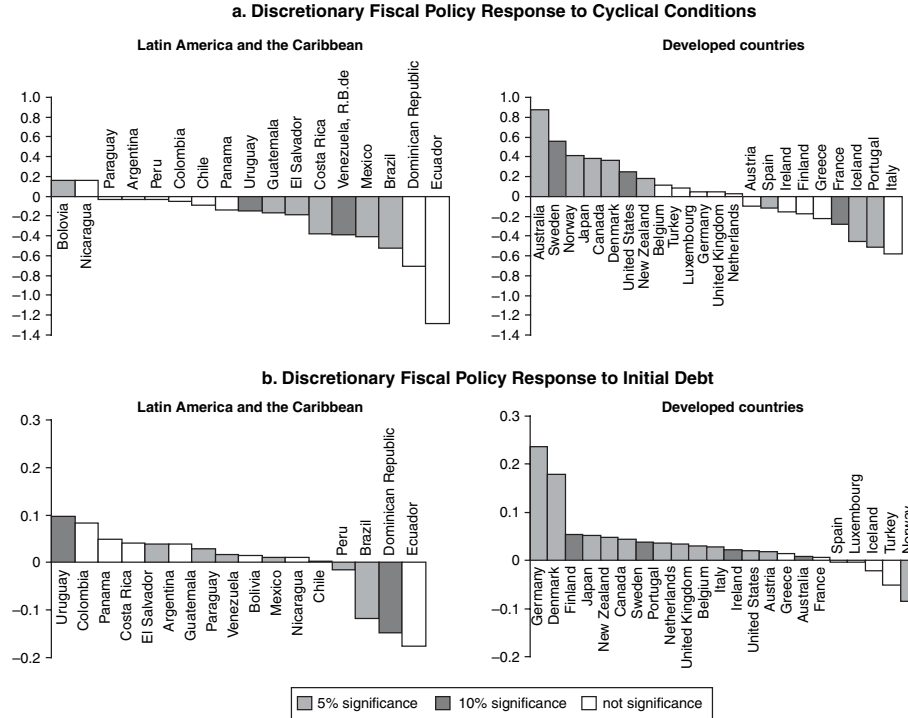
This damaging effect seems to operate mainly—as shown by regression results—through lower investment.

Finally, Fatás and Mihov attempt to explain the three characteristics of public spending in terms of four political and institutional indicators (plus a set of controls): political constraints (veto points in budgetary decisions), electoral system (majoritarian-proportional), political system (presidential-parliamentary), and (number of) elections. The only significant and robust link between institutions and policy characteristics is the one between political constraints and policy volatility. This suggests that political constraints are able to contain the level of discretionary policy aggressiveness and thus its damaging effect on long-term growth, without affecting the responsiveness of government spending to cyclical conditions.

Using an approach pioneered by Galí and Perotti (2003), Suescún (2005b) sheds further light on the forces driving discretionary fiscal policy in Latin America.⁵ Its cyclical behavior can be summarized by the coefficient of the output gap in a regression with the cyclically adjusted primary balance (a proxy for discretionary policy) as the dependent variable. Other regressors include the lagged ratio of government debt to potential GDP, the terms of trade, and the lagged dependent variable (for details, see Suescún 2005b). In this context, a positive output gap coefficient reflects countercyclical discretionary policy. The top panel of figure 1.5 shows individual country estimates of the coefficients on the output gap for Latin America and industrial countries. The estimates show that the dominant trend in Latin America has been toward the pursuit of procyclical discretionary policies. In contrast, industrial countries are better able to and more effective at conducting countercyclical policy, although some of them exhibit acyclical policies, too. The evidence of procyclical policies is more limited in industrial countries.

In turn, a positive debt coefficient in the same regression indicates that discretionary policy management incorporates a debt stabilization motive. The bottom panel of figure 1.5 depicts the estimated debt coefficients. They are generally positive for both Latin America and industrial countries. Nonetheless, industrial country estimates are, in general, statistically significant, while Latin America's regressions yield rather imprecise estimates. Using a similar specification, Bohn (1998) showed that a positive (and at least linear) response of the primary surplus-to-output ratio to the debt-to-output ratio is a sufficient condition to satisfy the long-run government budget constraint. According to this sustainability test, Latin American countries do not tighten discretionary fiscal policy when public debt ratios increase, as required for long-term sustainability. This represents a new piece of evidence of Latin America's fiscal policy problems—that is, not only is discretionary fiscal policy procyclical, it also has failed to systematically adjust to the requirements of long-term sustainability.

Figure 1.5 Discretionary Fiscal Policy Reaction Function



Source: Suescún 2005b.

The Size and Role of Automatic Stabilizers

Evidence presented thus far is not favorable to the use of discretionary fiscal policies in Latin America. So, we return to the initial policy question, should Latin American countries just “let the automatic stabilizers work”? We next examine the evidence on the size and effectiveness of automatic stabilization in the Latin American region.

Income taxes and transfer payment programs built into the fiscal system are normally considered the main budgetary items acting as automatic stabilizers. Suescún’s chapter in this volume (see chapter 3) explores the stabilizing role of the tax system and disregards the expenditure side, given that most Latin American countries do not have major automatic transfer systems.

The chapter focuses on the sensitivity of the budget balance to the cycle in Latin America and compares it with that found among industrial countries. Two cyclical sensitivity measures are used: (a) the estimation of tax proceeds and tax base elasticities, which is inspired by the OECD approach,⁶ and (b) an average of yearly ratios of the absolute increase in total tax revenue to the absolute increase in GDP.⁷

Both indicators reflect much weaker tax automatic stabilizers in Latin America than in the industrial world. This is broadly consistent with two well-known additional pieces of information that, by definition, are incorporated into the construction of these indicators: (a) relative government size, which is much larger in industrial countries, and (b) the structure of taxation, which shows a larger share of income taxes in industrial countries than in Latin America.

Thus, not only has fiscal policy been procyclical in Latin America, but automatic fiscal stabilizers have been found to be weak by two alternative methods and ancillary indicators. These two features combined suggest that discretionary fiscal policy and automatic stabilizers should move in opposite directions over the business cycle in the Latin American region, and the impact of the former should override the operation of the latter. Suescún finds empirical support for this conjecture: in 16 out of the 17 Latin American countries he considers, the two components of fiscal policy display a negative correlation. Within industrial countries, positive correlations are commonly (but not invariably) observed, suggesting that the two fiscal policy components tend to reinforce each other.

An additional perception of the strength of automatic stabilization or the degree of flexibility embedded in the tax system can be gained by looking at the responsiveness of automatic fiscal revenue stabilizers to changes in cyclical conditions. To that end, Suescún uses a regression approach based on Galí and Perotti (2003), with a measure of the automatic stabilizers as the dependent variable. The independent variables are the same as before: the output gap, the terms of trade, the lagged stock of outstanding public debt in ratio to potential GDP, and the lagged dependent variable. As before, the regression coefficient on the output gap measures the magnitude

of the automatic movements in government revenue in response to changes in cyclical conditions.

Figure 1.6 depicts the country-specific estimates of the output gap coefficient just described. Without exception, all industrial countries exhibit a statistically significant revenue response to cyclical fluctuations. In Latin America, few countries do. When the response is significant, it is much weaker than in the industrial country sample. Thus, on the whole, the region has an acyclical nondiscretionary fiscal policy. This seems to be confirmed by other results. For example, the Chilean fiscal rule has been found to have only weak smoothing effects (see Perry, chapter 5 in this volume, and Fiess 2005).

Finally, a quick look at Latin American data suggests that automatic revenue stabilizers fail to dampen business cycles. Suescún reports evidence that automatic revenue stabilizers neither smooth nor exacerbate cyclical fluctuations in the region. In summary, fiscal policy fails to exert a stabilizing effect. One reflection of this fact is that in Latin America there is a positive relationship between government size and output volatility, which is in contrast to the negative or flat relationship found among industrial countries (figure 1.7).

Policies and Institutions to Deal with Procyclicality

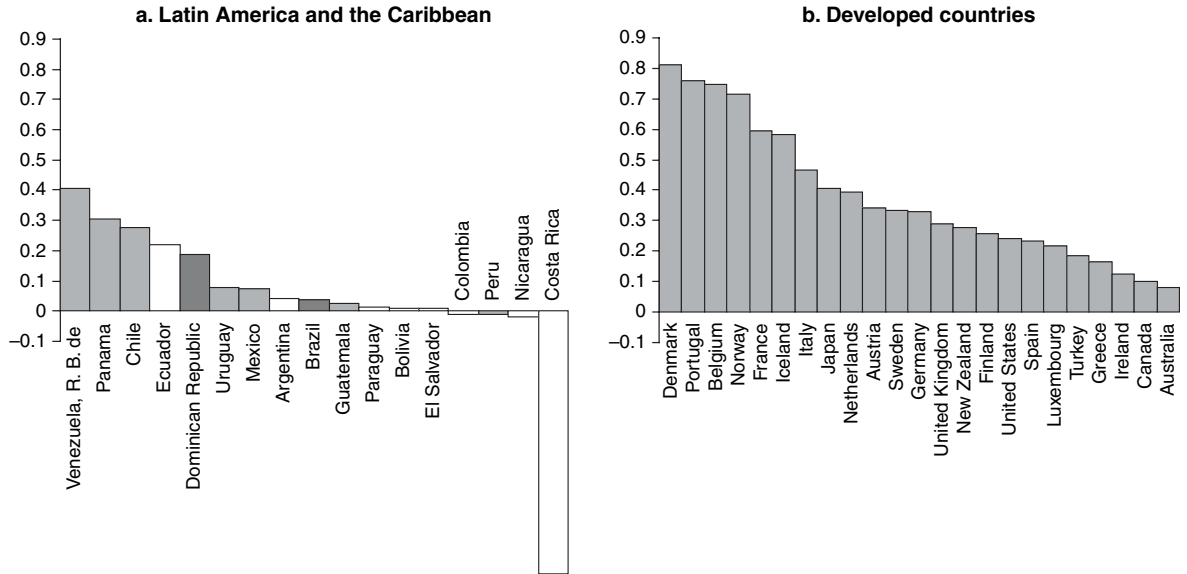
The preceding sections suggest that discretionary policies in Latin America have been highly volatile, procyclical, and harmful for growth. At the same time, automatic stabilizers built into tax codes have had only a weak smoothing effect. What can be done to correct these undesirable features?

One obvious policy goal, in light of Suescún's findings, should be to improve the size and effectiveness of automatic stabilizers. This would imply, first, adopting a tax structure more responsive to the business cycle. Traditionally this would be taken to mean an increase in the share of income taxes, contrary to recent trends. But it can also mean eliminating exemptions and collection lags (for example, by a more aggressive use of withholding mechanisms) that reduce the potential smoothing effectiveness of existing tax systems.

Also, countries could consider adopting transfer schemes that behave countercyclically in an automatic fashion—for example, unemployment insurance, self-selecting workfare programs, and the like. Such programs, however, should be designed in a way that mitigates their potentially adverse incentive effects.

Another key goal, derived from Fatás and Mihov's work, should be to strengthen budgetary and political institutions to limit the frequency and size of expenditure shocks. As mentioned, their results suggest that implicit institutional and political constraints are indeed effective to restrict the volatility of public expenditures and improve macroeconomic performance. Their evidence suggests that such constraints do not seem to

Figure 1.6 Response of Automatic Stabilizers to Cyclical Conditions

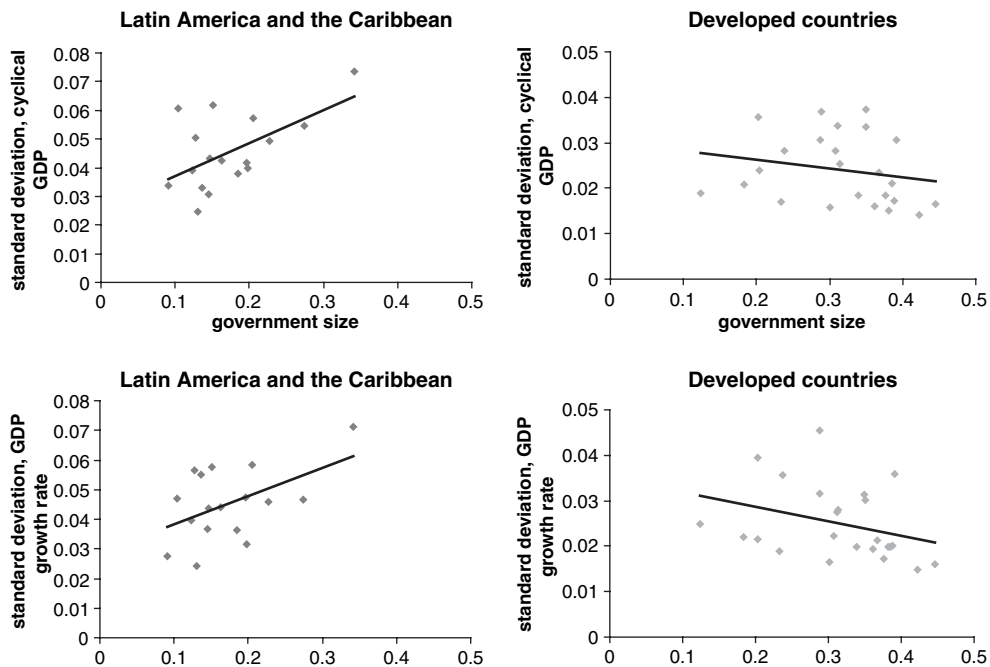


Source: Suescún, chapter 3 in this volume.

Note: Figures depict the coefficient β associated with the output gap variable in the following (country-by-country) regression:

$AS_t = \alpha + \beta CY_t + \gamma_P P_t + \gamma_D D_{t-1} + \gamma_L AS_t$, where AS = automatic stabilizers; CY = cyclical GDP; P = terms of trade; D = government debt to potential GDP ratio.

Figure 1.7 The Stabilizing Role of Government Size



Source: Suescún, chapter 3 in this volume.

affect the cyclical pattern of public expenditure. Thus, they would neither aggravate nor alleviate the observed procyclical biases of fiscal policy in most Latin American countries.

What about fiscal rules, that is, explicit constraints on the conduct of fiscal policy? Chapter 2 by Fatás and Mihov shows some skepticism regarding the possibility of developing simple and credible fiscal rules that can help both smooth economic fluctuations and avoid destabilizing public expenditure shocks. Their skepticism is largely based on the experience of the European Union (EU) with the Stability and Growth Pact (SGP), as well as those of some Latin American countries with rigid Fiscal Responsibility Laws (FRLs). In their words:

Controlling for the business cycle, deciding what gets included in the calculations of the budget, taking into account exceptional circumstances can only be done properly with a rule that is complex enough to take into account any foreseeable future event. Given that this is unlikely to be the case, the rule will be under pressure to be rewritten too frequently.

Chapter 5 by Perry takes a radically different view: rules that do not adjust for the business cycle—like the European rule that set a rigid 3 percent ceiling to fiscal deficits, the Argentinean and Peruvian FRLs, or even the standard performance targets enforced by international financial institutions (IFIs), which set rigid limits to fiscal deficit and debt-to-GDP ratios irrespective of cyclical conditions—permit expansionary policies during the boom and favor contractionary adjustments in the recession. Although rules often entail a dilemma between flexibility and credibility, excessively rigid rules such as those just mentioned may become altogether untenable and, as agents perceive them as unsustainable, will fail to deliver credibility. In other words, an excessively rigid rule may limit flexibility and not enhance credibility; it may entail only costs and few, if any, benefits.

Furthermore, Perry argues that the procyclical bias of fiscal policy leads to both anti-investment and deficit biases. And the reverse is true as well: a government with solvency problems would not be able to run countercyclical policies. Hence, a well-designed rule should deal jointly with the procyclical and deficit biases (we return later to the anti-investment bias). The argument is based on political economy considerations, informational asymmetry problems, and the procyclicality of financial systems, which combined explain the observed cyclical pattern of fiscal policy in developing countries.

To begin with, time inconsistency creates a serious credibility problem for most developing countries that attempt expansionary fiscal policies in a recessionary period. Governments may borrow in bad times, but then choose not to pay back in good times, and instead continue to raise their indebtedness. Because many governments have behaved in this way in past booms, financiers have no reason to anticipate different behavior in the future. Thus, expansionary policies during bad times can be rationally

expected to lead to an intertemporally unsustainable outcome—a deficit bias—and can be rightly perceived as raising default risk. No wonder then that creditors are reluctant to finance an increased deficit during recessionary periods, which then forces countries to apply procyclical policies that accentuate the recession.

Financial market failures, such as the tendency to overlend in good times and underlend in bad times because of asymmetric information and herd behavior, may accentuate fiscal procyclicality, but the origin of the problem can be traced back to governments' inability to achieve surpluses in good times. This, in turn, reflects the political economy of fiscal policy and the lack of strong budgetary institutions. Political incentives are aligned toward spending any available revenues (see Schick 2002), which makes it difficult for a responsible finance minister to maintain too visible a surplus through discretionary budgetary decisions.⁸

This analysis supports adopting an explicit, rules-based fiscal policy that would allow automatic stabilizers to work (as Chile has done) and would even permit a modestly countercyclical policy. Rules that adjust revenues and expenditures for cyclical and structural factors can help to keep surpluses in good times out of reach from the political process in normal discretionary budgetary decisions. Naturally, political incentives to spend potential surpluses in good times could lead to violations or changes in the rule, unless exit costs are sufficiently high. Executive authorities will have stronger incentives to comply with rules if there are enforceable penalties (as with the Brazilian Fiscal Crimes Law) and if their design does not leave much room for cheating. Violating an explicit rule or altering it is likely to be politically more costly than quietly indulging in discretionary expansionary policies in the absence of rules, because of the higher visibility of such overt action, especially when it involves changing a constitutional law that requires a qualified majority. The experience in Chile, during a major boom in copper prices at the beginning of the democratic period, clearly shows the usefulness of a tight legal rule—the Copper Stabilization Fund that required saving any revenues collected when copper prices exceeded a legally predetermined level.

Such a rule would help solve informational asymmetry problems in downturns. Financiers would be able to distinguish a responsible and sustainable (limited and predictable) countercyclical, rules-based fiscal policy from outright indulgence in intertemporally unsustainable policies. In addition, if this kind of policy was applied during the boom, governments would confront the ensuing recessionary phase with a stronger fiscal position (including savings that can be used to partially finance deficits during recessions) as well as a track record that enhances the credibility of the rule.

Perry applies this framework to analyze different experiences with stabilization funds, fiscal responsibility laws, and other similar arrangements in Latin America. He concludes that a simple cyclically adjusted rule that covers the whole budget, like the one adopted by Chile, works much better

than rules lacking cyclical adjustment (like most FRLs) or rules that restrict just part of the budget (such as commodity stabilization funds). Perry, however, also points out that such rules pose important technical and credibility requirements—for example, for estimating potential output, cyclical adjustments, and long-term commodity price benchmarks—that in many countries would necessitate the support of IFIs, and especially the International Monetary Fund (IMF).

Procyclical Fiscal Policies and Fiscal Federalism

Fiscally decentralized countries may face a harder task in confronting the procyclicality of fiscal policies, because a large fraction of expenditures is controlled by subnational authorities who suffer the same pressures as national ones to overspend in booms, but bear no responsibility for macro outcomes, and thus have no net incentive to counteract such pressures. Chapter 4 by Sturzenegger and Werneck in this volume is the first to address this unexplored issue in Latin America, focusing on the cases of Argentina and Brazil.

In the case of Argentina, the analysis follows a two-step procedure. The first step estimates the cyclical response of various budgetary aggregates (the budget surplus, revenues, and expenditures) for various government levels—the federal government, subnational governments overall, and large and small subnational governments separately. This exercise finds some evidence of countercyclical fiscal policy at the federal level in the 1992–2002 period. In contrast, subnational governments exhibit procyclical behavior: the budget surplus falls as output increases, and subnational revenues and spending are both highly procyclical. Small provinces appear much more procyclical than larger provinces. To further study the procyclicality of provincial revenues, chapter 4 divides these revenues into taxes and transfers from the central government. Tax revenue is uniformly more procyclical than national transfers, and the most procyclical revenue item is the cascading sales tax.

In the second step, the analysis examines three possible determinants of procyclicality. The first one is the possibly changing market access of subnational governments—the subnational version of the Gavin, Hausmann, Perotti, and Talvi (1996) hypothesis that procyclicality arises from limited access to capital markets during downturns. The second is the fiscal voracity effect, which implies a direct relationship between the procyclicality of government spending and the procyclicality of fiscal revenues. The third is a fiscal voracity of provinces in their relationship with the federal government. If the federal government has more abundant resources or easier access to credit, provinces may try to appropriate its resources.

The empirical analysis concludes that the procyclicality of the spending of provincial governments is explained exclusively by the procyclicality of their own revenues. The other possible determinants play no significant

role. In particular, procyclicality at the provincial level cannot be explained by the features of the national-provincial transfer scheme.

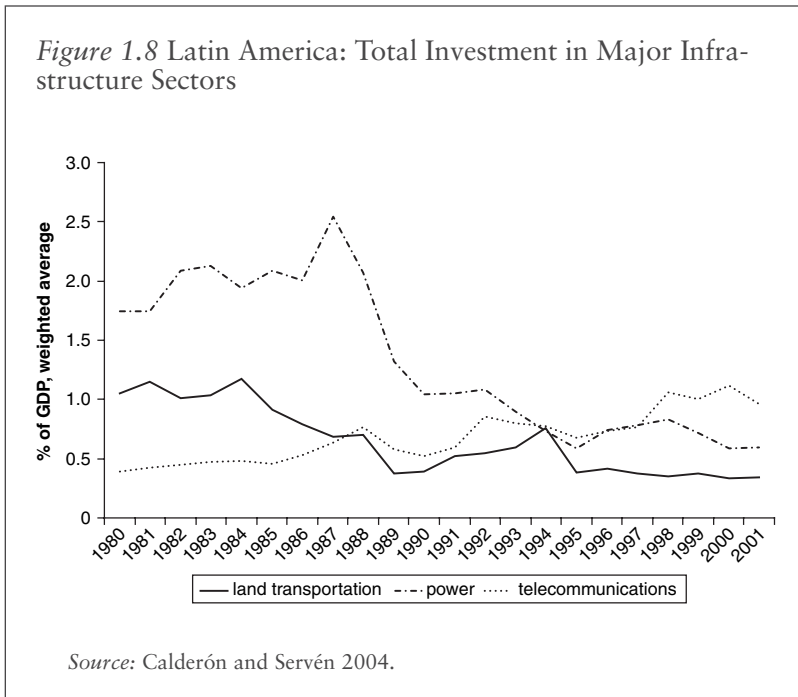
The study of Brazil follows a different approach, owing to data limitations. In this case, too, aggregate primary expenditures of subnational governments are highly procyclical. And again the main source of expenditure procyclicality is not found in federal transfers, but rather in the tax revenue collected by subnational entities.

In summary, subnational governments have indeed been a source of aggregate policy procyclicality both in Brazil and in Argentina despite major differences in their fiscal federalism arrangements. However, neither in Brazil nor in Argentina can the procyclicality of subnational spending be attributed to the behavior of federal transfers. This implies that efforts to reduce the procyclicality of provincial spending must focus on expenditure itself (through better local institutions and the imposition of cyclically adjusted rules) or must make the transfer system countercyclical to such an extent that the aggregate of all sources of provincial resources is acyclical. Future research should focus on explaining the observed differences in cyclical responsiveness of the federal and provincial revenues.

IV. Fiscal Policy and Growth: Overcoming the Anti-Investment Bias

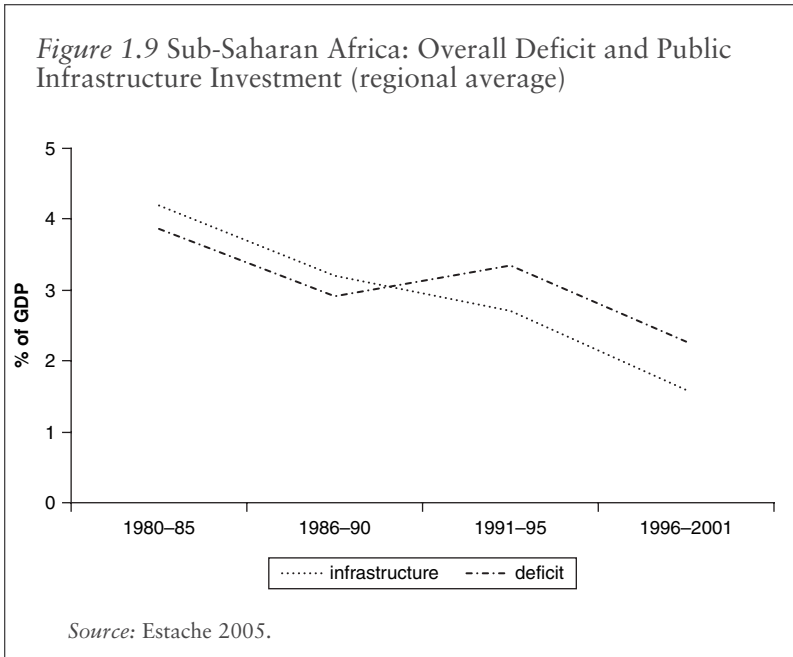
To a large extent, Latin America's fiscal adjustment of the 1980s and 1990s was done at the expense of public investment in infrastructure, as shown in figure 1.4. This would not be a matter of great concern if it had been matched by increases in private investment in infrastructure or by improvements in the efficiency of infrastructure spending. However, though private investment in infrastructure did rise in most Latin American countries, reflecting a regionwide shift toward private sector participation in infrastructure under various forms (from privatization of utilities to arrangements like concessions and service purchase agreements), in general, the increase was not enough to offset the decline in public investment. Indeed, as documented by Calderón and Servén (2004), among Latin America's larger economies only Chile and Colombia maintained or raised total infrastructure investment relative to GDP during the period. Across infrastructure sectors, only telecommunications escaped the investment decline (figure 1.8).

Declining investment is a cause for concern to the extent that it results in decreased accumulation of productive infrastructure capital below what is needed for the economy to sustain growth. This is certainly not always the case. Projects labeled as public investment can be wasteful "white elephants" that bring no future output benefits to the economy—a situation more likely to arise when governance is weak and corruption is high. For the Latin American case, however, Easterly and Servén (2003) have



shown that these reductions in the pace of investment were paralleled by a slowdown in the growth of the stocks of infrastructure capital (measured in physical terms),⁹ and this, as expected, took a toll on growth. They estimate that Latin America's lagging infrastructure could account for up to one-third of the increase in the gap in output per worker between Latin America and East Asia over the 1980s and 1990s.

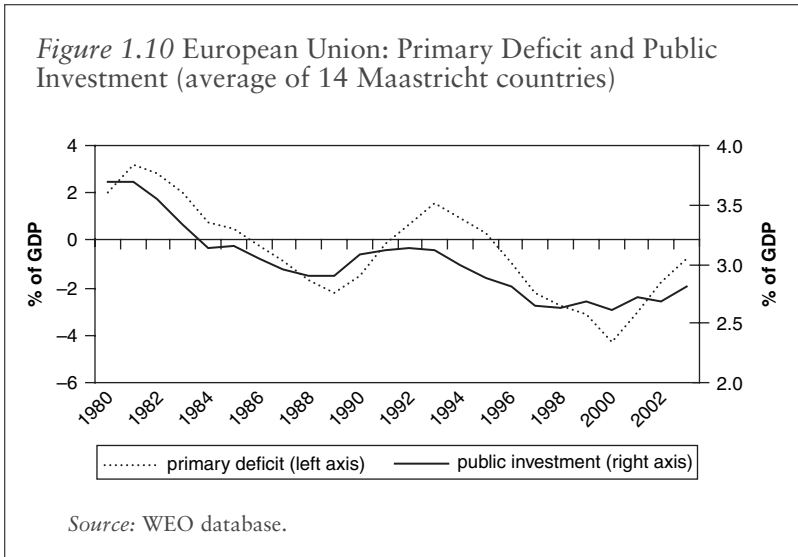
But this anti-investment bias of fiscal austerity is not exclusive to Latin America. The same phenomenon has been documented in a variety of countries by numerous observers (chapter 6 by Servén in this volume provides some references). For example, in Sub-Saharan Africa the overall fiscal deficit fell from an average 4 percent of GDP in the early 1980s to just over 2 percent in the late 1990s. Closer inspection shows that this fiscal correction was fully attributable to a contraction of public infrastructure investment, which declined from 4 percent of GDP to less than 1.5 percent during the same period (figure 1.9). Likewise, EU member countries underwent a significant fiscal correction since the early 1980s, which was similarly biased. Their primary balance rose by some 3 percent of GDP between 1980 and 2002—from a deficit of 2 percent to a surplus of 1 percent. One-third of the correction was due to the downward trend of public investment, a remarkable contribution given that investment accounts for less than 10 percent of the general government's total primary spending (figure 1.10).



In hindsight, it seems a bit ironic that Latin America's fiscal adjustment programs of the 1980s and 1990s were undertaken under the catchphrase "adjustment with growth." The rationale was that such adjustments were indispensable to establish fiscal solvency, and that they would bring lower interest rates and increased capital inflows and, hence, higher private investment and growth. But by focusing the retrenchment on infrastructure spending, the fiscal adjustment became like "walking up the down escalator" (in the phrase of Easterly, Irwin, and Servén 2007). Lower revenues in the future offset much of the effect of expenditure cuts today, without much (or even any) net improvement in government solvency. The vicious circle of low growth and fiscal stress observed in several Latin American countries to this day can be partially attributed to this biased fiscal adjustment. Part II of this volume examines the deeper roots of that bias and explores ways to overcome it.¹¹

*The Anti-Investment Bias: Where Does It Come From?*¹⁰

Across countries the anti-investment bias of fiscal policy is associated with its procyclical behavior. Indeed, chapter 5 by Perry shows that standard measures of fiscal procyclicality (that is, constructed along the lines of Fatás and Mihov) are negatively correlated with simple measures of public

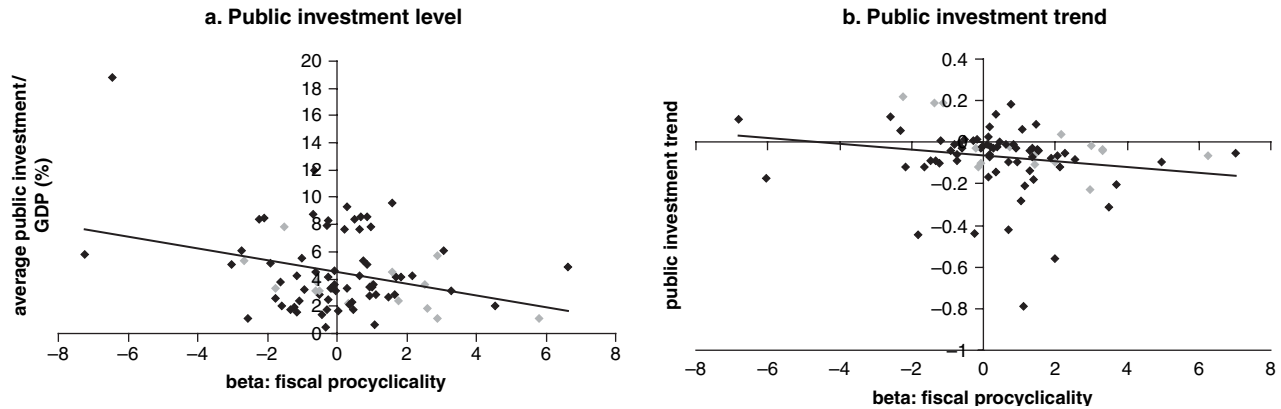


investment performance, such as the long-run average public investment/GDP ratio or the trend growth rate of public investment in real terms (figure 1.11). The correlation remains when a number of other factors are controlled for. Moreover, Perry finds evidence that, in countries with procyclical fiscal policies, public investment exhibits an asymmetric response to booms and busts: investment responds more strongly to busts than to booms. In other words, the procyclical expansion of spending in booms takes mainly the form of increases in current expenditures, while the procyclical contraction in downturns involves mostly investment cuts. Over time, public investment as a share of GDP tends to show a declining trend as a result of these contrasting dynamics.

This evidence suggests that the procyclicality of fiscal policy in Latin America and its anti-investment bias may share common roots. These roots are multiple. On the one hand, politicians with short electoral horizons may find it more profitable politically to increase the number of public employees than to engage in infrastructure investments whose productive impact would accrue to the economy under a future government. During fiscal adjustment periods in bad times, they will find it more expensive politically to dismiss public employees or reduce their salaries than to slow down the pace of infrastructure investment, postponing the initiation of new projects—or the completion of ongoing ones.

On the other hand, another key ingredient behind the anti-investment and procyclical biases of fiscal policy in Latin America is the almost-exclusive focus on short-term fiscal indicators, such as the cash deficit and gross

Figure 1.11 Fiscal Procyclicality and Public Investment Performance (levels and trends)



Source: Perry, chapter 5 of this volume.

Note: Latin American countries are denoted by black points.

debt, that characterizes fiscal adjustment programs and, more generally, conventional assessments of fiscal health. Such focus is at odds with the intertemporal dimension of fiscal solvency, which has to do with the future revenues and expenditures of the government. Yet the standard practice of financial markets and multilateral institutions is to assess the strength of public finances on the basis of what arguably are measures of liquidity, rather than solvency.

As already argued, the focus on public sector cash flows has been a significant factor in the procyclicality of fiscal policies in Latin America. Indeed, expenditures are cut during recessions in tandem with cyclical reductions in tax revenue ratios to avoid increases in fiscal deficits and debt ratios. And as long as these key indicators do not increase in booms, few will object to expansions of expenditure financed by booming revenues. Similarly, this focus on short-term targets has contributed to bias fiscal policies against investment. Adjustment programs that assess solvency on the basis of the overall cash balance and gross debt treat all public expenditures in the same way, because they all pose the same claim on today's fiscal resources. Such an approach therefore fails to take into account that public investment, if sound, increases future public revenues through tariffs, tolls, and general tax collection as a consequence of higher growth. This neglect, combined with the short political horizons, the procyclical character of fiscal policies in the region, and the downward inflexibility of current expenditures, is bound to tilt fiscal discipline against public investment. And, as noted, the phenomenon is not exclusive to Latin America. Chapter 8 by Blanchard and Giavazzi in this volume argues that the same thing has happened in European countries as a result of the cash deficit targets imposed by SGP.

How do government cash-flow targets hamper investment? After all, governments always face tough choices in the allocation of scarce fiscal resources among alternative uses. Chapter 6 by Servén in this volume argues that cash-flow targets distort the trade-offs faced by fiscal policy, both across time and between different kinds of public expenditures. Across time, binding cash balance and debt targets tend to encourage postponement of today's expenditures and advancement of tomorrow's revenues, even if their present value, which is the relevant concern for solvency, remains unchanged (or worsens as a consequence of delaying urgently needed expenditures, for example). Among expenditure types, liquidity targets pose a one-for-one trade-off at the margin, regardless of the type of expenditures involved and their impact on future cash flows, whereas solvency targets do not. Faced with these trade-offs, governments needing to strengthen public finances frequently choose adjustment paths that, by altering the time profile or the composition of expenditures, attain the prescribed liquidity targets without any significant improvement (or even a reversal) in solvency—that is, they engage in “illusory” fiscal adjustment.

Thus, other things equal, governments that face binding cash-flow targets today may devote too few resources to expenditures that yield returns tomorrow. And the effect is *additional* to that of other political economy factors that tend to encourage short-termism—for example, governments' short time horizons and political clientelism. Hence, far from correcting distortions originated in misaligned political incentives, the conventional approach to fiscal discipline arguably magnifies them.¹²

Fiscal adjustment in the form of large cuts in growth-enhancing spending may lead to a vicious circle in which low growth reduces tax collection and forces further fiscal adjustment through additional cuts in productive expenditure, which lowers growth further, and so on. In other words, attempts to strengthen solvency by cutting productive spending can actually weaken solvency—the “walking up the down escalator” mentioned earlier.¹³ This reasoning applies not only to public investment—to the extent that public capital yields financial returns that the government can capture—but also to other kinds of public expenditure with future fiscal benefits. Chapter 6 by Servén shows, in particular, that cuts in the maintenance of productive public capital—a typical casualty of fiscal austerity—affect public solvency in the same way investment cuts do, and thus they can be fiscally self-defeating, too. Maintenance spending determines the useful life of capital and hence has a “capital-creating” aspect similar to that of investment. In fact, the government's financial return on operation and maintenance (O&M) may well exceed that of new capital if the assets are not being properly maintained.

Three major elements determine the solvency impact of public investment: (a) the cost of public capital, (b) the returns on public capital in terms of additional output and growth, and (c) the government's ability to capture them—be it directly through user charges or indirectly through general tax collection. These three elements in turn reflect a host of factors. For example, the cost of capital has to do with the public sector's marginal borrowing cost (itself dependent on the government's initial debt stock and financial market perceptions), as well as the waste involved in public procurement practices. The marginal return on public capital has to do with the government's ability to select projects with high marginal productivity, as well as with the prevailing extent of underprovision of productive public services. The public sector's ability to capture the returns depends on the tax rate and on the government's capacity to recover costs through user charges.

These factors vary across countries, and even across investment projects, so there cannot be a presumption that public investment is invariably good or bad for solvency. For example, in many developing countries—including most of Latin America—tax collection rates are probably too low to permit full cost recovery of public investments in roads, say, through general tax revenues. Likewise, the capability of the government to select high-return projects varies greatly across countries. In Latin America, Chile features

thorough project evaluation procedures (Fontaine 1997), but it represents the exception rather than the rule. In contrast, Costa Rica lacks both *ex ante* and *ex post* formal evaluation procedures (Bolaños 2005).

The literature offers some direct empirical assessments that underscore this diversity. Perotti (2004) explores the extent to which public investment can be self-financing using data from five rich OECD countries—whose public capital endowments are probably among the highest in the world—and focusing on total public investment, including projects with diverse growth impact. His results show a great deal of diversity across countries: public investment appears to raise net worth in Germany and to reduce it in all other countries—most notably in the United Kingdom and Canada. More recent work by Pereira and Pinho (2006), using similar techniques but a broader sample of industrial countries, finds that public investment is roughly self-financing in Ireland, France, and Greece, and more than self-financing in Italy and Germany. Its growth effects are large in the majority of countries considered.

Because developing countries possess smaller infrastructure capital endowments than industrial countries, one might expect infrastructure capital to have a higher marginal productivity and hence come closer to being self-financing. Chapter 10 by Ferreira and Araújo in this volume finds that public infrastructure investment may be self-financing in Brazil, although in most of their experiments it takes a long time (over 10 years) for the government to collect sufficient tax revenues to recoup the investment cost. But it is important to keep in mind that even if investment does not fully “pay for itself,” fiscal correction through public investment cuts may still be an inefficient adjustment strategy if public capital is productive. This is illustrated by Calderón and Servén (2004) for the case of Latin America.

Dealing with the Anti-Investment Bias

If conventional cash deficit and debt targets unduly discourage productive public spending, what is the solution? Broadly speaking, there are two possible remedies. One is to selectively exclude such spending from fiscal targets. The other is to change the targets themselves.

The selective approach. There is nothing new about sheltering selected expenditures from the action of fiscal targets. Indeed, it has been common practice in several Latin American countries, albeit in a nontransparent way, by shifting public investment projects and their financing off-budget. This has often been done through the assumption by the government of the investment risk of private sector projects, in the form of service purchase agreements in public-private partnerships, revenue guarantees, and similar devices, which are seldom recorded in the fiscal accounts and sometimes not even disclosed.

These agreements with the private sector are often dictated more by the objective of evading fiscal targets than by that of achieving efficiency gains through private sector participation. As a result, they enhance neither efficiency nor solvency. Indeed, these arrangements have occasionally entailed large fiscal costs when the guarantees have been called by the private sector (see Irwin, Klein, Perry, and Thobani 1997).

Another version of the selective approach would give special treatment to projects undertaken by public enterprises deemed to be “commercially run” (see IMF 2005). Such commercial orientation could be seen as providing some assurance of the financial profitability of the projects in question. But this approach has serious limitations. On the one hand, the emphasis on the direct financial profitability of investment—necessary to attract the interest of commercially oriented firms—rules out projects whose future financial returns would be captured mainly through increasing tax bases and tax collection. On the other hand, identification of the public enterprises deserving special treatment because of their commercial orientation is a tricky task for which clear objective criteria are lacking. Further, in Latin America, such enterprises may not be abundant according to likely criteria,¹⁴ and this naturally detracts from the practical relevance of this approach for public investment.

More fundamentally, the selective approach may result in a public investment program artificially biased toward “allowed” categories—that is, activities associated with public enterprises that fulfill the “commercial orientation” requirement, or projects attractive to private investors—which could well be far removed from the socially (or fiscally) optimal investment program.

Using fiscal targets and rules that remove the bias against investment. A better option is to replace conventional cash deficit and debt targets with alternative fiscal targets and rules that enforce solvency but do not do it at the expense of public investment. Rather than cash deficits and gross debt, the focus of such targets should be on net worth and its changes over time. Chapter 7 by Mintz and Smart in this volume discusses how different fiscal rules interact with public investment decisions, and reviews the practical difficulties that surround the application of the rules.

One of the leading alternatives to conventional cash deficit rules is the so-called golden rule, which prevents the government from running a deficit on current accounts but allows borrowing to finance (net) investment—that is, if the borrowing is used to create assets. To put it differently, the golden rule requires that the public sector’s income statement—which excludes public investment but includes the depreciation of public capital—be in surplus. Observance of the golden rule over a long period of time would eventually result in a public debt stock no larger than the public capital stock, so that to a first approximation, the outstanding debt would be fully backed by public assets.

It has been argued that the same reasons that motivate such special treatment of public investment would apply to health or education expenditures, because they help build human capital and thereby raise future output and tax collection just like public investment does. Mintz and Smart stress that one key difference is that investment, as conventionally defined, builds productive assets primarily through capital expenditures, whereas health and education spending typically build productive assets through recurrent expenditures. In both cases, the expected returns should be taken into account when choosing the optimal levels of expenditure, but the arguments for debt financing are more persuasive in the case of capital expenditures than in that of recurrent expenditures.

The golden rule is followed in some countries, most notably the United Kingdom, where its application is accompanied by a public debt ceiling restricting overall government indebtedness to 40 percent of GDP (H.M. Treasury 2006, p. 4). In chapter 8, Blanchard and Giavazzi show that reformulating the SGP in terms of a golden rule would allow other EU member countries to devote more resources to improving their infrastructure without violating the deficit limits thus redefined.

But the golden rule has important limitations. Some are conceptual: the fact that debt is fully backed by assets under the golden rule does not suffice to ensure solvency, because there is no guarantee that the assets will yield a return high enough to cover the interest on the debt that financed their acquisition. The assets could yield low or no return (they could be “white elephants”). Even if they do yield high returns, the state might be unable to capture them. Other limitations are practical: by treating current and capital spending differently, the golden rule offers an incentive for opportunistic misclassification of unproductive expenditures as “investment,” so as to allow financing them with public debt and facilitate the achievement of the rule’s zero current balance.

An alternative to the golden rule that overcomes these limitations—at least in theory—is the permanent-balance rule, which is a direct application of the intertemporal budget constraint and therefore focuses on the public sector’s net worth rather than its cash flows (see Buiter and Grafe 2004). It is based on an extreme form of tax smoothing: it amounts to setting a constant tax-to-GDP ratio that over the long run suffices to finance the government’s present and future expenditure (net of the financial yield on public capital). Analogously to consumers’ behavior under Milton Friedman’s permanent-income hypothesis, the rule allows governments to borrow when revenue is temporarily low or when present investment opportunities are greater than future investment opportunities.

But the permanent-balance rule entails rather stringent informational requirements. In particular, to set taxes today as stated by the rule, the policy maker needs access to long-term fiscal projections specifying the trajectory of the primary surplus far into the future. Construction of such projections raises significant technical and, even more crucially, incentive-compatibility

problems—which, as we shall describe below, are discussed elsewhere in this volume.

An even more direct way to target public sector net worth would be through a net worth fiscal rule, which would set expenditure and financing decisions to achieve a desired net worth trajectory. This imposes an even more demanding informational burden than the permanent-balance rule, because it requires constructing a complete balance sheet of the public sector and estimating the net worth impact of alternative fiscal policy paths. These requirements clearly restrict the applicability of net worth rules. Nevertheless, net worth measures and targets have featured for some time among the core principles of fiscal management in New Zealand (Janssen 2001).

To confront the limitations of both the golden rule and the permanent-balance (and net worth) rule, Mintz and Smart propose in this volume (chapter 7) a compromise solution: a modified golden rule allowing debt finance of public investment in “self-liquidating” assets—that is, those that generate future user fees or tax revenues for the government to “pay for themselves” (such as in the case of utilities)—but not of investment in assets that provide services at no charge, like schools in many countries. Furthermore, government borrowing would be limited to some fraction of the value of the revenue-generating assets, just as firms do not finance all their assets with debt.

These features would result in a fiscal rule more conducive to solvency than the original golden rule, without relying as much on potentially unreliable long-term forecasts as does the permanent-balance rule, or demanding as much information as a net worth rule. At the same time, the modified rule would still distort public investment decisions, to the extent that only commercially oriented and self-liquidating investment projects would be eligible for (partial) debt finance. Investments with high social impact but low financial returns would have to be fully tax financed, possibly running counter to the objectives of tax smoothing and intergenerational equity.

Improving Investment Decisions

The risk of investment-friendly fiscal rules is that, by enlarging the room for investment, they could lead to more wasteful projects being adopted—such as roads to nowhere and loss-making power plants (see Keefer and Knack 2007; Pritchett 2000; Tanzi and Davoodi 2002). Wasteful investments could be due to faulty economic analysis or motivated by corruption and patronage. Hence, the extra degrees of freedom allowed by investment-friendly fiscal targets also raise the value of institutional and capacity enhancements that prevent public resource waste.

A key step to prevent waste is to enhance project selection procedures and capabilities, including more systematic reliance on cost-benefit analysis whenever this evaluation method is likely to be useful for decision making,

such as when charging users is difficult or undesirable (for example, most roads). More generally, strengthening fiscal and budgetary institutions, and in particular fiscal checks and balances, to correct the perverse political economy incentives that encourage wasteful spending (for example, for political patronage) is essential to reduce the scope for waste disguised as public investment (Keefer and Knack 2007).

In this regard, increasing the commercial orientation of public enterprises that get their revenues from direct user fees (for example, ports, airports, railways, and public utilities) can improve their investment decision making. Guiding public investment in such areas by purely commercial criteria can be desirable if the difference between economic and financial costs and benefits is small—or if the government can use taxes, subsidies, or regulation to close the gap between them. Commercial performance is more easily measured than economic performance, and decision makers are therefore more easily held accountable. Related to this fact, increasing competition among private and public firms in the production of services can play an important role. The biggest improvements in the provision of public services have occurred when new policies and new technology have created competition in cases in which there had been a monopoly. The most notable success story is in telecommunications, although it has proven hard to replicate this success in other sectors (see, for example, Newbery and Pollitt 1997; Steiner 2001; Zhang, Parker, and Kirkpatrick 2002).

In practice, however, commercialization of publicly owned service providers has not always worked as expected, because governments have often continued to saddle public enterprises with noncommercial goals that have hampered their financial performance, eventually prompting their sale to the private sector. Privatization of public enterprises operating in competitive markets appears to have improved efficiency and other outcomes of interest,¹⁵ but it is less clear whether the privatization of regulated monopolies has worked as expected in developing countries.¹⁶

Investment agencies. Organizational changes within the public sector could improve its investment decisions. Along these lines, in recent years, some industrial countries have established separate agencies for infrastructure spending. This approach may help improve management of large-scale public investment projects whose design and implementation require considerable specialized expertise. However, another reason for creating infrastructure agencies may simply be to evade debt and cash deficit limitations, by moving investment and related expenditures to an off-budget agency.

In chapter 8, Blanchard and Giavazzi review benefits and risks of delegating the running of public investment projects to an investment agency. There are two main benefits. The first one is enhanced transparency: while the consolidated public sector budget remains the same with or without an agency, the existence of the latter will make it easier to openly track key

project performance indicators, such as depreciation, maintenance costs, and financial returns, which tend to get lost in the overall government accounts. These magnitudes will be key factors in the bargaining between the agency and the government. The second benefit is the improved project management that should result from greater specialization—as the agency will be devoted to a single and well-defined task.

Nonetheless, there are also risks. First, the government may be tempted to use the agency to hide its liabilities. Second, faced with a government guarantee on the agency's borrowing, its managers may have little incentive to maximize the return on its projects—or, equivalently, they may have an incentive to understate the returns to extract larger subsidies from the government.

Blanchard and Giavazzi outline some simple proposals to overcome these difficulties. For example, the agency should meet the same disclosure obligations as any other public company. Also, compensation of agency managers should be linked to the financial performance of the agency's project portfolio.

Fiscal information. The preceding discussion does *not* imply that governments should stop paying attention to conventional measures of short-term fiscal performance, such as the overall balance. After all, there are good reasons why short-run fiscal aggregates should be watched closely. The overall balance (or, even better, the public sector borrowing requirement, which adds to the overall balance the public sector's net lending) offers a fairly good approximation of the government's financing needs, a primary concern for the fiscal authorities as well as financial market participants. It provides an indication of the public sector's contribution to overall aggregate demand and thus its stance from the viewpoint of short-term stabilization. The primary deficit may be preferable for this purpose, however, and even more so if estimated in structural terms, correcting for the effects of cyclical conditions.

But the overall balance and gross debt are much less adequate as solvency measures, basically because they do not consider the assets and the future incomes that the government may acquire by incurring debt today. This, of course, is hardly surprising: liquidity and solvency are fundamentally different concepts, and different indicators are needed to gauge them—as is the case in corporate finance. Forcing the overall balance to proxy for all three concerns—public sector solvency, liquidity, and macroeconomic stance—is asking too much.

Tracking solvency requires going beyond the traditional fiscal accounting focused on cash deficits and debt, and building accrual-accounting information on the value of government assets and net worth. Building such information will typically involve construction of long-term projections of cash revenues and expenditures. Chapter 9 by Irwin in this volume reviews the changes that this shift would involve and the practical difficulties it may

encounter. Table 1.1, taken from Easterly, Irwin, and Servén (2007), offers a comparative summary of how cash accounting, accrual accounting, and long-term projections stack up in terms of key criteria: (a) their ability to provide standard information on liquidity and on net worth, (b) their flexibility to accommodate uncertainty, and (c) their usefulness in preventing the fiscal authorities from overstating their long-term prospects by resorting to biased forecasts of future fiscal performance.

Cash accounting offers information on liquidity and, because of its short-term focus, limits the opportunities for forecast bias, but it provides no information on the crucial issue of government net worth and thus on future fiscal performance. Accrual accounting fills this gap using methods designed to limit bias—for example, by requiring that asset value measures be objectively verifiable by outside auditors. In exchange, however, it provides no information on key questions such as future tax revenues. It fails to distinguish between cash-generating and other assets. It is not the best approach to capture the uncertainty inherent in estimates of future fiscal magnitudes. Long-term projections can overcome these problems—for example, by introducing risk adjustment of uncertain future cash flows and highlighting how net worth changes with critical assumptions about the economic and social environment—but they also offer more leeway for forecast bias.

Given the advantages and limitations of each approach, the best strategy would be for governments to develop both accrual accounting and long-term projections to track net worth and long-run fiscal performance, while continuing to monitor short-term cash flows to track liquidity trends.

Rethinking fiscal strategies. The upshot from the preceding discussion is not that countries in Latin America (or anywhere else) should rush to raise public investment, nor that they should increase the recourse

Table 1.1 Benefits and Drawbacks of Three Sources of Fiscal Indicators

	<i>Cash accounting</i>	<i>Accrual accounting</i>	<i>Long-term projections</i>
Provides information on short-term cash flows	Yes	Yes	Yes
Provides information on net worth, given current policies	No	Partially	Yes
Incorporates uncertainty	Avoids the issue	Partially	Yes
Limits self-serving forecast bias	Yes	Yes	Not easily

Source: Easterly, Irwin, and Servén 2007.

to deficit finance (or to any other particular form of financing) of investment. Instead, the appropriate fiscal strategy depends on the particular conditions of each country, such as the level and composition of revenues and expenditures, the level of indebtedness, the endowments of public capital, the state of fiscal institutions, and a variety of other country-specific factors.

Consider, for example, the cases of Brazil and Colombia. Over the last decade and a half, Brazil underwent a sharp rise in taxation, which financed a substantial increase in the public sector's current expenditure and a halving of public investment relative to GDP, which accounted for the bulk of the fiscal adjustment of the last decade. In contrast, Colombia managed to protect public investment but now faces the need for fiscal adjustment to accommodate future unfunded pension liabilities that threaten fiscal solvency. The authorities face two main options to close the fiscal gap: (a) raising taxes or (b) cutting public investment. Obviously, the initial conditions and the strategic choices the two countries face are quite different.

Chapter 10 by Ferreira and Araújo reviews in depth the case of Brazil. They examine the performance of public investment and its consequences for growth and public solvency.¹⁷ The chapter documents the impact of the public investment contraction on infrastructure capital and aggregate output. The link between infrastructure capital and output has been addressed in a variety of empirical studies. Those using physical measures of infrastructure assets typically find significantly positive output contributions. Those that measure public capital using cumulative investment flows tend to be less conclusive, likely reflecting the fact that recorded investment flows may involve significant amounts of spending inefficiency and waste. In Brazil, however, the accumulation of physical assets tracks infrastructure investment relatively closely, and both approaches yield similarly positive and significant output effects of infrastructure capital.¹⁸

Ferreira and Araújo examine the impact of public infrastructure investment on government solvency. Their conclusion is that infrastructure investments may be self-financing in Brazil, although the result is closely dependent on the slope of the government's marginal cost of borrowing. If the latter is sufficiently steep—reflecting the presence of a substantial risk premium—the positive net worth effect of deficit-financed public investment disappears.

Rigorous assessment of the welfare and growth consequences of alternative fiscal strategies requires a full-blown dynamic macroeconomic model offering a synthetic representation of the inter- and intratemporal trade-offs faced by policy makers. For the case of Brazil, the development and simulation of such a model has been recently undertaken by Ferreira and Nascimento (2005). They explore the consequences of a reversal of the public investment decline under three alternative financing strategies: (a) a matching decline in public consumption relative to GDP, (b) an

increase in public borrowing, and (c) a tax hike. The conclusion is that all financing options yield growth and welfare gains relative to the status quo, but the largest gains are obtained when the investment expansion is financed through an offsetting public consumption decline.

These empirical exercises suggest some broader lessons. For example, a prerequisite for the fiscal rebalancing that Brazil needs is that governments have the flexibility to redeploy their expenditures. This, however, is far from being the case at present in Brazil as well as in most Latin American countries, because comprehensive entitlements and expenditure earmarking imply that discretionary expenditures often account for a small fraction of the total—for example, below 10 percent in Brazil, Colombia, and Peru. This suggests the urgent need for reform in this area.

More generally, the decline in public (and overall) infrastructure investment across Latin America suggests the need for a rethinking of fiscal strategies. In some cases, it may be best to increase public investment and accept a higher cash deficit now in exchange for higher taxes and user fees later. Yet this strategy is unlikely to be right for all countries. Those with good infrastructure and bad fiscal positions may indeed do well to cut back on public investment. Others with high taxes and debt, with Brazil perhaps as a leading example, may do best to increase public investment but finance it by cutting current expenditure. Still others, with high debt and little room for cuts in current expenditure, may have no choice but to raise taxes or forgo improvements in their infrastructure. Each case must be analyzed on its merits and—given past experience with governments' overoptimistic forecasts of growth and the performance of investments—with a degree of skepticism.

V. Summing Up

Despite the improvement in standard indicators of fiscal health, overcoming procyclical and anti-investment biases remain important challenges for Latin American fiscal policies. This volume argues that those biases reflect both technical and political economy problems in need of solution.

The main technical issue concerning procyclicality is how to increase the size and effectiveness of automatic stabilizers. Discussions of tax policy in the region have paid little attention to this question. Tax structures in Latin America and the Caribbean are plagued by other efficiency and equity problems that rightly absorb most of the attention of reform-minded authorities. Thus, the stabilization properties of the tax system are unlikely to become the focus of their efforts in the short term. However, advances in solving some of the most glaring efficiency and equity shortcomings of the region's tax structures (such as the proliferation of tax rates and exemptions, special deductions, and loopholes, as well as the extremely low yield of personal income taxes)

will, in all likelihood, improve on the weak stabilization properties of present tax structures.

With respect to automatic stabilizers on the expenditure side, a few countries have begun to develop partial unemployment insurance programs. It is unclear, however, how far this can be extended in countries with large informal sectors. Self-selecting workfare programs could be a useful complement in such circumstances, but these initiatives are limited so far. New antipoverty transfer programs, such as the conditional cash transfers instituted by Mexico, Brazil, Colombia, Peru, and a few other countries, are essentially acyclical in their present design. It might be worthwhile to consider adding some automatic cyclical adjustments into such programs. Indeed, there are good reasons to do so. Poverty tends to rise in recessions, and this, combined with the poor's lack of liquid assets or access to credit may increase the value of the contribution of child work to family incomes and lead to higher risks of school abandonment—the prevention of which is the main target of many of these programs.

But even if automatic stabilizers are improved in this way, their effects can be neutralized by highly procyclical discretionary policies, as is now the case in most countries in the region. There are two main reasons for this. First, the excessive focus of authorities, IFIs, and markets on short-term indicators of fiscal health (the gross debt and fiscal balance ratios to GDP) tends to make discretionary fiscal policy procyclical. It allows governments to adopt expansionary fiscal policies in booms—as is common practice in the region—without raising debt or deficit ratios, thanks to temporary revenue increases. And conversely, it prompts governments to cut spending in busts—thus offsetting the countercyclical effect of automatic stabilizers—to avoid the deterioration of such short-term indicators. To remove these perverse incentives, it is imperative to begin introducing cyclical adjustments to fiscal balances and debt ratios, which will allow more sensible assessments of countries' fiscal stances.

Second, and at a deeper level, procyclical behavior is ultimately driven by powerful political economy incentives to spend in booms and by asymmetric information problems in capital markets. These markets may not recognize whether an increase in expenditures in a bust represents responsible countercyclical policy or whether it represents the beginning of a permanent relaxation of fiscal policy.

To address these deeper factors, it seems desirable to embed cyclical adjustments into fiscal rules that contain budgetary pressures, restrict opportunistic behavior, and provide more transparent information to the public and to capital markets on fiscal policy trends. Chile's success with its “structural surplus” fiscal rule shows the potential usefulness of this approach. But the chances of success of a similar rule in other countries will depend on its design specifics: how credible is the process for determining output gaps and long-term commodity price projections, how cautious is

the long-run debt target, and how severe are the explicit or implicit penalties for deviating from the rule?

The excessive focus on short-term fiscal indicators, combined with perverse political economy incentives, lie at the root of the anti-investment bias of fiscal discipline. The focus on short-term cash flows neglects the differential growth and solvency effects of current and capital expenditures, while political economy considerations tend to bias fiscal adjustment against investment. It is politically more costly to reduce current expenditures by firing public employees or reducing their salaries than to cut capital expenditures, whose negative growth effects will only be observed at a later date—and possibly under a different government.

Potential solutions are more complex in this case. The menu of options ranges from excepting particular investments (for example, those with private sector participation or IFI financing) or public enterprises from standard debt or deficit targets, to adoption of rules based on different targets—such as the golden rule—and abandonment of simple standards in favor of full-fledged accrual accounting and long-term projections that would permit rigorous intertemporal fiscal analysis.

Each of these options has its own problems. The ad hoc approach of exempting specific investments and public enterprises from fiscal targets—recently advocated by the IMF—may bias the composition of investment. It tends to reduce fiscal transparency and provides incentives for creative accounting and cheating. In practice, many countries in the region have been doing precisely this through off-balance sheet financing of public investments, and the results are far from encouraging. Building capacity for full accrual accounting and measuring public net worth (as pioneered by New Zealand) and long-term fiscal projections should be a priority, but it also represents a long-term endeavor. Adopting too simple a rule, such as the golden rule, that exempts all public investments from fiscal targets, could open the door to wasteful investments and excessive indebtedness.

A plausible way forward is a modified golden rule, in the style of the United Kingdom, imposing an overall debt ceiling on top of the golden rule. Or even better, as Mintz and Smart suggest in this volume, a golden rule would allow debt finance of public investment only in assets that generate future user fees or tax revenues for the government to “pay for themselves” (like in public utilities or toll roads), but not of investment in assets that provide services at no charge, like schools or hospitals. Such a modified golden rule, however, might bias public investment composition toward self-liquidating projects and would require cyclical adjustments to prevent procyclical policy. Its practical implementation would also pose major demands on the government’s technical and institutional capacity.

Whatever the specific solution chosen, it would need to be accompanied by measures to strengthen the process and institutions for public investment evaluation, selection, and execution to avoid wasteful investments. More

broadly, countries and IFIs should stop paying almost exclusive attention to short-term fiscal indicators and bring into the picture longer-term measures of fiscal performance. To do this, they should devote increasing efforts to gradually develop full public net worth accounting, robust long-term fiscal projections, and truly intertemporal solvency analysis.

Notes

1. The structural fiscal balance represents what general government revenue (including grants) and expenditure would be if output, commodity prices (coffee, oil, copper, and so on), and interest rates were at their potential levels.

2. See Easterly and Servén (2003) for details, including a variety of examples of illusory fiscal adjustment.

3. Volatility, however, does not depend just on procyclicality, as discussed below.

4. Indeed, in the calculation of the structural budget balance in the Chilean fiscal rule, the cyclical elasticity of spending is assumed to be zero.

5. This approach solves potential endogeneity problems present in previous estimates of procyclicality. Most of the existing literature uses either a positive correlation between the growth rate of real government spending and output as a measure of procyclicality (for example, Gavin, Hausmann, Perotti, and Talvi 1996) or a positive correlation between Hodrick-Prescott filtered components of government spending and output (for instance, Agénor, McDermott, and Prasad 1999; Stein, Talvi, and Grisanti 1999; Talvi and Végh 2000). However, these positive correlations may not be indicative of procyclicality of *discretionary* policies because of endogeneity problems (see chapter 3 by Suescún in this volume). Regression-based measures of cyclicity are correct when current output growth is instrumented to control for possible endogeneity bias. Only recently has this methodology, which has been adopted in several chapters in this volume, been employed. See Galí and Perotti (2003) for industrial countries; Fatás and Mihov (2003) for a sample of industrial and developing countries; and chapter 3 by Suescún in this volume.

6. According to this indicator, the measure of the cyclical sensitivity of the budget is operationally defined as the change in the budget balance (relative to potential GDP) in response to a 1 percent cyclical deviation of GDP from trend. This semielasticity, in turn, can be expressed in terms of a weighted sum of elasticities associated with cyclically sensitive budgetary categories alone, where the weights are given by the size of the corresponding budgetary category relative to the size of the economy (GDP).

7. This indicator loosely builds on Pechman's (1973) measure of a tax system's built-in flexibility.

8. It is worth noting that this view integrates the Gavin, Hausmann, Perotti, and Talvi (1996) hypothesis that procyclicality arises from limited access to capital markets during downturns, with the "fiscal voracity effect" of Tornell and Lane (1999). The latter in turn is a formalization of Talvi and Végh's (2000) idea that procyclicality arises from the fact that governments face stronger fiscal demands during expansions.

9. Other empirical studies confirm that the accumulation of physical assets appears to track infrastructure investment fairly closely in Brazil (Ferreira and Araújo 2005), Colombia (Suescún 2005a), and Costa Rica (Bolaños 2005), although the quality of the fit varies across sectors.

10. Most of the chapters in part II were originally prepared for the regional study “Fiscal Space in Latin America,” developed at the Office of the Regional Chief Economist of the World Bank.

11. Much of the material that follows is based on Easterly, Irwin, and Servén (2007).

12. Some political economy forces may operate in the opposite direction, however. For example, politicians might show a preference for investment expenditure because it allows bigger bribes and ribbon-cutting photo opportunities (for example, Keefer and Knack 2007). Likewise, international donors often embed their aid in concessional loans for investment projects.

13. See Buiter (1990) for a general equilibrium model in which fiscal austerity in the form of public investment cuts is self-defeating.

14. In fact, few were found in pilot country studies developed by the IMF (2005).

15. Megginson and Netter (2001) survey this evidence.

16. Of course, knowing what would have happened in the absence of privatization is difficult. Harris (2003) reviews some of this evidence.

17. Suescún (2005a) develops a similar exercise applied to Colombia.

18. This is explored in detail in Ferreira and Araújo (2005).

References

- Agénor, P., J. McDermott, and E. Prasad. 1999. “Macroeconomic Fluctuations in Developing Countries: Some Stylized Facts.” IMF Working Paper No. WP/99/35, International Monetary Fund, Washington, DC.
- Auerbach, A. 2002. “Is There a Role for Discretionary Fiscal Policy?” NBER Working Paper No. 9306, National Bureau of Economic Research, Cambridge.
- Auerbach, A., and D. Feenberg. 2000. “The Significance of Federal Taxes as Automatic Stabilizers.” *Journal of Economic Perspectives* 14: 37–56.
- Bohn, H. 1998. “The Behavior of U.S. Public Debt and Deficits.” *Quarterly Journal of Economics* 113: 949–63.
- Bolaños, R. 2005. “Public Investment, Fiscal Adjustment and Fiscal Rules in Costa Rica.” Unpublished manuscript, San José.
- Budina, N., and N. Fiess. 2004. “Public Debt and Its Determinants in Market Access Countries. Results from 15 Country Case Studies.” Unpublished paper, World Bank, Washington, DC.
- Buiter, W. 1990. *Principles of Budgetary and Financial Policy*. Cambridge: MIT Press.
- Buiter, W., and C. Grafe. 2004. “Patching up the Pact: Suggestions for Enhancing Fiscal Sustainability and Macroeconomic Stability in an Enlarged European Union.” *The Economics of Transition* 12 (1): 67–102.
- Calderón, C., and L. Servén. 2004. “Trends in Infrastructure in Latin America, 1980–2001.” Policy Research Working Paper No. WPS 3401, World Bank, Washington, DC.
- De Ferranti, D., G. Perry, I. Gill, and L. Servén. 2000. *Securing Our Future in a Global Economy*. Washington DC: World Bank.
- Easterly, W., T. Irwin, and Luis Servén. 2007. “Walking Up the Down Escalator: Public Investment and Fiscal Stability.” Policy Research Working Paper No. 4158, World Bank, Washington, DC.

- Easterly, W., and Luis Servén, eds. 2003. *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*. Palo Alto: Stanford University Press and World Bank.
- Estache, A. 2005. "What Do We Know About Sub-Saharan Africa's Infrastructure and the Impact of Its 1990s Reforms?" Draft working paper, World Bank, Washington, DC.
- Fatás, A., and I. Mihov. 2003. "The Case for Restricting Fiscal Policy Discretion." *Quarterly Journal of Economics* 118: 1419–47.
- Ferreira, P., and C. Araújo. 2005. "On the Economic and Fiscal Effects of Infrastructure Investment in Brazil." Fundação Getulio Vargas Ensaio Econômico No. 613, Rio de Janeiro.
- Ferreira, P., and L. Nascimento. 2005. "Welfare and Growth Effects of Alternative Fiscal Rules for Infrastructure Investment in Brazil." Fundação Getulio Vargas Ensaio Econômico No. 604, Rio de Janeiro.
- Fiess, N. 2005. "Chile's New Fiscal Rule." In *Fiscal Sustainability in Theory and Practice: A Handbook*, ed. C. Burnside, 175–204. Washington, DC: World Bank.
- Fontaine, E. 1997. "Project Evaluation Training and Public Investment in Chile." *American Economic Review* 87 (2): 63–67.
- Galí, J., and R. Perotti. 2003. "Fiscal Policy and Monetary Integration in Europe." *Economic Policy* 37: 533–72.
- Gavin, M., R. Hausmann, R. Perotti, and E. Talvi. 1996. "Managing Fiscal Policy in Latin America and the Caribbean: Volatility, Procyclicality, and Limited Creditworthiness." OCE Working Paper No. 326, Inter-American Development Bank, Washington, DC.
- Gavin, M., and R. Perotti. 1997. "Fiscal Policy in Latin America." In *NBER Macroeconomics Annual*, eds. B. Bernanke and J. Rotemberg, 11–61. Cambridge: MIT Press.
- Harris, C. 2003. "Private Participation in Infrastructure in Developing Countries. Trends, Impacts, and Policy Lessons." Working Paper No. 5, World Bank, Washington, DC.
- H.M. Treasury. 2006. "Long-Term Public Finance Report: An Analysis of Fiscal Sustainability." The Stationery Office, London.
- IMF (International Monetary Fund). 2005. "Public Investment and Fiscal Policy." Manuscript, IMF, Washington, DC.
- Irwin, T., M. Klein, G. Perry, and M. Thobani. 1997. *Dealing with Public Risk in Private Infrastructure*. Washington, DC: World Bank.
- Janssen, J. 2001. "New Zealand's Fiscal Policy Framework: Experience and Evolution." New Zealand Treasury Working Paper 01/25, Wellington.
- Keefer, P., and S. Knack. 2007. "Boondoggles, Rent-Seeking and Political Checks and Balances: Public Investment Under Unaccountable Governments." *Review of Economics and Statistics* 89 (3): 566–72.
- Lane, P. 2003. "The Cyclical Behaviour of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87: 2661–75.
- Meggison, W., and J. Netter. 2001. "From State to Market: A Survey of Empirical Studies of Privatization." *Journal of Economic Literature* 34: 321–89.
- Newbery, D., and M. Pollitt. 1997. "The Restructuring and Privatization of Britain's Central Electricity Generating Board (CEGB) – Was It Worth It?" *Journal of Industrial Economics* 45 (3): 269–303.

- Pechman, J. 1973. "Responsiveness of the Federal Individual Income Tax to Changes in Income." *Brookings Papers on Economic Activity* 2: 385–421.
- Pereira, A., and M. Pinho. 2006. "Public Investment, Economic Performance and Budgetary Consolidation: VAR Evidence for the 12 Euro Countries." Department of Economics, Discussion Paper 40, College of William and Mary Williamsburg, VA.
- Perotti, R. 2004. "Public Investment: Another (Different) Look." IGER Working Paper No. 277, Bocconi University, Milano, Italy.
- Pritchett, L. 2000. "The Tyranny of Concepts: CUDIE (Cumulated, Depreciated, Investment Effort) Is Not Capital." *Journal of Economic Growth* 5 (4): 361–84.
- Romer, C., and D. Romer. 1994. "What Ends Recessions?" In *NBER Macroeconomics Annual*, eds. S. Fischer and J. Rotemberg, 13–57. Cambridge: MIT Press.
- Schick, A. 2002. "Budget Rules vs. Political Will." Paper prepared for the IMF/World Bank Conference on Rules-Based Fiscal Policy in Emerging Market Economies, February 14–16, Oaxaca, Mexico, Brookings Institution.
- Stein, E., E. Talvi, and A. Grisanti. 1999. "Institutional Arrangements and Fiscal Performance: The Latin American Experience." In *Fiscal Institutions and Fiscal Performance*, eds. J. Poterba and J. von Hagen. Chicago, IL: University of Chicago Press.
- Steiner, F. 2001. "Regulation, Industry Structure, and Performance in the Electric Supply Industry." OECD Economic Studies No. 32, Paris.
- Suescún, R. 2005a. "Fiscal Space for Investment in Infrastructure in Colombia." Policy Research Working Paper No. 3629, World Bank, Washington, DC.
- Suescún, R. 2005b. "Procyclical Fiscal Policy in Latin America: Where Do We Stand?" World Bank LAC Regional Study, World Bank, Washington, DC.
- Talvi, E., and C. Végh. 2000. "Tax Base Variability and Procyclical Fiscal Policy." NBER Working Paper No. 7499, National Bureau of Economic Research, Cambridge.
- Tanzi, V., and H. Davoodi. 2002. "Corruption, Public Investment, and Growth." In *Governance, Corruption, & Economic Performance*, eds. G. Abed and S. Gupta, 280–99. Washington, DC: International Monetary Fund.
- Taylor, J. B. 2000. "Reassessing Discretionary Fiscal Policy." *Journal of Economic Perspectives* 14: 21–36.
- Tornell, A., and P. Lane. 1999. "The Voracity Effect." *American Economic Review* 89: 22–46.
- Wyplosz, C. 2002. "Fiscal Policy: Institutions versus Rules." CEPR Discussion Paper No. 3238, Centre for Economic Policy Research, London.
- Zhang, Y., D. Parker, and C. Kirkpatrick. 2002. "Electricity Sector Reform in Developing Countries: An Econometric Assessment of the Effects of Privatization, Competition and Regulation." University of Manchester, Centre on Regulation and Competition, Institute for Development Policy and Management Working Paper No. 13, Manchester.

Part I

Procyclical Fiscal Policy and Volatility

Fiscal Discipline, Volatility, and Growth

Antonio Fatás and Ilian Mihov

I. Introduction: The Impact of Fiscal Policy on Macroeconomic Performance

The recent deterioration of budget balances in the United States and Europe has increased the interest of policy makers and academics in fiscal policy. The debate on the role of fiscal discipline has become particularly intense on the issue of the appropriateness of the rules contained in the Stability and Growth Pact. In the case of the United States, a surplus that vanished into one of the largest postwar deficits has added arguments to a long-standing debate on constraining fiscal policy, a debate that in the past has been focused on the proposals for a balanced budget amendment.

Among developing countries, these debates are not new either. The volatile behavior of governments and fiscal policy and the associated loss of credibility have often been responsible for their recurrent crises. Fiscal policy is in many cases associated with the failure of government to achieve real progress in economic reforms.¹

These events have sparked a debate on how to achieve fiscal discipline to maximize confidence and boost macroeconomic performance. This is a difficult debate because we lack a precise definition of what constitutes good fiscal policy management beyond some simple recipes, such as ensuring long-term sustainability and avoiding short-term procyclicality. For this debate to move forward, we need to advance our knowledge along three dimensions. First, we need to characterize empirically what

* The authors of this chapter may be contacted at antonio.fatas@insead.edu and ilian.mihov@insead.edu.

constitutes poor fiscal policy management and better understand its costs. Second, we need to understand the origins of that behavior: What are the circumstances that lead to poor management beyond bad political decisions? Do any institutional characteristics favor one type of fiscal outcomes more than others? Third, and related to the previous point, how do we avoid the recurrence of this behavior? A growing body of literature analyzes the effects of fiscal policy rules or, more generally, the effects of constraining the behavior of governments. Because the potential benefits of constraints and rules need to be weighed against the costs associated with the lack of flexibility, the debate has become quite heated. This debate is not new to macroeconomic analysis as it has been central in the rules-versus-discretion debate on monetary policy, but the implications of constraints are explored much less theoretically and empirically in the case of fiscal policy.

Indeed, many economists have a clear opposition to restrictions or limits on fiscal policy based on the argument that fiscal policy is a powerful tool to control business cycles and that tying government's hands leads to an increase in the amplitude of business cycles. This argument frequently appears in the public debate as summarized by the following quotes:

“These so-called built-in stabilizers limit declines of after-tax income and purchasing power. To keep the budget balanced every year would aggravate recessions.”

—*Petition signed in the United States by 1,100 economists in opposition to a balanced budget rule, February 1997*

“The Balanced Budget Amendment could turn slowdowns into recessions, and recessions into more severe recessions or even depressions.”

—*Robert Rubin, White House Briefing on the Balanced Budget Amendment, Federal News Service Transcript, February 24, 1995*

This chapter attempts to contribute to the above debate by presenting a broad empirical analysis of the behavior of fiscal policy in a large sample of countries. We follow the analysis of our previous work (Fatás and Mihov 2003, 2004) and structure the chapter in the following manner. After a brief review in section II of the key arguments for restrictions on fiscal policy and a short discussion of the literature, we start in section III with the characterization of fiscal policy. In section IV, we analyze how fiscal policy is affected by different institutions and the extent to which different institutional and political environments lead to different policy outcomes. Section V studies the macroeconomic impact of different fiscal policies and assesses the importance and benefits of various proposals for fiscal policy reforms. We address the debate on the relative costs and benefits of fiscal policy restrictions by seeking an answer to the following questions: Do restrictions smooth or

exacerbate the business cycle? Do they affect the elasticity of fiscal policy? In section VI, we connect our results and look at policy implications. We do so by reviewing and analyzing alternative proposals for fiscal policy reforms in both industrial and developing countries.

II. Fiscal Policy Biases and the Need for Discipline

What constitutes poor fiscal policy management and what are its costs? The issue of optimal fiscal policy is a complex one around which there are relevant microeconomic and macroeconomic arguments. We will focus on the macroeconomic aspects of fiscal policy and will ignore such issues as the composition of taxes or spending. The center of our discussion is the macroeconomic biases of fiscal policy. By biases we mean behavior that has been documented in the literature and to which we can attach macroeconomic costs. To simplify the analysis, we group these biases into three categories: (a) volatile fiscal policy, (b) procyclical fiscal policy, and (c) excessive deficits.

Volatile Fiscal Policy

Changes in fiscal policy have an effect on macroeconomic outcomes and, as a result, bring undesirable volatility to the economy. We focus on a narrow definition of discretionary fiscal policy, which identifies changes in fiscal variables that are unrelated to economic conditions. These changes cannot be attributed to the normal functioning of automatic stabilizers or to the usual response of fiscal policy to business cycle fluctuations. Examples of discretionary fiscal policy include changes in taxes or spending around election times (either for reelection purposes or because of ideological changes in the government). They can also be the result of other political events that lead to a demand for different levels of government spending or taxation (for example, the increase in government spending around the process of German unification). Furthermore, such changes can occur because, as Stokey (2002) argues, not all governments are “as benevolent and clever as a Ramsey government.” Incompetent or greedy politicians can generate substantial volatility in fiscal policy instruments.²

The empirical evidence on discretionary fiscal policy leads to two main conclusions. First, there are significant politically motivated changes in fiscal policy. By using data for a large sample of countries, recent works by Persson (2001) and Shi and Svensson (2001) present convincing evidence in favor of an opportunistic political business cycle. Second, the macroeconomic effects associated with these changes are large. A growing body of literature has documented the effects of exogenous changes on fiscal policy (Blanchard and Perotti 2002; Burnside, Eichenbaum, and Fisher 1999; Fatás and Mihov 2001; Galí, Lopez-Salido, and Valles 2002; Mountford

and Uhlig 2002; Perotti 2004). This literature presents a dynamic analysis of the effects of discretionary changes in fiscal policy on output, consumption, and investment. The results are consistent across papers, and evidence strongly suggests that these discretionary changes have a significant effect on business cycle fluctuations. In our empirical analysis, we document these effects following a complementary approach, one that we have pursued in our previous work (Fatás and Mihov 2003). Instead of looking at dynamic effects for a given country, we present cross-country evidence that countries where governments use extensively discretionary fiscal policy experience unnecessary economic volatility, which might lead to lower growth in the long run.

Procyclical Fiscal Policy

The second bias that can be harmful for the economy is procyclical fiscal policy. In response to economic fluctuations, fiscal policy should be countercyclical—that is, to smooth out fluctuations in income, budget balances should increase in booms and decrease in recessions. There is evidence, however, that in many cases fiscal policy behaves in a procyclical manner. The argument is that in good times spending increases in excess of the increase in taxes. Most Latin American economies, for example, display procyclical fiscal policy as documented in Gavin and Perotti (1997) and explained in terms of the voracity effect in Tornell and Lane (1999). The evidence for Organisation for Economic Co-operation and Development (OECD) and European economies is somewhat mixed. There is some evidence of procyclical behavior, but in most cases, policy is either acyclical or only slightly countercyclical. Lane (2003) and Wyplosz (2002) present evidence on the cyclical properties of fiscal policy for this group of countries, and the European Commission in their analysis of European Union (EU) members' budgetary plans recently stressed the importance of avoiding procyclicality in fiscal policy.

What are the macroeconomic effects of procyclical fiscal policy? There is a parallel with the effects of discretionary fiscal policy. In both cases, we have a fiscal stance that does not correspond to the cyclical position of the economy, either as a pure exogenous change in fiscal policy or as a cyclical change that runs opposite to what would be appropriate given the circumstances. As such, a procyclical fiscal stance amplifies economic fluctuations because it reduces the effectiveness of automatic stabilizers (as argued by Melitz 2000 and Perry 2002).

Excessive Deficits

The build up of public debt in most industrial countries after the mid-1970s and the difficulty of some developing countries in containing government indebtedness have led to a large literature on the bias toward large deficits

and excessive debt. This bias is a result of the fact that governments do not internalize fully the cost of additional debt. Persson and Tabellini (2001a) summarize some of the main theoretical arguments of this literature. Most of these arguments are indeed related to the “dynamic common-pool problem,” in which different groups (parties in a coalition, or spending ministers) decide on part of public spending. This decentralized process often leads to excessive spending. Another reason for a transitory accumulation of debt is the postponement of fiscal adjustment after a cyclical downturn.

What are the macroeconomic consequences of excessive deficits? There are two scenarios to be considered: the accumulation of debt leads either (a) to default or (b) to a large fiscal adjustment to return to a sustainable path. In both cases, we expect negative effects on economic volatility and the business cycle as a consequence of the crisis or the large fiscal adjustment. Therefore, even if the notion of excessive deficits is one that refers to long-term sustainability, in many cases the build up of excessive deficits leads to scenarios that can be a source of business cycle volatility.³

In summary, our approach to the analysis of these three macroeconomic biases is to focus on a macroeconomic cost that is common to all of them: their effects on the business cycle and, in particular, on economic volatility. This is a partial analysis and we are aware that we are ignoring additional macroeconomic (and even microeconomic) costs.

How large are the costs of additional output volatility? Does it simply represent an increase in uncertainty or does this translate into longer-term effects on output growth rates? Although the link between volatility and growth is easily found in the policy literature (that volatility leads to lower growth, for example, see Perry 2002), it is a source of debate in the academic literature. From a theoretical point of view, we know that in a standard neoclassical model, in which agents (firms) are risk neutral, investment should increase with uncertainty (at least in prices) because of the concavity of the profit function. There are several ways of modifying the analysis so that volatility and uncertainty become detrimental for investment and long-term growth. The first is mechanical and involves thinking about fluctuations as being asymmetric. What if more fluctuations meant deeper recessions relative to unchanged expansions? Rodrik (1991), for example, considers the case of policy reform and the uncertainty introduced by the possibility that reform is reversed. In his model, additional uncertainty not only increases risk, but also lowers the average return to investment, because it is assumed that no reform leads to larger distortions.⁴ Another possible source of asymmetry is the accumulation process. What if the negative effects of recessions on learning by doing are stronger than the positive effects of booms? This is the spirit of the model developed by Martin and Rogers (1997). In this case, a negative relationship also exists between volatility and growth.

Several papers analyze the relationship between volatility and growth from an empirical standpoint. The first group of papers looks directly

at the relationship between volatility and growth without focusing on a specific channel through which the effects take place. This group includes Ramey and Ramey (1995), Kormendi and Meguire (1985), and Martin and Rogers (2000). A second strand of the literature explores specific sources of uncertainty and how this uncertainty has affected long-term growth. For example, Alesina and others (1996) study the effects of political instability on growth, while Judson and Orphanides (1999) analyze the effects of the volatility of inflation on growth. Most of these papers present evidence in favor of the hypothesis that volatility, uncertainty, and political instability hurt growth. Finally, Fatás (2002) provides evidence that the relationship between volatility and growth could be negative and significant for poor countries, but it is negligible and not significant for high-income countries.

From these studies we conclude that, even if the theoretical link between cycles and growth is not clearly established, there is enough empirical evidence of a negative relationship between volatility and growth in a cross-section of countries. As a result, in our empirical analysis, we study whether the possible effect of bad fiscal management on the business cycle has an effect on long-term growth rates. By identifying a specific source of volatility (that is, the volatility resulting from fiscal policy changes), we are able to better isolate the link between cycles and growth.

III. Characterizing Fiscal Policy

The first step in our empirical analysis is to characterize fiscal policy outcomes in a way that allows us to compare them with biases discussed in the previous sections. Again, our focus is on the effects of these biases on macroeconomic volatility, and our characterization of fiscal policy will reflect this focus. If we had a different concern, for example, if the focus was on issues related to long-term sustainability problems, then our analysis would focus on measures of the budget deficit or, even better, on the stock of government debt and its evolution.

A key issue in our empirical strategy is how to separate reactions of fiscal policy to the cycle (presumably implemented to smooth cyclical fluctuations) from exogenous changes in policy stance. One possibility is to remove from our analysis the reactive components like taxes and transfers and to concentrate only on the autonomous components of spending. Admittedly, this is a crude method of adjustment that might throw away important information, but we will use this approach as a first pass on the key questions in our investigation. An alternative method is to construct a “cyclically adjusted” fiscal balance, as is the current practice at the International Monetary Fund (IMF) and the OECD. The adjustment is carried out by establishing a benchmark cyclical indicator (an output gap, for example) and relating the deficit to the state of the cycle relative to

that benchmark.⁵ An interesting contribution to this literature is a paper by Blanchard (1993). He argues that an indicator of discretionary fiscal policy must be relative in nature. The procedure outlined in his paper requires selecting a prespecified benchmark and estimating elasticities of the different components of the budget with respect to a representative set of macroeconomic variables. The response of the budget deficit to current economic conditions is then constructed by using the estimated elasticities. The difference between this value and the actual budget deficit is a measure of discretionary fiscal policy.

In this study, we will use only government spending for the empirical analysis of fiscal policy. There are at least two reasons for this choice. First, most of the fluctuations on the revenue side of the budget come from automatic reaction of tax revenues to the state of the economy. In general, spending reacts much less to the cycle and, as a result, some of the endogeneity problems that we discussed above are less severe. For example, in the calculation of the structural budget balance in the Chilean fiscal rule, the cyclical elasticity of spending is assumed to be zero. Second, it seems that a finding that spending behavior is affected by the presence of fiscal rules or implicit constraints on fiscal policy is as challenging and policy relevant as the finding that the budget is affected by such rules.

In our empirical characterization of fiscal policy, we use annual data for 91 countries over the period 1960–2000 to estimate the following equation for each country:

$$\Delta G_{i,t} = \alpha_i + \beta_i \Delta Y_{i,t} + \gamma_i \Delta G_{i,t-1} + \delta_i W_{i,t} + \varepsilon_{i,t} \quad (1)$$

where G is the logarithm of real government spending, and Y is the logarithm of real gross domestic product (GDP).⁶

We characterize fiscal policy outcomes by three empirical estimates: (a) the elasticity of government spending with respect to output growth β_i ; (b) the persistence of changes in government spending γ_i ; and (c) the country-specific volatility of $\varepsilon_{i,t}$. A more complete list of policy characteristics will also include (d) the level and (e) the composition of government spending, as well as characteristics of taxation and public debt. Because we analyze spending, the natural question is why we leave out (d) and (e).

The answer is that these two characteristics have been researched extensively in the political economy literature, whereas characteristics (a) through (c) have received much less attention. The motivation for choosing this vector of policy variables is as follows: Our basic hypothesis is that fiscal policy is constrained in two ways—by explicit rules, which are usually quantitative in nature, and by implicit restrictions, which are coming from the nature of political institutions. First, these rules and restrictions can affect the elasticity of spending because they may impose explicitly (for example, a limit on the budget deficit) or implicitly (by the nature of decision making and presence of veto points) how fiscal policy should

behave over the cycle. Second, any change in fiscal policy might be more or less persistent as a function of the institutional environment. For example, countries with significant policy constraints may find it difficult to implement a policy change, but once it is implemented, the change is more or less permanent. Third, these restrictions can affect the use of discretion in fiscal policy. As a quantitative estimate of discretionary policy, we use the volatility of the residual. We calculate this volatility as $\sqrt{\text{Var}_i(\varepsilon_{i,t})}$ and denote it as σ_i^e . This variable can be interpreted as the typical size of a discretionary change in fiscal policy for country i . The interpretation of $\varepsilon_{i,t}$ as a discretionary spending shock is not new. Similar frameworks have been employed by Blanchard and Perotti (2002) using quarterly U.S. data, and Alesina and others (2002) with annual OECD data. The novelty of our approach is to focus on the average *aggressiveness* of discretionary policy, which we measure by the volatility of the spending shock.

In our baseline specification of equation (1), we include the contemporaneous value of output growth and we use past values as instrumental variables (IV) to avoid possible endogeneity bias. We instrument for current output growth with two lags of GDP growth, the index of oil prices, lagged inflation, and the lagged value of government spending growth. In the baseline regressions, we estimate equation (1) for each country and include as additional controls a time trend, inflation, and inflation squared.⁷ As a result of the first-stage estimation, we preserve three variables for each country: β_i , ρ_i , and σ_i^e . Table 2.1 presents some summary statistics related to these characteristics of fiscal policy. The results are sensible: European countries like France, Austria, and Germany have stable fiscal policy, while countries like Nicaragua, Argentina, and the Democratic Republic of Congo have volatile fiscal policy. Among the group of countries with the most procyclical government spending are most of the Latin American countries, which is consistent with the findings of Gavin and Perotti (1997). In the analysis below, we will investigate how rules and implicit constraints affect these characteristics of national fiscal policies, and we will investigate how these characteristics, possibly shaped by the institutional environment in the country, affect macroeconomic performance in terms of output volatility and output growth.

IV. The Effects of Institutions and Restrictions on Fiscal Policy

Review of the Literature

A large body of literature has looked into the political and institutional determinants of different fiscal policy outcomes. Most of the papers analyze the circumstances or motivations for some of the biases described in section II. Why do we see discretionary changes in fiscal policy? Why is

Table 2.1 Summary Statistics for Volatility, Elasticity, and Persistence

		<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Volatility (log)		2.062	0.742	0.476	3.533
Countries with low volatility	France, Austria, Sweden, Japan, Switzerland, Netherlands, Belgium, Germany, United States, United Kingdom				
Countries with high volatility	Nicaragua, Burundi, Mali, Nigeria, Zambia, Gabon, Democratic Republic of Congo, Malawi, Bangladesh, Argentina				
		<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Elasticity		0.409	1.363	-4.646	3.444
Countries with most counter-cyclical elasticity	Malawi, Mali, Republic of Korea, Madagascar, Burundi, Bangladesh, Dominican Republic, Nicaragua, Sri Lanka, Canada				
Countries with most procyclical elasticity	Bolivia, Paraguay, Brazil, Uruguay, Haiti, Trinidad and Tobago, South Africa, Colombia, República Bolivariana de Venezuela, Jamaica				
		<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Persistence		0.025	0.253	-0.601	0.969
Countries with low persistence	Zimbabwe, Bolivia, Madagascar, Haiti, Arab Republic of Egypt, Sri Lanka, Uruguay, Indonesia, Mali, Zambia				
Countries with high persistence	Mauritius, Finland, Benin, Japan, Netherlands, Philippines, United States, Ireland, Republic of Korea, South Africa				

Source: Authors' calculations.

fiscal policy procyclical? Why do governments accumulate excessive deficits? The answers are found in the political economy literature in which political choices are linked to the budgetary process, the electoral process, or the political system. We summarize here some of the main arguments in relation to the first two biases. These arguments serve as motivation for the empirical analysis we present in the coming section.

We start with the volatility of discretionary changes in government spending. The argument that there is a component in fiscal policy that does not represent reaction to macroeconomic conditions raises the question of what motivates governments to use discretionary fiscal policy. To investigate the incentives for fiscal authorities to intervene in the functioning of the economy, we go to the theoretical literature that deals with the political economy of policy making.⁸ Most of the papers in this area have studied the question of how differences in political institutions and electoral rules can explain differences in the level of government spending, composition of spending, or size of the budget deficit.⁹ Some papers, however, have also studied more dynamic issues on how differences in political institutions affect the response of fiscal policy to economic shocks or to the electoral calendar (Alesina and Drazen 1991; Roubini and Sachs 1989).

To summarize the insights of this large body of literature, we have to address two questions. First, we must explain why we observe changes in fiscal policy. Second, we need to understand the characteristics of the political system or the institutional environment that justify why some governments are more likely to use discretionary fiscal policy than others.

What is the origin of discretionary changes in fiscal policy? The first candidate is the electoral cycle. Because of the large number of papers on this topic, it is hard to do justice here to this literature. We refer the reader to Alesina, Roubini, and Cohen (1997) and Drazen (2000) for a thorough analysis of the theoretical foundations and the empirical validity of the electoral cycle. In brief, there are two types of political budget cycles. The first—called opportunistic—states that to maximize its chances for reelection, the incumbent party runs larger-than-usual budget deficits in the election year. Although there are some questions about the empirical relevance of the opportunistic cycle, recent work by Persson (2001) and Shi and Svensson (2001) present convincing evidence in favor of an opportunistic political budget cycle in a large sample of countries. The presence of electoral cycles would justify the observed changes in spending and taxes around the time of elections. Furthermore, Shi and Svensson (2001) argue that a key variable that determines the size of the electoral cycle is the magnitude of the rents from remaining in power. To the extent that cross-country variation exists in the rents from political offices, we should observe variation in the volatility of discretionary fiscal policy.

Discretionary changes in fiscal policy may arise from changes in the preferences of the political party in power, as in Alesina (1987). This argument forms the basis for the second type of political budget cycle—the partisan cycle. Although the timing of these fiscal policy changes might be related to elections, the reason they occur is unrelated, in general, to the business cycle.

Finally, governments may change policy for reasons not related to the electoral cycle or to the inability to form a coalition for policy response to macroeconomic shocks. For example, concerns about redistribution or

raising inequality may prompt a policy change. Similarly, public demands for larger provision of certain public goods like security may increase total government spending. Interestingly, in all three cases—political budget cycles, nonadjustment to shocks, and idiosyncratic policy change—a key explanatory variable should be the degree of political constraints, that is, to what extent the executive branch is at liberty to change policy.

Given our description of why discretion is used in fiscal policy, we now ask the question of what institutional settings are more conducive to the use of this discretion. By answering this question, we hope to provide theoretical justification for the empirical specification used in the next sections. We start with the characteristics of the political and electoral systems. The effects of the electoral system on fiscal policy are discussed in Persson (2001) and Milesi-Ferretti, Perotti, and Rostagno (2002). Persson (2001) argues that majoritarian systems will have more volatile electoral cycles. As a result of higher individual accountability, the career concerns of the incumbent are more pronounced in such systems. This prediction is consistent with Alesina and Perotti (1994) who argue that proportional systems lead to coalitions and fiscal deadlocks that delay stabilizations. Conversely, majoritarian systems can create excessive volatility of policies because the party in office is not moderated by the fact that it has to deal with partners in a coalition.¹⁰

Electoral rules can affect the likelihood and the shape of the partisan business cycle. Which electoral systems are more vulnerable to changes in the dominant ideology of the executive branch? Although there is no clear-cut conclusion in the literature, it is worth emphasizing the key mechanisms affecting policy discretion. We might expect that majoritarian systems, in which single-party governments are more likely, will lead to more pronounced changes in ideology of the executive and therefore larger changes in fiscal policy. At the same time, if coalition governments, which are typical for proportional systems, postpone adjustment to shocks, we can expect this nonadjustment to result in a large unexplained component of fiscal policy. Therefore, according to our definition of discretionary fiscal policy, proportional electoral rules will lead to larger volatility of policy.

The type of political system (presidential versus parliamentary) can also have an effect on fiscal policy. The model of Persson (2001) predicts that presidential systems have smaller governments and display smaller electoral cycles. One can hypothesize, however, that presidential systems have fewer veto points. This implies that any significant policy change will be easier to implement in a presidential democracy than in a parliamentary one.

The second set of variables, which are not necessarily independent of the ones discussed in the previous paragraphs, are the ones that attempt to measure directly the constraints faced by governments in the process of policy implementation. Governments in which power is more concentrated and that face fewer veto points will be less constrained in the implementation of fiscal policy changes. Although these constraints might

be linked to electoral rules and the concentration of power in governments (single party versus coalitions), they are much broader than that, because they also consider how the institutional setting introduces veto points along the decision process. Plenty of empirical evidence supports the idea that constraints matter for fiscal policy. Roubini and Sachs (1989) present evidence for OECD economies that governments in which power is more concentrated create an excessive response of fiscal policy to economic shocks. Similar evidence exists for U.S. states. Poterba (1994) and Alt and Lowry (1994) show that divided state governments display a less reactive fiscal policy to changing economic conditions. In our analysis, we will use a measure of political constraints that captures the limits that governments face to implement their economic policies. This measure has been constructed by Henisz (2000) and summarizes in one variable the “number of independent veto points over policy outcomes and the distribution of preferences of the actors that inhabit them.”

Elections matter by keeping policy makers accountable and disciplined (as in Ferejohn 1986). However, this positive effect of elections might be fully offset by the temptation to use pre- or postelectoral policy manipulation to obtain reelection or to change the policy direction set by the previous government. Therefore, the net effect of elections on policy volatility is ambiguous.

So far, our discussion has focused on the first of the three fiscal policy biases—volatility of fiscal policy. But budgetary procedures and political constraints also affect cyclicity of fiscal policy (the second of the identified biases). Consider the government’s ability or inability to respond to economic shocks in a timely manner, which will have an effect on the procyclical or countercyclical nature of fiscal policy. In some countries, the nature of the budgetary institutions is such that the fiscal authority cannot adjust promptly to changes in economic conditions. This type of nonadjustment may show up as procyclical (or, at the other extreme, as excessively countercyclical) fiscal policy. Indeed, Persson (2001) and Persson and Tabellini (2001b) present evidence that the nature of the political regime and electoral rules determine the degree of reaction to macroeconomic shocks. This analysis is related to Lane (2003) who presents evidence that political constraints (measured by the same index as in Henisz 2000) affect the cyclicity of fiscal policy—that is, countries that face more political constraints display more procyclical fiscal policy.

Finally, regarding the third bias, that of excessive deficits, the theoretical literature has established a link between deficits and the degree of decentralization or the concentration of power in the budgetary institutions. This theoretical claim is corroborated by many empirical studies. There is evidence that weak budgetary procedures and dispersion of power can lead to high deficits, as documented in von Hagen and Harden (1995), Kontopoulos and Perotti (2002), Alesina and Perotti (1994), Poterba (1994), and Poterba and von Hagen (1999).

The Effects of Institutions and Political Constraints on Policy: Empirical Results

Based on the previous discussion, we will focus on four political and institutional characteristics: *Political constraints* is a continuous variable from 0 to 1 with the highest value signifying extensive veto points in the decision-making process; the electoral system is captured by a dummy variable (*majoritarian*) that takes a value of 1 for majoritarian systems, and 0 for proportional; the political system is coded with the variable *presidential*, which takes a value of 1 for presidential systems and 0 for parliamentary; and finally the effect of elections is captured by the variable *number of elections*. We will use these variables to explain policy volatility, elasticity, and persistence. In addition to the main variables of interest, we use a set of controls that have become standard in cross-sectional studies. First, we control for the average GDP per capita to capture income effects that might be correlated with institutions and affect policy volatility at the same time. Second, we use urbanization, the dependency ratio, and average population to control for key social characteristics that affect fiscal policy directly. Finally, we include openness, which can be correlated with the institutional setup in the country and policy volatility via its effect on government size (Rodrik 1998).

Volatility of discretionary fiscal policy. To establish the link between policy volatility and the institutional environment in the country, we run the following regression:

$$\text{Log}\sigma_i^e = \alpha + \lambda P_i + \delta X_i + \eta_i \quad (2)$$

The vector P includes the institutional and political variables discussed in the previous paragraph, while X represents the economic and social controls. The results from estimating equation (2) by least squares are reported in table 2.2.

The first column documents the strong and highly significant effect of political constraints on policy volatility. Interestingly, the presence of political constraints alone can explain more than 50 percent of the cross-country variation of policy volatility. The conclusion that political constraints are significant determinants of spending variability is corroborated by the regressions in columns (5) and (6), where the rest of the institutional variables and the economic controls are also included. None of the other variables are significant when we control for the economic and social characteristics of the country. Concurrently, column (6) shows that richer and more populous countries have less volatile fiscal policy.

What affects policy persistence? One of the well-recognized pitfalls of discretionary fiscal policy is the possibility that certain increases in spending are hard to reverse, that is, fiscal consolidations are politically difficult

Table 2.2 What Determines Volatility of Fiscal Policy?

$$\text{Log}\sigma_i^e = \alpha + \lambda P_i + \delta X_i + \eta_i$$

Dependent variable: volatility of government spending (σ^e)

	(1)	(2)	(3)	(4)	(5)	(6)
Political constraints	-1.869 (0.000)				-1.377 (0.000)	-0.727 (0.039)
Majoritarian		-0.116 (0.569)			-0.004 (0.969)	0.056 (0.562)
Presidential			0.942 (0.000)		0.415 (0.030)	0.107 (0.527)
Number of elections				-1.065 (0.135)	-1.219 (0.049)	-0.317 (0.533)
Population						-0.138 (0.008)
Urbanization						0.007 (0.046)
Dependency ratio						0.398 (0.544)
Openness						-0.202 (0.230)
GDP per capita						-0.365 (0.001)
Adjusted R^2	0.538	-0.006	0.349	0.012	0.55	0.651
Number of observations	90	88	90	90	88	88

Source: Authors' calculations.

Note: The p -values in the parentheses are based on heteroscedasticity-robust standard errors. All regressions include an intercept.

Table 2.3 What Determines the Persistence of Government Spending?

$$\gamma_i = \alpha + \lambda P_i + \delta X_i + \eta_i$$

Dependent variable: persistence of government spending (γ)

	(1)	(2)	(3)	(4)	(5)	(6)
Political constraints	0.335 (0.000)				0.333 (0.002)	0.172 (0.229)
Majoritarian		0.119 (0.053)			0.106 (0.085)	0.097 (0.104)
Presidential			-0.141 (0.006)		0.008 (0.911)	0.085 (0.409)
Number of elections				0.167 (0.484)	0.164 (0.435)	-0.06 (0.836)
Population						0.015 (0.535)
Urbanization						-0.002 (0.244)
Dependency ratio						0.123 (0.739)
Openness						0.035 (0.628)
GDP per capita						0.129 (0.060)
Adjusted R^2	0.14	0.037	0.058	-0.006	0.153	0.156
Number of observations	90	88	90	90	88	88

Source: Authors' calculations.

Note: The p -values in the parentheses are based on heteroscedasticity-robust standard errors. All regressions include an intercept.

because they require cuts in spending that are not easy to implement. Fiscal restrictions might help in this case by forcing policy makers to retrench an earlier spending increase.

The connection between policy persistence and policy institutions is determined by the following regression:

$$\gamma_i = \alpha + \lambda P_i + \delta X_i + \eta_i \quad (3)$$

The persistence parameters are based on equation (1), and they are estimated for each country. The results are reported in table 2.3, which is organized like table 2.2—we use the same controls and the same set of variables. A country with persistent government spending will have higher . The univariate regressions in columns (1) to (4) show that there are some links between policy persistence and the institutional environment—constraints make policy more persistent, while presidential regimes with proportional representation have less persistent spending changes. Unlike the volatility regressions, however, in the case of persistence, controlling for the characteristics of the country destroys the significance of the link between institutions and persistence. Furthermore, the fit of the regression is rather poor with the highest R^2 around 15 percent.

What affects policy elasticity? So far, our analysis has focused on the component of fiscal policy that is orthogonal to the business cycle and on the persistence of policy changes. Discretionary fiscal policy, in our view, is a source of business cycles, and restrictions on fiscal policy can help reduce its costs. People on the other side of the debate oppose restrictions on fiscal policy by arguing that these restrictions have a negative effect on the economy through the limits they impose on countercyclical fiscal policy. A standard measure of cyclical fiscal policy is the elasticity of government spending with respect to output growth as it is estimated in equation (1). We now take on this claim and look at whether these elasticities are affected by the same institutions that we have found have an effect on discretionary fiscal policy.¹¹

The connection between policy elasticity and budget rules are determined by the following regression:

$$\beta_i = \alpha + \lambda P_i + \delta X_i + \eta_i \quad (4)$$

The elasticities are based on equation (1) and they are estimated for each country.

Table 2.4 reports the results and it is organized in a similar way to tables 2.2 and 2.3—we use again the same controls and the same set of institutions. To facilitate the interpretation of the results in table 2.4, we emphasize that a higher β corresponds to more procyclical fiscal policy. It is clear from the table that none of the institutional variables that we

Table 2.4 Do Institutions Affect Policy Responsiveness?

$$\beta_i = \alpha + \lambda P_i + \delta X_i + \eta_i$$

Dependent variable: elasticity of government spending (β)

	(1)	(2)	(3)	(4)	(5)	(6)
Political constraints	0.007 (0.987)				0.096 (0.896)	-1.398 (0.114)
Majoritarian		-0.328 (0.286)			-0.342 (0.267)	-0.307 (0.283)
Presidential			0.018 (0.947)		0.02 (0.968)	0.015 (0.976)
Number of elections				-0.157 (0.891)	-0.371 (0.790)	-2.738 (0.095)
Population						-0.06 (0.608)
Urbanization						0.02 (0.054)
Dependency ratio						5.457 (0.004)
Openness						-0.319 (0.335)
GDP per capita						0.905 (0.017)
Adjusted R^2	-0.011	0.001	-0.011	-0.011	-0.034	0.113
Number of observations	90	88	90	90	88	88

Source: Authors' calculations.

Note: The p -values in the parentheses are based on heteroscedasticity-robust standard errors. All regressions include an intercept.

consider can explain the cross-country variation in elasticities. In other words, the presence of constraints that reduce the use of discretionary fiscal policy does not have a significant effect on the cyclical properties of spending. This empirical fact contradicts the claim made by those who oppose constraints on fiscal policy, because their main argument is based on the assumption that these restrictions will exacerbate business cycle volatility by reducing policy elasticity.

V. The Macroeconomic Consequences of Different Fiscal Policy Institutions

After establishing the link between institutions and policy characteristics in the previous section, we now ask the following question: How do these policy characteristics—volatility, persistence, and elasticity—affect business cycle fluctuations and economic growth? The main goal of this section is to establish how macroeconomic stability (measured as the standard deviation of output growth, σ_i^y) is affected by policy. To document the link between economic stability and the three characteristics of fiscal policy, we run the following regression.

$$\text{Log}\sigma_i^y = \alpha + \lambda_v \text{Log}(\sigma_i^\varepsilon) + \lambda_e \beta_i + \lambda_p \gamma_i + \delta X_i + \eta_i \quad (5)$$

In addition to the three variables of interest (volatility, persistence, and elasticity), we include as controls government size, openness, and average GDP per capita. One problem with this regression is the possibility that a reverse causation runs from output volatility to fiscal policy. To deal with this problem, we will use IV to estimate equation (5). The list of instruments includes the four institutional characteristics (political constraints, presidential, majoritarian, and number of elections), as well as variables capturing social characteristics of each country (population, dependency ratio, urbanization).

In table 2.5, columns (1) to (3) present univariate ordinary least squares (OLS) regressions to describe the correlation between output volatility and our three policy characteristics. There is a clear positive correlation between volatility of discretionary fiscal policy and output volatility. This correlation survives in various iterations of the specification and in different estimation methods. Columns (4) through (7) present IV estimations, which deal with potential reverse causation from output to policy volatility. In all cases, the link between policy and output volatility is highly significant.

Persistence of fiscal policy is significantly linked to output volatility in the univariate regression, but once GDP per capita is included as a control, this significance disappears. Income per capita is highly correlated to persistence of fiscal policy in the data. One possible explanation is that policy reversals are much more common in poor countries than in rich countries. In any case, this fact merits further investigation, which is beyond the

Table 2.5 Output Volatility and Fiscal Policy Characteristics

$$\text{Log}\sigma_i^y = \alpha + \lambda_v \text{Log}(\sigma_i^\varepsilon) + \lambda_e \beta_i + \lambda_p \gamma_i + \delta X_i + \eta_i$$

	OLS			IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Volatility of fiscal policy (σ^ε)	0.477 (0.000)			0.798 (0.000)			0.749 (0.010)
Persistence of fiscal policy (γ)		-0.608 (0.000)			-1.694 (0.141)		-0.26 (0.718)
Elasticity of fiscal policy (β)			0.008 (0.823)			0.217 (0.039)	0.002 (0.985)
Government size				0.176 (0.697)	-0.953 (0.190)	-0.388 (0.503)	0.09 (0.842)
GDP per capita				0.123 (0.226)	-0.013 (0.931)	-0.265 (0.001)	0.13 (0.457)
Openness				0.098 (0.552)	0.425 (0.039)	0.271 (0.108)	0.122 (0.431)
Adjusted R^2	0.482	0.082	-0.011				
Test of OID (p -value)				(0.387)	(0.281)	(0.122)	(0.164)
Number of countries	91	91	91	88	88	88	88

Source: Authors' calculations.

Note: The p -values in the parentheses are based on heteroscedasticity-robust standard errors. In the IV estimation, the OID test reports the p -value from a test that the instruments are uncorrelated with the residuals. All regressions include an intercept. IV = instrumental variables; OLS = ordinary least squares.

scope of the current chapter. The elasticity of fiscal policy is not related in any way to output volatility. Again, this finding questions the received wisdom that fiscal policy restrictions and in particular political constraints will have a significant negative impact on the volatility of business cycles.

The main conclusion from table 2.5 is that aggressive use of discretionary fiscal policy creates macroeconomic volatility. From section IV, we know that the aggressiveness of fiscal policy can be mitigated by institutional

arrangements that create constraints on the policy makers. The next question is to determine how detrimental this macroeconomic volatility is for long-term economic growth. Previous studies have found at best mixed results between output volatility and growth. Our conjecture is that a two-way causation exists between output volatility and growth. Higher economic growth often is related to more volatility because high growth comes from adoption of risky technologies and implementation of risky investment projects. Macroeconomic volatility can be potentially damaging for investment and growth, however, because it increases uncertainty. In table 2.6, we start with the link between output volatility and growth.

There is a slightly insignificant link between output volatility and growth, as is indicated by the first column. This negative correlation is driven by a couple of outliers, and an estimation performed using quantile regressions does not find any significant correlation. Once we control for standard determinants of growth, however, a clear negative correlation between output volatility and growth appears, as column (2) indicates. The possibility for reverse causation from growth to volatility prompts us to use IV estimations in columns (3) and (4). Initially, we omit the investment ratio from the regression, and we find a statistically significant negative link between volatility and growth. Consistent with our argument that OLS is biased because of reverse causation, we now find a fourfold increase in the absolute value of the coefficient on output volatility.

Why does volatility affect growth? As we have mentioned, our conjecture is that it works predominantly through investment. To check this hypothesis, in column (4) we include the investment ratio as a regressor. There is a sharp fall in the value of the coefficient in absolute value from -3.50 to -2.27 . This implies that indeed part of the predictive power of output volatility is achieved through investment. However, that output volatility is still highly significant in statistical and economic senses. This implies that there are other channels through which volatility affects growth, or that the link among investment, volatility, and growth is nonlinear.

To investigate the relationship between investment and output volatility, we graph the raw data in figure 2.1. As with growth, the link between investment and volatility can be both positive and negative. And indeed figure 2.1 documents that there is no clear pattern. The univariate regression of investment on volatility produces an R^2 of 0.006 and the coefficient is highly insignificant. Next, we want to look only at the volatility of output generated by policy volatility. To this end, we regress output volatility on policy volatility, and we construct the predicted value of output volatility. Then in figure 2.2 we plot this predicted value of output volatility against investment (in other words, we report in graphic form the IV estimations of investment on output volatility using policy volatility as an instrument). The resulting plot is quite convincing—countries with higher policy-generated volatility have lower investment rates. Our interpretation of this finding is that aggressive discretionary policy leads to more volatility of output, which in turn lowers investment rates and leads ultimately to slower economic growth.

Table 2.6 Growth and Fiscal Policy

$$\Delta y_i = \alpha + \lambda \text{Log}(\sigma_i^\gamma) + \beta X_i + \mu_i$$

	OLS		IV	
	(1)	(2)	(3)	(4)
Volatility (σ^γ)	-0.984 (0.051)	-0.875 (0.025)	-3.504 (0.006)	-2.267 (0.001)
GDP per capita		-0.685 (0.047)	-0.989 (0.018)	-0.847 (0.014)
Government size		0.022 (0.971)	0.153 (0.894)	0.048 (0.945)
Primary education		0.016 (0.051)	0.013 (0.382)	0.008 (0.434)
Secondary education		0.024 (0.125)	0.015 (0.556)	0.011 (0.516)
Openness		-0.145 (0.686)	0.852 (0.366)	0.039 (0.934)
Investment ratio		0.226 (0.000)		0.233 (0.000)
Adjusted R^2	0.054	0.544		
Number of observations	74	74	74	74

Source: Authors' calculations.

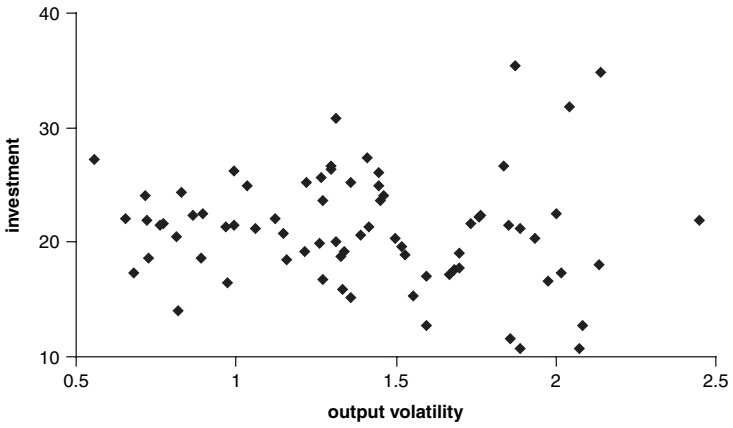
Note: The p -values in the parentheses are based on heteroscedasticity-robust standard errors. All regressions include an intercept. IV = instrumental variables; OLS = ordinary least squares.

VI. Policy Implications: How to Restrict Fiscal Policy

The empirical results that we have presented in sections IV and V can be summarized as follows:

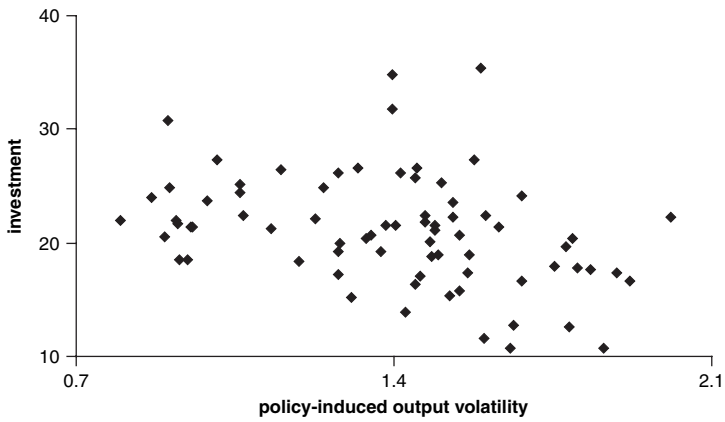
- One, there is evidence of a significant exogenous (or discretionary) component in fiscal policy and, confirming previous results in the literature, there is also evidence that fiscal policy is procyclical (or only slightly countercyclical) for a good number of countries in our sample.

Figure 2.1 Volatility and Investment



Source: Authors' calculations.

Figure 2.2 Policy-Induced Volatility and Investment



Source: Authors' calculations.

- Two, poor fiscal management (a combination of excessive use of discretionary fiscal policy and procyclical fiscal policy) adds to the volatility of the business cycle and hurts long-term growth. In other words, the macroeconomic costs are large.
- Three, the behavior of fiscal policy depends on the institutional settings under which policy is implemented. We find that constraints on policy makers lead to less frequent use of discretionary fiscal policy and, therefore, to lower volatility of output and higher growth.

From a policy perspective, these results support the idea that restricting fiscal policy can improve macroeconomic performance. While the empirical support might be strong, the recent experience of Economic and Monetary Union (EMU) countries or the failure of the fiscal responsibility laws in Peru and Argentina illustrate the difficulties in establishing constraints that are effective and credible. Why are constraints so difficult to implement? Is there a way to design fiscal policy restrictions in a way that they survive economic and political tensions? What have we learned from the EMU experience? In this section, we address these issues as we translate our empirical results into a framework for implementation of restrictions on fiscal policy. Although we will use the recent European experience as an illustration of some of the arguments, we believe that our conclusions are broader and do not apply exclusively to industrial economies.

What Do We Mean by Restrictions?

The discussion of restrictions requires that we first clarify the broad categories in which constraints can be grouped. In our view, there are three categories: (a) explicit budgetary rules like the balanced budget requirements or spending limits in several U.S. states, EMU countries, or developing countries such as Chile; (b) the structure of political and electoral institutions that establishes checks and balances across policy makers; and (c) the ideological alignment across policy-making institutions, which can be determined by voters via split-ticket voting.

In our data set, and because of the presence of few explicit limits on fiscal policy, we have characterized constraints as implicit constraints embedded in the political process. Some of the most recent debates about fiscal policy constraints are about explicit (not implicit) constraints. In parallel work (Fatás and Mihov 2004), we have also looked at explicit rules in the context of the U.S. states. The variation of strict rules among U.S. states makes them an ideal sample to test whether explicit restrictions on fiscal policy increase or decrease the amplitude of the business cycle. Our results confirm the hypothesis that restrictions (whether implicit or explicit) induce less volatility in fiscal policy and improve macroeconomic performance. We will return to the issue of explicit versus implicit constraints at the end of this section.

Two Lessons from the Recent EMU Experience

There are two key lessons from the EMU experience that highlight the difficulties in implementing certain types of fiscal policy restrictions: (a) the need to establish transparent goals and (b) how to keep a balance between discipline and the necessary flexibility to deal with automatic stabilizers.

The need to establish transparent goals. What are the goals in setting up constraints for fiscal policy? Following our previous analysis, we can think of fiscal rules that address some or all of the biases that we have identified. Is the main goal to ensure sustainability? Or is it to avoid procyclicality and additional volatility? In most of the recent cases in which we have seen an adoption of a fiscal rule, this adoption tends to originate from the need to ensure credibility from a longer-term perspective and to limit the possibility of default or, at the least, from the necessity of large fiscal adjustments in response to exploding debt. For example, the Maastricht Treaty and the Stability and Growth Pact, which set strict numerical limits on budget deficits and debt for EMU member countries, justify these limits with the notion that to safeguard the value and the credibility of the single currency and the European Central Bank monetary policy must be protected from pressures coming from unsustainable debt paths. The notion of procyclicality or even excess volatility of fiscal policy seems absent from both the treaty and the pact.

The importance of defining the goal and making this goal transparent can be illustrated by following the evolution of the EMU constraints. The failure of the deficit and debt rules in European countries has led to a debate with two different interpretations on what went wrong and, as a consequence, with two sets of proposals for reform—one from those who stress that the original goal of these restrictions was to ensure sustainability and another from those who want to extend the goals to a broader concept of good fiscal management. Those who focus on sustainability would like to focus on limits that refer to the debt burden rather than to the annual deficit. Debt rules would allow stronger fiscal expansions when sustainability is not threatened. Pisani-Ferry (2002), for example, suggests that the deficit criterion might be loosened for countries with low debt ratios. This proposal implies making the current rules looser under the assumption that the current restrictions are too rigid given their goals.

A different reading of the experience of the last years starts by highlighting the difficulties of establishing transparent medium-term goals in an effective manner. Although the notion of overseeing debt-to-GDP ratios is sound from a theoretical point of view, countries may avoid making the necessary efforts during good times and will be under enormous political pressure during bad times to sacrifice long-term sustainability in favor of short-term stability. One lesson from these years shows that limits were unable to guarantee good fiscal policy in good times, which left countries with little room to absorb the effects of a recessionary environment during the years 2001 to 2003.

In other words, fiscal policy was procyclical (or not countercyclical enough) in the boom years of 1999 and 2000. The European Commission, aware of this problem, tried to move the system toward stricter vigilance of budgetary plans through the implementation of yearly discussions around the Broad Economic Policy Guidelines, for which the issue of avoiding procyclical fiscal policy was clearly present. Also, there was a strong emphasis on the notion that countries should move toward balanced budgets (or even a surplus) on a yearly basis, a system that resembles the fiscal rule adopted by Chile but without an explicit definition of “close to balance” or “surplus budgets.” What we see in the evolution of the EMU fiscal framework is a move away from a simple rule to a more judgmental and short-term analysis of fiscal positions motivated by the (implicit) inclusion of additional goals.

The lesson is clear: there is a need to establish a transparent and explicit set of goals. If the goal is narrow, such as enforcing long-term sustainability, limits on debt or deficits might be appropriate from a theoretical point of view, but its implementation will be difficult because of the inherent difficulty in monitoring on a short-term basis a commitment that is relevant only in the long run. If monitoring is in place only when debt levels are considered to be too high, the necessary adjustment might be too difficult to be accepted politically. The alternative, stricter monitoring in the sense that budgetary plans are subject to criticisms and punishments even when debt levels are not high, is not viable unless the goal is broadened and includes other biases such as procyclical policy. But as the goal is broadened, numerical rules become too simple, because they are unable to take care of circumstances that cannot be foreseen when the rule is established. This is our next point.

The trade-off between flexibility and discipline. Even if the benefits of discipline are accepted, the lack of flexibility implied by strict fiscal rules cannot be ignored. It is fair to say that most of the opponents of the adoption of fiscal rules base their arguments on the assumption that restricting fiscal policy increases output volatility.¹² Our empirical results do not support this view. Even if there is evidence that in some cases the adoption of strict balanced budget rules can bias fiscal policy toward being more procyclical (this is the case of U.S. states as documented in Fatás and Mihov 2004), this cost is outweighed by the decrease in the volatility of discretionary fiscal policy and, as a result, business cycles are smoothed in the presence of constraints (and not exacerbated as the opponents of these rules would argue). But even if this is the case, there is still room for debate on what type of rules or restrictions provide discipline at a minimum cost or, in other words, which rules control discretion without having a significant impact on the functioning of automatic stabilizers.

Several issues are central to this debate. The first and probably most important one is to define targets for budgets that are cyclically adjusted. Although this might be an obvious point, as a counterexample, it was not considered in the original Maastricht Treaty. Limits to budget deficits were set without considering the cyclical position of the economies. Over time,

and given the increasing sense of failure of the system, the European Commission introduced flexibility in the way these balances were computed and moved toward a systematic application of the concept of structural balances in the EMU. This is the approach of the Chilean system that targets a 1 percent structural surplus (as a ratio to GDP) and therefore allows for balances to fluctuate during the cycle. Although this is a fundamental issue, it is very much of a technical nature—that is, how to measure the fiscal stance. We refer to some of the references discussed in section III for a detailed discussion of this issue.

There is a second related issue—that is, what to include in the calculations of the budget. Should all expenditures and revenues be included? One possible approach is to exclude from the budget investment expenditures with the logic that their benefits spread over several generations and that they are needed to build the productive capacity in coming years. This is the approach called the golden rule, which is embedded in the German constitution and in the current fiscal framework followed by the U.K. government. A variant of this has recently proposed by Blanchard and Giavazzi (2002) to replace the Stability and Growth Pact.¹³

If we now summarize the experience of EMU countries regarding the two issues described above, we see that the original approach was one of having a simple rule in which judgment was absent to provide a transparent and credible fiscal framework. This fiscal framework was intended to ensure the debt sustainability of EMU member countries. The experience shows that creates an unavoidable tension between strict rules and flexibility. It becomes difficult to design rules that are simple and transparent but at the same time allow enough flexibility to let automatic stabilizers do their job. Controlling for the business cycle, deciding what is included in the calculations of the budget, and considering exceptional circumstances can be done properly only with a rule that is complex enough to take into account any foreseeable future event. Given that this is unlikely to be the case, the rule will be under pressure to be rewritten too frequently. For example, the original rules of the Stability and Growth Pact in the EMU were simple, but they faced a difficult test when these economies suffered low growth rates combined with a desire to lower tax rates and start public sector reforms. The increasing number of qualifications added to the 3 percent and 60 percent limits, and the allowance of exceptional cases contradicts the very idea of a simple fiscal rule and enables political bargaining. Ultimately, the system becomes more flexible, but it does so at the cost of failing to restrict fiscal policy.

Explicit versus Implicit Constraints

The alternative to fixed rules (explicit constraints) is to allow flexibility within an institutional environment that can also provide the desired discipline. Will this be enough? Can discipline be achieved without strict

rules? Our empirical results suggest that, yes, this is possible. Again, in our data set, we looked at implicit institutional and political constraints and determined that these types of constraints are indeed effective to restrict fiscal policy and improve macroeconomic performance. We have plenty of additional evidence that institutions matter for fiscal policy. We have described some of these studies before. Political and electoral systems, budgeting procedures, and political constraints faced by governments have been shown to have significant effects on different dimensions of fiscal policy. The empirical studies by von Hagen (1992), von Hagen and Harden (1995), Alesina and Perotti (1996), von Hagen, Hallett, and Strauch (2002), and Fatás and Mihov (2003) show that the design of budget processes (for example, relative power assigned to the finance minister and the importance given to budgetary targets) and different degrees of political constraints (for example, the number of veto points in the budgetary decisions) have a significant impact on fiscal outcomes, such as the budget deficit, the success of fiscal consolidations, and the volatility of discretionary changes in the budget. So thinking about institutions is natural when it comes to fiscal policy. And, as such, we are seeing an increasing number of proposals that take this idea seriously and even a small number of countries that have started applying it. For example, von Hagen and Harden (1995); Eichengreen, Hausman, and von Hagen (1999); and, more recently, Wyplosz (2002) or Fatás and others (2003) all propose the creation of independent committees or boards that ensure that fiscal policy is consistent with the goals set by the political power.¹⁴

Does an institutional solution to the credibility problem of fiscal policy sound unrealistic? The experience of monetary policy in the past decades shows that this is not the case. The analysis of monetary policy in the 1970s and 1980s showed that discretion in monetary policy leads to an inflation bias and to unnecessary volatility. The outcome of this analysis was not a rigid rule (such as a constant money growth target), the outcome was an institutional reform that delegates monetary policy to an independent central bank that has no reason to produce any bias in the conduct of monetary policy. The experience of the last 20 years, in many countries, industrial and developing, shows that such an institutional arrangement can deliver discipline without eliminating flexibility.

Is it possible to implement an institutional solution? Once again, we refer to our empirical results in which institutional and political constraints were effective in providing the necessary fiscal policy discipline. But this was not done by design, so the question remains whether a properly designed institutional framework to ensure fiscal policy discipline could be implemented. However, many examples of institutional settings resemble our proposal. At the supranational level, we can think of the IMF or the European Commission playing a strong monitoring role when it comes to national fiscal policy of the countries they oversee. Their

actions might not be as effective as one would like, but their monitoring is likely having an effect on fiscal policy outcomes.¹⁵

At the national level, there are also examples of committees or boards that oversee and monitor budgetary plans. Such committees or councils operate in Belgium, Austria, and Sweden. In other cases, the institutional arrangement comes from budgetary processes in which the finance minister has the power to set a ceiling for the annual deficit at the outset of the process (see von Hagen, Hallett, and Strauch 2002).

These examples illustrate how institutions designed to enforce fiscal discipline are feasible and politically viable. These examples may not be the final answer to all the issues discussed in this chapter, but they are experiments from which lessons will be learned. These lessons will help us understand better the relationship between institutions and fiscal discipline and move forward in our challenge to design an institutional framework for fiscal policy that can provide the necessary discipline while keeping enough flexibility. This flexibility is needed to reduce the economic costs of restrictions and, more important, to make the system politically and economically viable.

Notes

1. See, for example, a recent speech by Anne Krueger on reforms in developing countries (“Meant Well, Tried Little, Failed Much: Policy Reforms in Emerging Market Economies,” New York, March 23, 2004). Her discussion on the recent crises of Argentina and Turkey highlight the role of fiscal policy in their recent crises. Also, the *World Development Report 2000/01* (World Bank 2000) provides evidence that fiscal policy is a significant driver of business cycles for Latin America.

2. In section IV, we provide a more detailed discussion of the theoretical literature on political budget cycles.

3. For a longer and more general discussion of the welfare costs of excessive deficits see Fatás and others (2003).

4. Another example is the analysis of political uncertainty. Political uncertainty is usually measured by variables such as the number of revolutions and military coups or the number of political assassinations. An increase in both of these variables does not simply represent more volatility around a constant mean, but rather indicates more volatility and a lower mean.

5. See Alesina and Perotti (1996) for a discussion and criticism of these measures.

6. The choice of our sample is dictated by data availability. We started the sample with 109 countries listed in appendix C in Jones (2002). We had to drop 18 countries from our sample either because fiscal data were not available or because the time span was too short for a meaningful estimation of equation (1). We kept 91 countries for which we had at least 25 years of data. The list of countries and data sources are described in a data appendix available from the authors. We add to this regression various controls for government spending as well as deterministic components like time trends W .

7. We include inflation to ensure that our results are not driven by high-inflation episodes in which the co-movement between real government spending and output might be due to monetary instability rather than fiscal policy. Inflation squared is

included to control for a possible nonlinear relationship between inflation and spending. See Fatás and Mihov (2003) for further discussion of this specification.

8. The recent work of Persson (2001) summarizes some of the arguments developed in this literature to justify why political institutions matter for economic policy.

9. See, for example, Roubini and Sachs (1989), Alesina and Perotti (1994), or Milesi-Ferretti, Perotti, and Rostagno (2002).

10. Milesi-Ferretti, Perotti, and Rostagno (2002) predict that proportional governments will react more, using fiscal policy, to economic shocks. It is not clear how to compare this prediction with the previous ones. First, their model is not dynamic and therefore cannot fully account for changes in fiscal policy. Second, changes in fiscal policy in response to business cycles is not what we are after. We admit, however, that the effects that we are trying to capture could be similar to those caused by a government that sometimes overreacts to business cycle fluctuations by changing fiscal policy too much.

11. A similar analysis has been done by Lane (2003) in a smaller sample (OECD countries). Cyclicity of government spending varies greatly across countries and it is shown that political constraints tend to make fiscal policy more procyclical for certain components of spending.

12. See Levinson (1998) for the case of U.S. states or many of the recent criticisms of the Stability and Growth Pact in the EMU.

13. An alternative approach would be the permanent-balance rule proposed by Buitert and Grafe (2002), which emphasizes differences across countries in terms of initial conditions and tries to move away from the arbitrariness of any numerical target.

14. Just as a clarification, from a procedural point of view, and unlike in the case of monetary policy, these independent committees do not have an instrument (such as the interest rate) to achieve a certain goal (such as an inflation target in the case of monetary policy). Instead, they use judgment to assess whether the budgetary goals of the governments are consistent with a predefined set of goals (that is, a mandate) and have an enforcement mechanism to ensure that the actions of the government correspond to these goals.

15. For example, in the case of Europe, even if several countries have breached the 3 percent deficit limits, in the absence of the yearly discussions on their budgetary plans with the European Commission, it is likely that their deficits would be even higher than they are now.

References

- Alesina, Alberto. 1987. "Macroeconomic Policy in a Two-Party System as a Repeated Game." *Quarterly Journal of Economics* CII: 651–78.
- Alesina, Alberto, Silvia Ardagna, Roberto Perotti, and Fabio Schiantarelli. 2002. "Fiscal Policy, Profits and Investment." *American Economic Review* 92: 571–89.
- Alesina, Alberto, and Allan Drazen. 1991. "Why Are Stabilizations Delayed?" *American Economic Review* LXXXII: 1170–88.
- Alesina, Alberto, Sule Ozler, Nouriel Roubini, and Phillip Swagel. 1996. "Political Instability and Economic Growth." *Journal of Economic Growth* 1: 189–211.
- Alesina, Alberto, and Roberto Perotti. 1994. "The Political Economy of Budget Deficits." NBER Working Paper No. 4637, National Bureau of Economic Research, Cambridge.
- . 1996. "Fiscal Expansions and Adjustment in OECD Economies." *Economic Policy* XXI: 205–40.

- Alesina, Alberto, Nouriel Roubini, and Gerald Cohen. 1997. *Political Cycles and the Macroeconomy*. Cambridge, MA: MIT Press.
- Alt, James, and Robert Lowry. 1994. "Divided Governments, Fiscal Institutions and Budget Deficits: Evidence for the States." *American Political Science Review* 88: 811–828.
- Blanchard, Olivier. 1993. "Suggestions for a New Set of Fiscal Indicators." In *The New Political Economy of Government Debt*, eds. H.A.A. Verbon and F.A.A.M. van Winden. Amsterdam, The Netherlands: Elsevier Science Publishers.
- Blanchard, Olivier, and Francesco Giavazzi. 2002. "Reforms That Can be Done: Improving the SGP through a Proper Accounting of Public Investment." Unpublished manuscript, Department of Economics, Massachusetts Institute of Technology.
- Blanchard, Olivier, and Roberto Perotti. 2002. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output." *Quarterly Journal of Economics* LXVII: 1329–68.
- Buiter, Willem, and C. Grafe. 2002. "Patching up the Pact: Some Suggestions for Enhancing Fiscal Sustainability and Macroeconomic Stability in an Enlarged European Union." CEPR Working Paper 3495, Centre for Economic Policy Research, London.
- Burnside, Craig, Martin Eichenbaum, and Jonas D. M. Fisher. 1999. "Assessing the Effects of Fiscal Shocks." NBER Working Paper No. 7459, National Bureau of Economic Research, Cambridge.
- Drazen, Allan. 2000. *Political Economy in Macroeconomics*. Princeton: Princeton University Press.
- Eichengreen, Barry, Ricardo Hausman, and Jurgen von Hagen. 1999. "Reforming Budgetary Institutions in Latin America: The Case for a National Fiscal Council." *Open Economies Review* 10: 415–42.
- Fatás, Antonio. 2002. "The Effects of Business Cycles on Growth." In *Economic Growth: Sources, Trends and Cycles*, eds. Norman Loayza and Raimundo Soto, 191–219. Series on Central Banking, Analysis and Economic Policies, Vol. 6. Santiago de Chile: Central Bank of Chile.
- Fatás, Antonio, Andrew Hughes Hallett, Anne Siebert, Ralf Strauch, and Jurgen von Hagen. 2003. "Stability and Growth in Europe: Towards a Better Pact." *Monitoring European Integration* 13. Center for Economic Policy Research, London.
- Fatás, Antonio, and Ilian Mihov. 2001. "The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence." INSEAD Working Paper, Fontainebleau.
- . 2003. "The Case for Restricting Fiscal Policy Discretion." *Quarterly Journal of Economics* CXVIII: 1419–447.
- . 2004. "The Macroeconomic Effects of Fiscal Rules in the U.S. States." INSEAD Working Paper, Fontainebleau.
- Ferejohn, John. 1986. "Incumbent Performance and Electoral Control." *Public Choice* L: 5–26.
- Galí, Jordi, David Lopez-Salido, and Javier Valles. 2002. "Understanding the Effects of Government Spending on Consumption." Bank of Spain, Madrid.
- Gavin, Michael, and Roberto Perotti. 1997. "Fiscal Policy in Latin America". *NBER Macroeconomics Annual*. Cambridge: MIT Press.
- Henisz, Witold J. 2000. "The Institutional Environment for Economic Growth." *Economics and Politics* XII: 1–31.

- Jones, Charles. 2002. *Introduction to Economic Growth*. New York: W.W. Norton and Company.
- Judson, Ruth, and Attanasio Orphanides. 1999. "Inflation, Volatility and Growth." *International Finance* 2 (1): 117–38.
- Kontopoulos, Yianos, and Roberto Perotti. 2002. "Fragmented Fiscal Policy." *Journal of Public Economics* 82 (2): 191–222.
- Kormendi, Roger, and Philip Meguire. 1985. "Macroeconomic Determinants of Growth." *Journal of Monetary Economics* 16 (2): 141–63.
- Lane, Philip. 2003. "The Cyclical Behavior of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87 (12): 2661–75.
- Levinson, Arik. 1998. "Balanced Budgets and Business Cycles: Evidence from the States." *National Tax Journal* LI: 715–32.
- Martin, Philippe, and Carol Rogers. 1997. "Stabilization Policy, Learning by Doing, and Economic Growth." *Oxford Economic Papers* 49 (2): 152–66.
- . 2000. "Long-Term Growth and Short-Term Economic Stability." *European Economic Review* 44 (2): 359–81.
- Melitz, Jacques. 2000. "Some Cross-Country Evidence About Fiscal Policy Behavior and Consequences for EMU." *European Economy* 2: 3–21.
- Milesi-Ferretti, Gian-Maria, Roberto Perotti, and Massimo Rostagno. 2002. "Electoral Systems and Public Spending." *Quarterly Journal of Economics* CXVIII: 609–58.
- Mountford, A., and H. Uhlig. 2002. "What Are the Effects of Fiscal Policy Shocks?" CEPR Discussion Paper No. 3338, Centre for Economic Policy Research, London.
- Perotti, Roberto. 2004. "Estimating the Effects of Fiscal Policy in the OECD Countries." IGIER, Milano.
- Perry, Guillermo. 2002. "Can Fiscal Rules Help Reduce Macroeconomic Volatility in the Latin American and the Caribbean Region?" Unpublished manuscript, World Bank, Washington, DC.
- Persson, Torsten. 2001. "Do Political Institutions Shape Economic Policy?" NBER Working Paper No. 8214, National Bureau of Economic Research, Cambridge.
- Persson, Torsten, and Guido Tabellini. 2001a. *Political Economics: Explaining Economic Policy*. Cambridge, MA: MIT Press.
- . 2001b. "Political Institutions and Policy Outcomes: What are the Stylized Facts?" CEPR Discussion Paper No. 2872, Centre for Economic Policy Research, London.
- Pisani-Ferry, Jean. 2002. "Fiscal Discipline and Policy Coordination in the Eurozone: Assessment and Proposals." Unpublished manuscript, University of Paris-Dauphin.
- Poterba, James. 1994. "State Responses to Fiscal Crises: The Effects of Budgetary Institutions." *Journal of Political Economy* 102: 779–821.
- Poterba, James, and Jurgen von Hagen. 1999. *Fiscal Institutions and Fiscal Performance*. Chicago: University of Chicago Press.
- Ramey, G., and V. Ramey. 1995. "Cross-Country Evidence on the Link Between Volatility and Growth." *American Economic Review* LXXXV: 1138–51.
- Rodrik, Dani. 1991. "Policy Uncertainty and Private Investment in Developing Countries." *Journal of Development Economics* 36 (2): 229–42.

- . 1998. “Why Do More Open Economies Have Bigger Governments.” *Journal of Political Economy* CVI: 997–1032.
- Roubini, Nouriel, and Jeffrey Sachs. 1989. “Government Spending and Budget Deficits in the Industrialized Countries.” *Economic Policy* 8: 99–132.
- Shi, Min, and Jakob Svensson. 2001. “Political Budget Cycles: Do They Differ Between Developed and Developing Countries?” Institute for International Economic Studies, Stockholm.
- Stokey, Nancy. 2002. “Rules Versus Discretion after Twenty-Five Years.” *NBER Macroeconomics Annual*. Cambridge: National Bureau of Economic Research.
- Tornell, Aaron, and Philip Lane. 1999. “The Voracity Effect.” *American Economic Review* 89: 22–46.
- von Hagen, Jurgen. 1992. “Fiscal Arrangements in a Monetary Union—Some Evidence from the US.” In *Fiscal Policy, Taxes, and the Financial System in an Increasingly Integrated Europe*, eds. Don Fair and Christian de Boissieu, 337–60. Deventer: Kluwer.
- von Hagen, Jurgen, Andrew Hughes Hallett, and Rolf Strauch. 2002. “Budgetary Consolidation in Europe: Quality, Economic Conditions and Persistence.” *Journal of the Japanese and International Economies* 16: 512–35.
- von Hagen, Jurgen, and Ian Harden. 1995. “Budget Processes and Commitment to Fiscal Discipline.” *European Economic Review* 39: 771–79.
- World Bank. 2000. *World Development Report 2000/2001: Attacking Poverty*. Washington, DC: World Bank.
- Wyplosz, Charles. 2002. “Fiscal Policy: Institutions vs. Rules.” Graduate Institute of Economic Studies, Geneva.

The Size and Effectiveness of Automatic Fiscal Stabilizers in Latin America

Rodrigo Suescún

I. Introduction

A climate of mistrust toward discretionary fiscal policy is growing in Latin America. De Ferranti, Perry, Gill, and Servén (2000) found that a significant fraction of Latin America's excess volatility relative to industrial economies is due to fiscal policy volatility. The underlying reason for this volatility is that fiscal policy tends to be procyclical in the region and, instead of smoothing economic fluctuations as in textbook macroeconomics, it contributes to exacerbating them. The destabilizing conduct of fiscal policy has been documented in various cross-country studies (Gavin, Hausmann, Perotti, and Talvi 1996; Gavin and Perotti 1997). Furthermore, Fatás and Mihov (2004) demonstrated a discernable positive relationship between discretionary fiscal policy changes and macroeconomic volatility and a negative one between the latter and economic growth in a sample including developing countries.

The distrust of fiscal activism is a widespread phenomenon in today's industrial world as is the concomitant focus, in public policy and academic circles, on an alternative type of fiscal policy—that is, a nondiscretionary one—based on the built-in flexibility of taxation and

* The author would like to thank Ernesto May, Guillermo Perry, David Rosenblatt, and Luis Servén for their helpful comments on a preliminary version and Mariana Fajardo for her excellent research assistance.

automatic stabilization. “Let the fiscal automatic stabilizers work” seems to be the new mantra, and it is being chanted by those who feel the need for protection from discretionary fiscal management. Auerbach and Feenberg (2000) and Auerbach (2002) recommend heavier reliance on automatic stabilizers for macroeconomic stabilization purposes for the United States, particularly given the difficulties in conducting countercyclical fiscal policy. They argue that active policy changes suffer from information, political, and economic lags. Romer and Romer (1994) reached a similar conclusion in a study of the contribution of monetary and fiscal policies to the ending of eight U.S. postwar recessions. Their study documented the fact that discretionary fiscal impulses have been too small to have had a significant role in ending downturns, while automatic fiscal policy seemingly exhibited the magnitude, timing, and consistency necessary to have had a stabilizing influence in all recoveries. Taylor (2000) espoused monetary policy to do the countercyclical task, “taking as given the workings of the automatic stabilizers.” The comparative advantage of monetary policy is attributed to shorter implementation lags, greater flexibility to adjust the policy stance, and lower political constraints. Following the same line of reasoning, the institutional arrangement of the Economic and Monetary Union (EMU) has been set up to hold a strong stance against the use of discretionary fiscal policy to fine-tune the economy.

The emerging public policy consensus appears to have some additional backing in the empirical work of Fatás and Mihov (2003), who show that fiscal policy discretion has harmed macroeconomic stability and caused the deterioration of long-term growth in a sample of member countries of the Organisation for Economic Co-operation and Development (OECD), while Fatás and Mihov (2001) found a strong negative correlation between automatic stabilizers, proxied by government size, and output volatility for the same sample of OECD countries given above and for the 50 U.S. states.

A natural policy question then arises. Should Latin American countries follow the lead of industrial countries in giving up the use of activist fiscal policy and focusing on automatic stabilization? The unsolved issue, however, is the degree of automatic stabilization that can be effectively embedded in the cyclical position of the government budget. The stakes for Latin America are quite high. If automatic stabilizers are weak or ineffective, various economies in the region will be at the mercy of a myriad of domestic and external shocks. These shocks frequently hit individual economies, or the region as a whole, with no stabilization instrument at their disposal. This would be true for fully dollarized economies, such as Ecuador, El Salvador, and Panama, as well as for the member countries of the Organization of Eastern Caribbean States (OECS), which are grouped around a monetary union, because they have lost their control over monetary policy. The numerous highly de facto dollarized countries (Bolivia, Costa Rica,

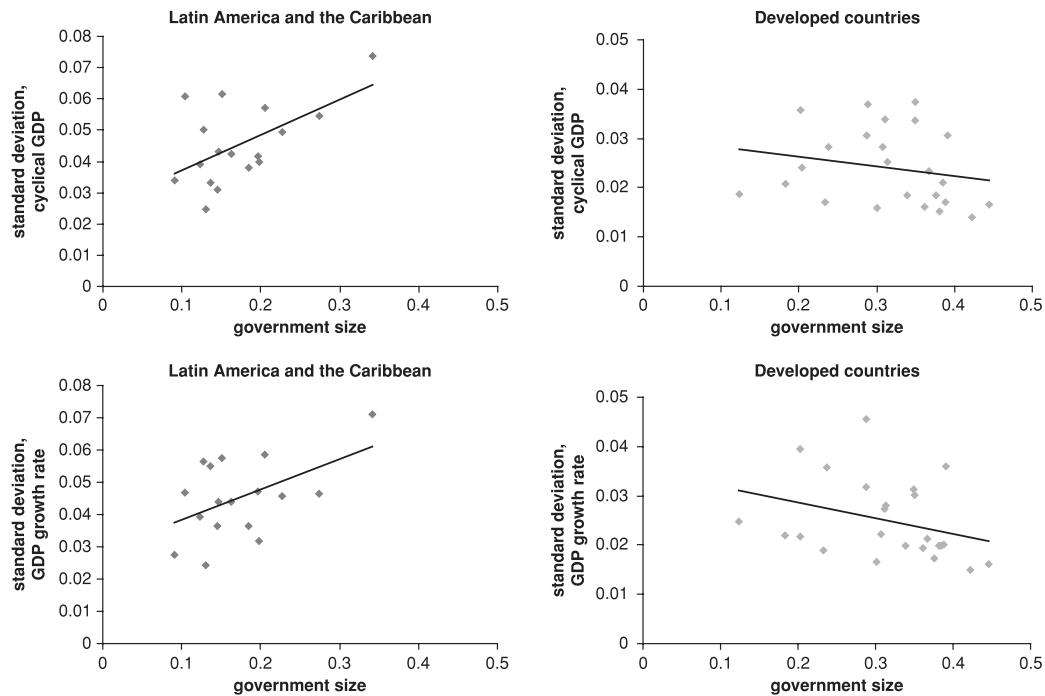
Jamaica, Peru, Paraguay, Uruguay, and others) will depend heavily on an undermined monetary policy to dampen business cycle fluctuations. Most of the other countries in the region that have the potential to run independent monetary policies may find themselves in a similar situation because of procyclical capital flows, financial sector inefficiencies, financial repression, banking crises, illiquid domestic markets, and so on, or simply because monetary policy is committed to maintaining price stability.

Two broad components of the government budget display the capacity to smooth out fluctuations in disposable income and consumption: (a) the tax system and (b) the unemployment insurance system. In most Latin American countries, automatic fiscal expenditure stabilizers are virtually shut down because of a lack of well-established welfare programs or a poor countercyclical design. The design of an unemployment compensation scheme is beyond the scope of this chapter. Rather, the focus is automatic fiscal revenue stabilizers or the tax system's built-in flexibility. The relevant literature is sparse and not informative. I know of no previous attempt to measure the size of automatic stabilizers in the Latin America and the Caribbean (LAC) region or even in developing countries. The literature has singled out just one feature of the region's fiscal management, that is, the countercyclical nature of discretionary fiscal policy, but little is known about the nondiscretionary component. Consequently, one of the objectives of this chapter is to provide a broader understanding of fiscal policy by quantitatively characterizing the main features of the nondiscretionary component.

Moreover, according to the existing literature, the most important determinant of the cyclical sensitivity of the budget is the size of the government sector. Van den Noord (2000) documented a strong positive relationship between the cyclical sensitivity of the fiscal position and government size in the OECD area, a result that makes clear why the existing empirical work has focused on that variable (government size), as measured by the expenditure- or tax revenue-to-gross domestic product (GDP) ratio, to epitomize the overall level of stabilization provided by fiscal policy (Andrés, Domenéch, and Fatás 2004; Fatás and Mihov 2001; Galí 1994). The striking observation for LAC countries is that larger governments are associated with more volatile business cycles. Figure 3.1 shows the differing effect of government size (primary expenditures-to-GDP ratio) on the amplitude of the business cycle in industrial and LAC countries. Regardless of the volatility measure (standard deviation of the Hodrick-Prescott filtered log-GDP or the volatility of the growth rate of GDP), larger governments in the LAC region tend to be correlated with more volatile macroeconomic environments. The opposite is observed in the industrial world.

The lack of understanding of the workings of automatic revenue stabilizers in developing countries is aggravated by the fact that the stabilizing

Figure 3.1 The Stabilizing Role of Government Size



Source: Author's calculation with World Bank World Development Indicators data.

properties of other dimensions of a tax system are also practically unknown. It is generally believed, for example, that a progressive income tax reduces fluctuations in after-tax income, but the size of its smoothing effect and the nature of the relationship between the degree of smoothing and the degree of progressivity of the income tax schedule have not been established. Furthermore, in addition to changes in the slope of the personal income tax schedule, alternatives can be used to introduce progressivity into a tax system. The personal exemption level exempts low-income households from paying taxes and induces a positive association between income and the tax-income ratio. Value added tax (VAT) exemptions (spending on goods of basic necessity, for instance) may induce a similar pattern. Is this type of progressivity stabilizing? Tax revenue composition or, more generally, the revenue sensitivity properties of different taxes may play a smoothing role, too, but their structural relationship with the business cycle has not been clarified. My reading of the existing empirical work is that the effect of all these variables has been hidden behind the (government) size variable. This variable acts as a summarizing measure of various stabilizing properties of the tax system, but the independent roles of each one have not been disentangled. An attempt will be made in this chapter to identify those features of a tax system that enhance the operation of automatic stabilizers. In this sense, this chapter is the first attempt to look into the microfoundations of automatic revenue stabilization in developing countries. In particular, the chapter tries to answer two normative questions: How can policy makers improve automatic stabilization? Is it plausible to make automatic stabilizers in developing countries more effective?

Automatic revenue stabilizers are commonly measured as a weighted sum of elasticities of specific tax categories with respect to a change in income, with weights given by the relative size of the corresponding tax collection. If elasticities are unitary, the measure boils down to the tax-to-GDP ratio. Both the government's size indicator and this weighted sum of elasticities—the so-called cyclical sensitivity of the budget—are associated, in a mechanistic fashion, in the minds of policy makers as well as in the existing literature with the capacity of fiscal policy to offset fluctuations, because an augmented smoothing power is attributed to a higher cyclical responsiveness of the budget. These measures remain invariant with respect to the sources of business cycle fluctuations, implying that automatic stabilizers, of a certain size, should work at all times and everywhere with the same effectiveness. No research, however, backs up this conjecture. In principle, a traditional Keynesian argument would provide a rationale for that hypothesis: any demand shock triggers automatic responses in taxes representing a countercyclical demand impulse via after-tax income. As originally conceived by Keynesians, a pure demand-driven business cycle is the ideal environment for the smooth operation of the fiscal revenue stabilizers. But, how do automatic

stabilizers operate when other forces drive the business cycle, as is the case of Latin America? What happens when shocks have relevant demand as well as supply dimensions? Mendoza (1995), in a study of the relationship between terms-of-trade shocks and business cycles, found that 56 percent of the observed volatility of GDP in developing countries was explained by terms-of-trade shocks. Kose (2002), also within an intertemporal general equilibrium framework, assessed the role of world prices in driving business cycle fluctuations in developing countries and found that shocks to the world real interest rate—along with shocks to the world prices of capital, intermediate, and primary goods—account for 88 percent of aggregate output fluctuations. Which brings us to the following questions: Do automatic stabilizers work equally well under any cyclical circumstances, as the summary indicators of the cyclical sensitivity of the budget seem to suggest? What does “let the fiscal automatic stabilizers work” mean in an economy facing multiple sources of business cycle fluctuations?

To answer the questions that have been posed, a relatively rich tax structure is introduced into a stochastic, dynamic, multisector, small, open-economy model to study the stabilizing properties of different parameters of the tax code. The tax structure partially builds on Jonsson and Klein (1996), Guo and Lansing (1998), and Cassou and Lansing (2004), who attempted to provide a reasonable portrayal of income taxation by introducing tax progressivity into a representative-agent dynamic general equilibrium setting. Some of the features of the modeled tax system are as follows: (a) three general types of government revenue: consumption, personal income, and business income taxes; (b) different rates applied to personal and business income; (c) graduated personal income tax rates; (d) expensing of new physical capital investment; (e) personal income exemption level; and (f) a level exemption in the consumption tax base. At the same time, an attempt is made to capture the major features of the region’s business cycle by including six sources of fluctuations: (a) world capital market shocks; (b) world business cycle shocks; (c) terms-of-trade shocks; (d) government spending shocks; and (e) nontradable and (f) tradable sector technology innovations. Calibrating the model economy to a typical LAC economy allows an evaluation of its ability to mimic the region’s observed business cycle fluctuations and an assessment of the quantitative relationship among tax code parameters, business cycle forcing variables, and business cycle behavior. In related work, Galí (1994), Andrés, Doménech, and Fatás (2004), and Guo and Harrison (2004) developed dynamic general equilibrium models to evaluate the role of automatic stabilizers in much the same vein as the exercise proposed here. In those models, however, only one source of business fluctuations (technology shocks) was included, only one property of the tax system was analyzed (government size), and the economy was closed. A richer

menu of tax parameters is evaluated by Andrés and Doménech (2006) in a closed-economy version of a representative European economy driven solely by technology shocks.

In contrast to standard, small open-economy models (Correia, Neves, and Rebelo 1995; Kose 2002; Mendoza 1991; Senhadji 1998), an economy is presented in which decision making is decentralized into the hands of households and firms. This modeling choice allows the study of the effect of distortionary corporate taxation on businesses and the effect of both the level and slope of the personal income tax schedule on household behavior. The standard, small open-economy model is extended to introduce agent heterogeneity along the lines of Mankiw's Savers-Spenders Theory of Public Finance (Mankiw 2000). That is, two types of agents inhabit the economy. Spenders or low-wealth households follow the rule-of-thumb of consuming their disposable income every period and do not save or borrow, rendering consumption-smoothing infeasible. Savers or Ricardian consumers or high-wealth households smooth their consumption over time by trading in physical and financial assets, and act in an optimizing, forward-looking manner.¹

The outline of the chapter follows. Section II describes the methodology and provides estimates of the size of the automatic fiscal revenue stabilizers in Latin America. To facilitate the comparison, the same approach is used to compute industrial country indicators. Section III describes the model economy and Section IV discusses calibration. Section V performs simulations and evaluates the stabilization role of different tax code parameters by comparing the volatility of output under alternative tax structures and sources of fluctuations with the volatility of an economy with lump-sum taxation. Section VI provides conclusions.

II. The Size of Automatic Revenue Stabilizers in Latin America

The focus in this section is on the measurement of the sensitivity of the budget balance to the cycle in the LAC region and this is compared with figures for industrial countries. The European Commission, the International Monetary Fund (IMF), and the OECD, as well as various national authorities, routinely compute budget sensitivities to facilitate the evaluation of budgetary policies and, for that specific endeavor, have developed a number of widely differing methodologies. Two measures are presented here. The first loosely builds on the OECD approach and relies on the estimates of tax proceeds and tax base elasticities, henceforth referred to as the SBB (sensitivity of the budget balance) indicator. The second loosely builds on Pechman's (1973) measure of a tax system's built-in flexibility, henceforth abbreviated as PI (Pechman's indicator).

The SBB to the cycle is operationally defined as the change in the primary budget balance (relative to potential GDP) in response to a 1 percent cyclical deviation of GDP from trend:

$$\text{SBB} = \frac{\frac{B_t^y - B_t^*}{Y_t^*}}{\frac{Y_t - Y_t^*}{Y_t^*}} \quad (1)$$

where asterisked variables represent potential or trend levels. B_t^y stands for the cyclically disturbed primary budget balance. The budget balance variable included in the preceding definition (B_t^y and B_t^*) can be expressed in terms of its defining revenue and expenditure categories. In principle, each budgetary category may or may not be cyclically sensitive. After simple manipulations, the preceding semielasticity can be rewritten in terms of a weighted sum of elasticities:

$$\text{SBB} = \sum_{i=1}^n \varepsilon_{R_i} \cdot \eta_{R_i} \cdot \left(\frac{R_i}{Y} \right)^* - \sum_{j=1}^m \varepsilon_{E_j} \cdot \eta_{E_j} \cdot \left(\frac{E_j}{Y} \right)^* \quad (2)$$

where ε_{R_i} (ε_{E_j}) is the elasticity of the corresponding budgetary category (R_i , $i = 1, \dots, n$, for revenues and E_j , $j = 1, \dots, m$, for expenditures) with respect to its base and η_{R_i} (η_{E_j}) is the elasticity of the corresponding macroeconomic base with respect to (cyclical) economic activity; n revenue categories and m expenditure categories are considered. $(R_i/Y)^*$ ($(E_j/Y)^*$) represents the average size of the corresponding budgetary category relative to the size of the economy (GDP). In the ensuing analysis, the second term on the right-hand side of the equation is dropped. Cyclically sensitive expenditures in the LAC region (mainly unemployment-related expenditures) are poorly designed or very small or time-series data are lacking. This choice reflects the concern for the stabilizing role of the tax system and not that of the benefit system. For the sake of comparison, industrial country sensitivities are calculated the same way.²

Based on the definitions adopted in the IMF Government Finance Statistics database, five revenue categories are acknowledged to depend on the cycle: (a) taxes on income, profits, and capital gains; (b) taxes on goods and services; (c) taxes on international trade; (d) social security contributions; and (e) other taxes.³ Fiscal elasticities are obtained from country-by-country regressions for each revenue category i (in real terms) as follows:

$$d(\log(R_{i,t})) = \alpha + \varepsilon_{R_i} d(\log(b_{i,t})) + \gamma^T Z_t + \zeta_t \quad i = \{1, \dots, 5\} \quad (3)$$

where $b_{i,t}$ is the relevant, real economic base of the tax and Z is a vector of other explanatory variables. Data availability restricts the choice of tax

bases. The GDP is assumed to be the relevant macroeconomic base for tax categories $i = \{1,4,5\}$; final household consumption is the base for $i = \{2\}$; and total imports is the base for $i = \{3\}$. The vector Z includes other determinants of the rate of growth of real tax proceeds, such as the inflation rate⁴ (in logs or log difference), and terms of trade (in logs or log difference). Unfortunately, because of data limitations on tax law changes over time, the regression does not control for discretionary policy measures, thus rendering elasticity estimates not completely reliable.⁵ An additional potential source of bias is the use of the ordinary least squares (OLS) estimation technique, which ignores the effect of the fiscal position on the cyclical behavior of macroeconomic aggregates, thus yielding biased estimates. To deal with the endogeneity problem, the instrumental variable estimation procedure is used. This uses the U.S. GDP (log difference) and the first lag of the inflation rate and terms-of-trade variables as instruments.

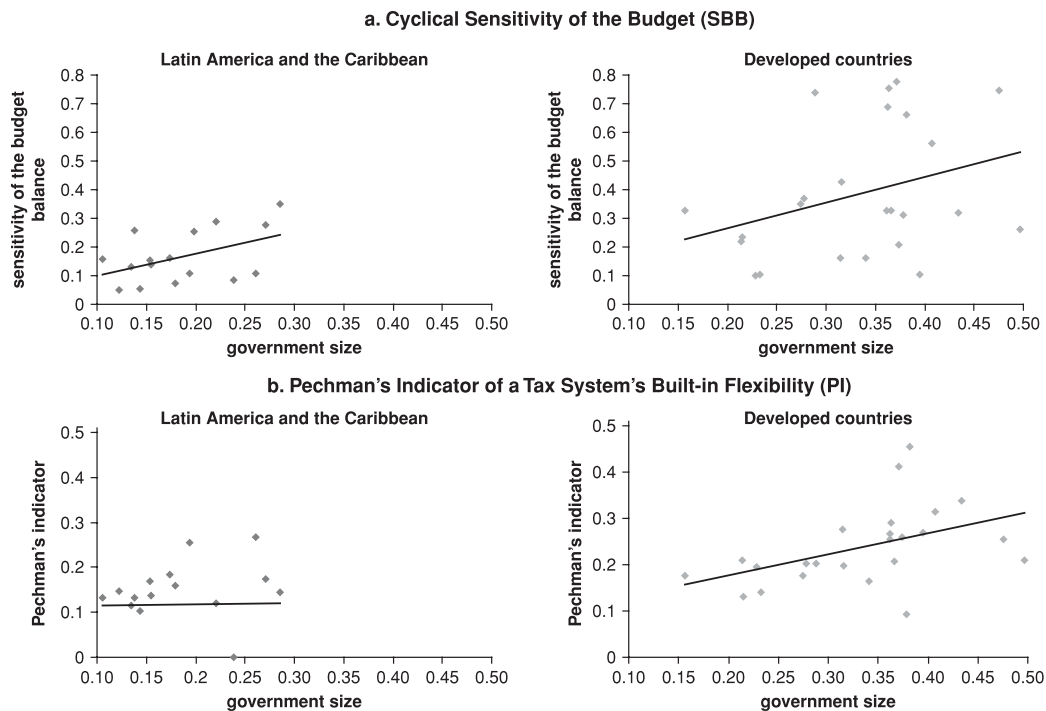
Annual tax data series generally spanning the period from 1972 to 2000 and generally including what the IMF defines as “consolidated central government” come from the Government Finance Statistics database and IMF country reports. The remaining data were retrieved from the World Bank’s World Development Indicators (WDI) database. Output elasticities of various macroeconomic bases were obtained from OLS regressions of $d(\log(b_{i,t}))$ on $d(\log(Y_t))$ with no correction for the potential endogeneity of the right-hand-side variable.⁶

In the PI methodology, Pechman (1973) estimates the responsiveness of the U.S. tax system to fluctuations in income using a sample of historic individual federal income tax returns to simulate the impact on tax liabilities of a dollar increase in personal income. Pechman refers to this measure as the tax system’s “built-in flexibility” and Auerbach and Feenberg (2000) refer to this measure as the “normalized tax change.” Lacking the specific information needed to perform a similar calculation for LAC countries, an aggregate version of the relationship between tax revenue and income is computed by defining it as the mean of the yearly ratios of the absolute increase in total tax revenue to the absolute increase in GDP. The PI indicator is computed as follows:

$$PI = N^{-1} \sum_{i=1}^N \frac{\Delta(R_t)}{\Delta(Y_t)} \quad (4)$$

where $N + 1$ is the sample size and $\Delta(R_t)$ is the absolute change in total tax revenue between periods $t-1$ and t . Unfortunately, the PI indicator is tainted by the problem of tax law changes. Figure 3.2 depicts the two measures of the cyclical sensitivity of the fiscal position. The figure relates both statistics with the government size variable (primary expenditures-to-GDP ratio), which is generally used as a proxy for the size of automatic stabilizers, for 16 Latin American⁷ and 24 industrial countries.⁸ The figure corroborates Van den Noord’s (2000) finding of a strong positive

Figure 3.2 Cyclical Sensitivity of the Fiscal Position



Source: Author's calculations with IMF and World Bank databases.

correlation in industrial countries, indicating that the size of government is the key force determining the cyclical sensitivity of the fiscal position. A note of caution is in order based on the discussion in the preceding paragraphs, but both indicators are suggestive of much weaker automatic fiscal revenue stabilizers in Latin America than in the industrial world.⁹ Hence, a new piece of evidence has been added to the small stack of evidence on LAC fiscal policy. Not only has discretionary fiscal policy been reported to be procyclical, but also automatic fiscal stabilizers have been found to be weak by two alternative methods and ancillary indicators (see footnote 9).

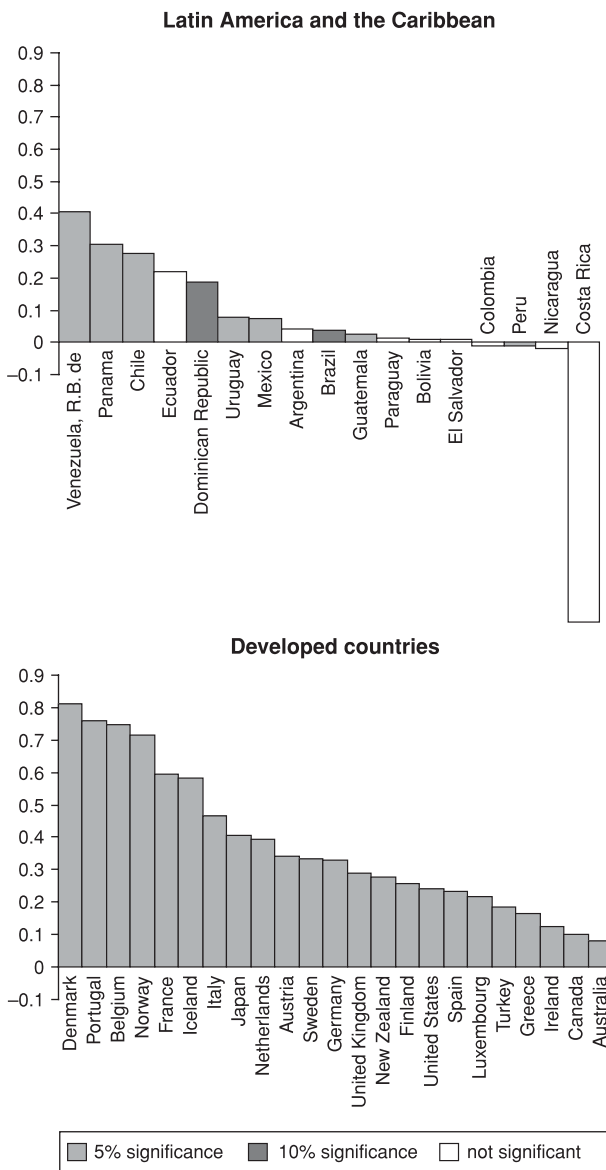
Additional intuition about the strength of automatic stabilization or the degree of flexibility embedded in the tax system can be gained by looking at the responsiveness of the automatic fiscal revenue stabilizers to changes in cyclical conditions. To that end, a variant (including terms of trade) of the policy rule used by Galí and Perotti (2003) is estimated on a country-by-country basis:

$$AS_t = \alpha + \beta \cdot CY_t + \gamma_p \cdot P_t + \gamma_D \cdot D_{t-1} + \gamma_L \cdot AS_{t-1} + \zeta_t \quad (5)$$

where CY_t represents the output gap measured by the Hodrick-Prescott cyclical component of log-GDP; P_t stands for the terms of trade (in level, in log, or in log difference, depending on unit root tests); D_t is the stock of outstanding public debt in ratio to potential GDP; and the potential GDP is in turn obtained from the Hodrick-Prescott trend component. The public debt time series for each country is estimated by using information on the debt-to-GDP ratio at a given point in time and using time-series data on the overall budget balance and GDP along with the law of motion of government debt to reconstruct the entire path. The government debt-to-GDP ratio at a given point in time is retrieved from the FitchResearch database and Moody's. The coefficient β measures the size of automatic movements in the revenue ledger accounts of the government budget in response to changes in cyclical conditions. The simultaneity bias associated with the potential problem of endogeneity of the output gap variable is addressed by instrumenting for it using its lagged value and the first lag of the U.S. output gap (or the first lag of the three major European economies' output gap for the U.S. regression).

Figure 3.3 depicts country-specific estimates of the output gap coefficient of the fiscal reaction function. Without exception, all industrial countries exhibit a statistically significant response from the revenue budget items to automatically counteract domestic cyclical fluctuations. In Latin America, few countries exhibit a significant response. When it is significant, it is much weaker than in the industrial country sample. In general, the region as a whole tends to have a barely acyclical nondiscretionary fiscal policy.

Figure 3.3 Automatic Stabilizers' Response to Cyclical Conditions



Source: Author's calculations.

III. The Model Economy

The model economy to be studied is open, small, and stochastic. Consider an economy populated by a continuum of infinitely lived households uniformly distributed on the unit interval $[0,1]$, a continuum of identical firms, and a government sector. A fraction π of households with names on the interval $[0, \pi)$, referred to as spenders and identified by the subscript s , choose current labor supply at the competitive wage rate and consume their disposable labor income to maximize period-by-period utility. The remaining share $(1-\pi)$ of households with names on $[\pi,1]$, referred to as optimizing households and identified by the subscript o , maximize their lifetime expected utility by transferring resources across periods and from one generation to another by using capital markets. Two goods are produced in the economy: (a) nontradables, identified by the superscript n , and (b) exportables, identified by the superscript x . Two goods are consumed: nontradables and importables, m . The importable good, which plays the role of numéraire, can be used for final household consumption and investment and for intermediate consumption in the production process. The volume of exports depends on relative prices (terms of trade) and on the GDPs of LAC trading partners and thus on the international business cycle. The Ricardian households have access to the world financial market for one-period real bonds. The representative LAC economy takes the world prices of exports and imports, as well as the world interest rate, as given parametrically. The world interest rate, the world business cycle, and the terms of trade, as well as other additional forcing processes to be introduced shortly, are assumed to follow a stationary, first order, vector Markov process.

The following model economy is expressed in per capita terms, and no population growth is allowed. Following convention, economy-wide per capita aggregates are represented by capital letters; variables under the household's control, not including prices, are denoted by lowercase letters. In equilibrium, individual choices and the corresponding aggregate counterparts should be identical. Time is discrete and indexed by t , $t = 0,1,2,\dots,\infty$.

Optimizing Households

The representative optimizing household has preferences over sequences of consumption and leisure and maximizes the present discounted value of momentary utility functions:

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_{o,t}, l_{o,t}) = E_0 \sum_{t=0}^{\infty} \beta^t \left\{ \log(c_{o,t}) - \frac{\kappa}{\xi} (1 - l_{o,t})^\xi \right\} \quad (6)$$

$$c_{o,t} = \left\{ \alpha (c_{o,t}^n)^{-\nu} + (1-\alpha)(c_{o,t}^m)^{-\nu} \right\}^{-\frac{1}{\nu}}$$

The representative household draws utility from a composite consumption good $c_{o,t}$ and from leisure time $i_{o,t}$. The composite consumption good is a combination of two goods treated as imperfect substitutes by a CES (constant elasticity of substitution) Armington aggregator: consumption of nontradable goods $c_{o,t}^n$ and consumption of importable goods $c_{o,t}^m$. The parameter α is a preference weight on nontradable goods and ν , $\nu > -1$, determines the elasticity of substitution between domestic and importable consumption goods given by $1/(1 + \nu)$. β is a subjective discount factor and ξ governs the intertemporal elasticity of substitution in labor supply. E_0 is the mathematical expectations operator, which is conditional on information available at time 0.

The Ricardian household faces the following flow budget constraint:

$$\begin{aligned} d_{o,t+1} - b_{o,t+1} = & (1 + r_t^d)d_{o,t} - (1 + r_t^b)b_{o,t} + p_t^n \left(c_{o,t}^n + \sum_{j \in \{n,x\}} i_{o,t}^{nj} \right) \\ & + \left(c_{o,t}^m + \sum_{j \in \{n,x\}} i_{o,t}^{mj} \right) + t_{o,t} - \sum_{j \in \{n,x\}} p_t^j w_t^j n_{o,t}^j \\ & - \sum_{j \in \{n,x\}} p_t^j r_t^j k_{o,t}^j + \psi^d [d_{o,t}] + \psi^b [b_{o,t}] - TR_t \end{aligned} \quad (7)$$

where $i_{o,t}^{nn}$, $(i_{o,t}^{mn})$, and $i_{o,t}^{nx}$ ($i_{o,t}^{mx}$) represent the investment of the nontradable (importable) goods in the nontradable and exportable producing sectors, respectively. w_t^n (w_t^x) and r_t^n (r_t^x) are the wage rate and the rental price of capital in the nontradable (exportable) sector. $n_{o,t}^j$, $j = \{n, x\}$, denotes labor input allocated to producing sector j . $k_{o,t}^j$ ($k_{o,t}^x$) is the stock of physical capital owned exclusively by optimizing households and allocated to firms in the nontradable (exportable) sector. p_t^n and p_t^x are the relative price of nontradables and the terms of trade, respectively. $t_{o,t}$ stands for tax payments to the government, to be described in detail below. TR_t is a time t lump-sum government transfer to the household. $b_{o,t}$ is the beginning-of-period holdings of government bonds with an endogenous rate of return r_t^b . $d_{o,t}$ is net foreign debt at the beginning of period t , and r_t^d is the interest rate, in terms of imports, charged on foreign debt. The interest rate charged on world capital markets is expressed as follows:

$$r_t^d = r^* + s_t \quad (8)$$

where r^* is the constant world interest rate and s_t is an exogenous stochastic borrowing premium. All assets and debts are held by Ricardian households (and the government).

It is well known that the equilibrium dynamics of a small open economy, with asset trading restricted to a noncontingent bond, exhibit a random walk property that prevents the use of local approximation methods to study the business cycle behavior of the economy around a stationary growth path. To induce stationarity in the equilibrium dynamics, convex portfolio adjustment costs, which help to pin down the steady-state level of

foreign debt, are introduced. Adjustment costs are represented by the term $\Psi^d[d_{o,t}]$ and the following parametric specification is used:

$$\Psi^d[d_{o,t}] = \frac{\Psi^d}{2}(d_{o,t} - D_o)^2 \quad (9)$$

where D_o is the steady-state aggregate level of foreign debt in the hands of the representative Ricardian household.¹⁰

The household's total time endowment is normalized to unity per period and time spent in employment is subject to the following constraint:

$$1 = l_{o,t} + \sum_{j \in \{n,x\}} n_{o,t}^j \quad (10)$$

Holdings of physical capital obey the following law of motion:

$$k_{o,t+1}^j = (1 - \delta^j)k_{o,t}^j + i^j[i_{o,t}^{nj}, i_{o,t}^{mj}] - \Psi^{kj}[k_{o,t+1}^j, k_{o,t}^j] \quad j = \{n,x\} \quad (11)$$

where δ^j is the depreciation rate of capital in sector j , and $\Psi^{kj}[\cdot]$ is a standard quadratic adjustment cost function in investment, characterized by a single parameter Ψ^{kj} , specified as follows:

$$\Psi^{kj}[k_{o,t+1}^j, k_{o,t}^j] = \frac{\Psi^{kj}}{2}(k_{o,t+1}^j - k_{o,t}^j)^2 \quad j \in \{n,x\} \quad (12)$$

Gross investment in sector j is a composite of nontradable and foreign goods, which are considered imperfect substitutes according to an Armington aggregator expressed in the CES form:

$$i_{o,t}^j = i^j[i_{o,t}^{nj}, i_{o,t}^{mj}] = \chi^j \left\{ \phi^i (i_{o,t}^{nj})^{-\nu^j} + (1 - \phi^i) (i_{o,t}^{mj})^{-\nu^j} \right\}^{-\frac{1}{\nu^j}} \quad j \in \{n,x\} \quad (13)$$

where χ^j is a scaling factor, ϕ^i is a weight specifying the relative nontradable content of investment, and ν^j , $\nu^j > -1$, governs the elasticity of substitution between domestic and foreign goods in investment.

Spenders

The restricted households solve a simple static problem, because they live hand-to-mouth and hence do not make intertemporal decisions. Formally, consumption allocations between domestic and importable goods and labor supply are chosen to solve this problem:

$$\max \quad u(c_{r,t}, l_{r,t}) = \left\{ \log(c_{r,t}) - \frac{\kappa}{\xi} (1 - l_{r,t})^\xi \right\} \quad (14)$$

where

$$c_{r,t} = \left\{ \alpha (c_{r,t}^n)^{-\nu} + (1-\alpha)(c_{r,t}^m)^{-\nu} \right\}^{-\frac{1}{\nu}}$$

subject to

$$p_t^n c_{r,t}^n + c_{r,t}^m + t_{r,t} = \sum_{j \in \{n,x\}} p_t^j w_t^j n_{r,t}^j + TR_t$$

$$1 = l_{r,t} + \sum_{j \in \{n,x\}} n_{r,t}^j$$

The notation and setup of the problem are straightforward. Savers and spenders have identical period utility functions, and because their labor effort is perfectly substitutable, they earn the same wage.

Firms

The two sectoral technologies have a CES specification given by the following:

$$Y_t^j = \lambda^j Z_t^j (N_t^j)^{\gamma^j} \left\{ \zeta^j (K_t^j)^{-\omega^j} + (1-\zeta^j)(S_t^{mj})^{-\omega^j} \right\}^{-\frac{(1-\gamma^j)}{\omega^j}} \quad j = \{n,x\} \quad (15)$$

These technologies exhibit constant returns to scale. λ^j is a sectoral scale parameter. S_t^{mj} represents imported intermediate inputs in sector j and ζ^j is the relative weight on capital in the aggregation of capital and intermediate input services. The elasticity of substitution between intermediate inputs and capital is controlled by ω^j . γ^j is the labor income share in sector j output. Z_t^j is an exogenous technology shock affecting total factor productivity in sector j at time t .

Firms solve a static program with the following:

$$\max \quad p_t^j Y_t^j - p_t^j w_t^j N_t^j - p_t^j r_t^j K_t^j - S_t^{mj} \quad j = \{n,x\} \quad (16)$$

The firms' optimization problem yields the usual condition that the marginal productivity of primary and intermediate inputs must be equal to their rental prices:

$$w_t^j = \gamma^j \lambda^j Z_t^j (N_t^j)^{\gamma^j-1} \left\{ \zeta^j (K_t^j)^{-\omega^j} + (1-\zeta^j)(S_t^{mj})^{-\omega^j} \right\}^{-\frac{(1-\gamma^j)}{\omega^j}} \quad j = \{n,x\} \quad (17)$$

$$r_t^j = \zeta^j (1-\gamma^j) \lambda^j Z_t^j (N_t^j)^{\gamma^j} \left\{ \zeta^j (K_t^j)^{-\omega^j} + (1-\zeta^j)(S_t^{mj})^{-\omega^j} \right\}^{-\frac{(1-\gamma^j)}{\omega^j}-1} (K_t^j)^{-\omega^j-1} \quad j = \{n,x\}$$

$$\frac{1}{p_t^j} = (1-\zeta^j)(1-\gamma^j) \lambda^j Z_t^j (N_t^j)^{\gamma^j} \left\{ \zeta^j (K_t^j)^{-\omega^j} + (1-\zeta^j)(S_t^{mj})^{-\omega^j} \right\}^{-\frac{(1-\gamma^j)}{\omega^j}-1} (S_t^{mj})^{-\omega^j-1}$$

$$j = \{n,x\}$$

Government and Tax Structure

In per capita terms, the government's budget constraint is calculated as follows:

$$B_{t+1} = (1 + r_t^b)B_t + p_t^n G_t^n - T_t + TR_t \quad (18)$$

where B_t is an economywide aggregate obtained by adding up over government bond holders, $B_t = (1 - \pi)B_{o,t}$. Government expenditures include public consumption of nontradable goods, G_t^n , lump-sum transfers to households, and outlays associated with domestic government borrowing. The government only issues domestic bonds. The distinction between government bonds issued domestically and those issued abroad is inconsequential, because households have unconstrained access to international borrowing. Households borrow on behalf of the government when they attempt to arbitrage away any difference between domestic and world interest rates. Government nontradable consumption is assumed to follow an exogenous stochastic process.

Taxes paid by the two types of households ($t_{o,t}$, $t_{r,t}$) and aggregate per capita taxes collected by the government (T_t) are given by the following expressions:

$$\begin{aligned} t_{o,t} = & \tau^c \left(p_t^n c_{o,t}^n + c_{o,t}^m - \varepsilon^c (p^n C^n + C^m) \right) \\ & + \tau_t^p \left(\sum_{j \in \{n,x\}} p_t^j w_t^j n_{o,t}^j - \varepsilon^p \sum_{j \in \{n,x\}} p_t^j w_t^j N_t^j \right) \\ & + \tau_t^k \left(\sum_{j \in \{n,x\}} p_t^j r_t^j k_{o,t}^j - \mu \sum_{j \in \{n,x\}} (p_t^n i_{o,t}^{nj} + i_{o,t}^{mj}) \right) \end{aligned} \quad (19)$$

$$\begin{aligned} t_{r,t} = & \tau^c \left(p_t^n c_{r,t}^n + c_{r,t}^m - \varepsilon^c (p^n C^n + C^m) \right) \\ & + \tau_t^p \left(\sum_{j \in \{n,x\}} p_t^j w_t^j n_{r,t}^j - \varepsilon^p \sum_{j \in \{n,x\}} p_t^j w_t^j N_t^j \right) \end{aligned}$$

$$T_t = \pi t_{r,t} + (1 - \pi) t_{o,t}$$

$$\begin{aligned} T_t = & \tau^c \left(p_t^n C_t^n + C_t^m - \varepsilon^c (p^n C^n + C^m) \right) + \tau_t^p (1 - \varepsilon^p) \sum_{j \in \{n,x\}} p_t^j w_t^j N_t^j \\ & + \tau_t^k \left(\sum_{j \in \{n,x\}} p_t^j r_t^j K_t^j - \mu \sum_{j \in \{n,x\}} (p_t^n I_t^{nj} + I_t^{mj}) \right) \end{aligned}$$

where aggregate variables are computed as a weighted average of the corresponding magnitudes for each household type:

$$\begin{aligned} C_t^n &= \pi C_{r,t}^n + (1 - \pi) C_{o,t}^n & C_t^m &= \pi C_{r,t}^m + (1 - \pi) C_{o,t}^m \\ N_t^j &= \pi N_{r,t}^j + (1 - \pi) N_{o,t}^j & j \in \{n,x\} & K_t^j = (1 - \pi) K_{o,t}^j & j \in \{n,x\} \\ I_t^{nj} &= (1 - \pi) I_{o,t}^{nj} & j \in \{n,x\} & I_t^{mj} = (1 - \pi) I_{o,t}^{mj} & j \in \{n,x\} \end{aligned} \quad (20)$$

The tax structure is determined by the government and described by a seven-dimensional vector of parameters, $\tau = \{\tau^c, \tau^p, \tau^k, \varepsilon^c, \varepsilon^p, \mu, \eta\}$. τ^c is the consumption tax rate, τ^p is the personal tax rate, and τ^k is the corporate tax rate. $\varepsilon^c \in [0,1]$ determines the fraction of consumption expenditures exempted from paying consumption taxes. The amount of exempted expenditures does not vary over the business cycle, and it is taken as given by the representative household. This captures the fact that spending on basic necessities, which is the type of spending generally exempted from VAT, does not change over the business cycle for the average household. $\varepsilon^p \in [0,1]$ determines the personal exemption level, which is modeled as a fraction ε^p of the average pretax labor income and taken as given by the representative household. The personal deduction changes with per capita labor income. μ is the fraction of investment in physical capital that can be deducted from corporate income. In the steady state, $\mu = 1$ implies that the amount “expensed” is equal to the usual depreciation allowance for physical capital.

The level and slope of the personal income tax schedule are controlled by τ^p and $\eta \geq 0$, respectively. The graduated-rate personal tax function is given by the following:

$$\tau_t^p = \tau^p \left\{ \frac{\sum_{j \in \{n,x\}} p_t^j w_t^j n_{h,t}^j - \varepsilon^p \sum_{j \in \{n,x\}} p_t^j w_t^j N_t^j}{(1 - \varepsilon^p) \sum_{j \in \{n,x\}} p_t^j w_t^j N_t^j} \right\}^{\eta} \quad h \in \{r, o\} \quad (21)$$

When $\eta = 0$ the tax schedule is flat and the personal income tax system does not exhibit progressivity. For $\eta > 0$, households with above-average (below-average) wage incomes confront a higher (lower) tax rate. In equilibrium, the average personal tax rate is τ^p , lower than or equal to the marginal tax rate given by $\tau^p(1+\eta)$.

Resource Constraints

Feasibility must be satisfied in equilibrium. The market-clearing condition in the nontradable sector is dictated by the following:

$$Y_t^n = C_t^n + \sum_{j \in \{n,x\}} I_t^{nj} + G_t^n \quad (22)$$

And changes in the net foreign asset position determine the current account:

$$D_{t+1} = (1 + r_t^d)D_t + C_t^m + \sum_{j \in \{n,x\}} (I_t^{mj} + S_t^{mj}) - p_t^x X_t \quad (23)$$

The aggregate level of net foreign debt is obtained by aggregating debts in the hands of the Ricardian households: $D_t = (1 - \pi)D_{0,t}$. Aggregate exports

X_t are demand determined. Foreign demand for LAC export commodities is assumed to depend on world economic activity Y_t^* and the relative world price of exports, p_t^x :

$$X_t = X(p_t^x)^{\varpi^p} (Y_t^*)^{\varpi^y} \quad (24)$$

where X is the steady-state level of exports, and ϖ^p and ϖ^y represent the price and income elasticity of the export demand function, respectively. Without loss of generality, p_t^x and Y_t^* are assumed to fluctuate around their unconditional means equal to unity.

IV. Steady-State, Calibration, and Solution Methods

Parameter Values and Steady-State Structure

The model economy is parameterized in such a way that its long-run features mimic those of the representative or average LAC economy during the 1990–2000 period. In the steady state of the model economy, the expenditure side of the national income accounts matches the average LAC structure: household consumption represents 73.6 percent of GDP ($C_{va}=0.736$), total investment represents 17.6 percent ($I_{va}=0.176$), government purchases of goods and services represents 14.5 percent ($G_{va}^n=0.145$), and net exports of goods and services represent approximately -5.7 percent of GDP.¹¹ The model economy matches the level and composition of imports. Total imports amount to 24.8 percent of GDP¹² and are made up of imports of consumption goods (7 percent of GDP, $C_{va}^m=0.07$), capital goods (6.1 percent of GDP, $I_{va}^{mn}+I_{va}^{mx}=0.061$), and intermediate goods (11.7 percent of GDP, $S_{va}^{mn}+S_{va}^{mx}=0.117$). According to the model, total output on the production side is obtained by adding the market value of goods and services produced in the nontradable and exportable sectors and by excluding the value of (imported) goods and services used in the intermediate stages of production. It is assumed that the relative sectoral use of intermediate goods is equal to the relative sectoral contribution to value added. On the production side, then, 82.9 percent of GDP is produced by the nontradable sector ($VA_{va}^n=0.829$) and the rest, 17.1 percent, is produced by the export-producing sector ($VA_{va}^x=0.171$).

The level and composition of government revenue are similar, under the benchmark parameterization of the model economy, to what is observed in Latin America.¹³ Total tax revenue in the model amounts to 15.7 percent of GDP and is made up of consumption taxes (8.8 percent of GDP, close to what is observed in the data, $CTR_{va}=0.088$), corporate taxes (2.5 percent of GDP, or $KTR_{va}=0.025$), and personal income taxes (4.4 percent of GDP, including social security contributions, $PTR_{va}=0.044$). The

steady-state government debt-to-GDP ratio (B_{va}), the economy's external debt-to-GDP ratio (D_{va}), and the total stock of physical capital-to-GDP ratio (K_{va}) are set at 0.56, 0.60, and 2.78, respectively, which replicate their average counterparts in the LAC region during the 1990s.¹⁴

Because of the lack of information about cross-sectoral resource allocation in the LAC region, total nontradable investment, importable investment, and labor input are split between the two producing sectors in proportion to these sectors' steady-state contributions to total value added. The fraction of time devoted to market activities is generally set to one-third in real business cycle studies. Ellery, Gomes, and Sachsida (2002), using the National Household Survey, found that Brazilian households spent, on average, exactly one-third of their nonsleeping hours working. The sectoral allocation of labor effort is based on sectoral contributions to total value added.

The steady-state interest rate that the representative economy is charged on world capital markets is set at 9.5 percent, which is the sum of two components: the exogenously given world interest rate (r^*), proxied by the U.S. interest rate (4 percent, according to Backus, Kehoe, and Kydland 1994), and a borrowing premium measured by the JP Morgan Latin American Eurobond Index (LEI) spread. The average LEI spread amounted to 550 basis points ($s = 0.055$) over the 1994–2001 period. The parameter β can be set to 0.913 by exploiting the relationship between the subjective discount rate and the interest rate that arises from the steady-state version of the household's first-order conditions ($1 = \beta(1+r^*+s)$). The length of a model period is one year.

For a sample of developing countries, Ostry and Reinhart (1992) estimate the elasticity of substitution between nontradables and importables in consumption to be 1.279. This implies a value for ν equal to -0.22 . From the equilibrium versions of the household's first-order conditions for c_t^n and c_t^m , evaluated at the steady state and setting relative prices at equal to unity in the steady state, an expression for α can be obtained:

$$\alpha = \frac{1}{1 + \left(\frac{C_{va}^m}{C_{va}^n} \right)^{1+\nu}} \quad (25)$$

where C_{va}^m and C_{va}^n are the average shares of imported and nontradable consumption expenditures in total value added, respectively. All the information on the right-hand side is known, in particular, the structure of the model economy described above. Then set $\alpha = 0.853$. Lacking specific evidence on the elasticity of substitution between nontradable and importable goods in investment, I use Ostry and Reinhart's (1992) consumption elasticity estimate as an alternative. This implies $\nu^n = \nu^x = -0.22$.

Using the first-order conditions for i_t^{mn} , i_t^{nx} , i_t^{mn} , and i_t^{mx} , evaluated at the steady state, it is possible to express ϕ^n and ϕ^x in terms of known magnitudes:

$$\phi^j = \frac{1}{1 + \left(\frac{I_{va}^{mj}}{I_{va}^{nj}} \right)^{1+\nu^j}} \quad j = \{n, x\} \quad (26)$$

Thus, set $\phi^n = \phi^x = 0.62$. The split of investment aggregates between the two producing sectors is based on sectoral contributions to total value added. Using the specification of the Armington investment function, the scaling parameter can be computed from this expression:

$$\chi^j = \frac{I_{va}^j}{\left[\phi^j (I_{va}^{nj})^{-\nu^j} + (1 - \phi^j) (I_{va}^{mj})^{-\nu^j} \right]^{\frac{1}{\nu^j}}} \quad j = \{n, x\} \quad (27)$$

This implies $\chi^n = \chi^x = 1.926$. By exploiting standard properties of the production function, an expression for the labor share of output can be obtained:

$$\gamma^j = \frac{VA_{va}^j - r^j K_{va}^j}{VA_{va}^j + S_{va}^{mj}} \quad j = \{n, x\} \quad (28)$$

The marginal product of capital in sector j , r^j , can be computed from the steady-state version of the first-order condition for k_{t+1}^j . This calculation, in turn, requires information on the depreciation rate. An average depreciation rate is obtained from the steady-state version of the law of motion of the aggregate stock of physical capital: $\delta = I_{va}/K_{va} = 0.063$. Assume $\delta = \delta_n = \delta^x$. K_{va}^j is obtained from the corresponding sectoral law of motion of physical capital: $K_{va}^j = I_{va}^j / \delta^j$. Hence set $\gamma^n = \gamma^x = 0.50$.

Using the first-order condition for S_t^{mj} , $j = \{n, x\}$, of the firm's optimization problem, the following expression for the weight parameter of capital in the CES-type aggregator of capital and imported, intermediate input services, ζ^j , can be found:

$$\zeta^j = \frac{1}{1 + \left(\frac{1}{r^j} \right) \left(\frac{S_{va}^{mj}}{K_{va}^j} \right)^{1+\omega^j}} \quad j = \{n, x\} \quad (29)$$

The unknown parameter ω^j is calibrated using Berndt and Wood's (1975) estimate of the Allen elasticity of substitution between intermediate inputs and capital goods ($\sigma_{ks} = 0.58$). Then, ω^j is given by the following (see Sato 1967):

$$\omega^j = \frac{1 - (\gamma^j + \sigma_{ks} - \gamma^j \sigma_{ks})}{\gamma^j + \sigma_{ks} - \gamma^j \sigma_{ks}} \quad j \in \{n, x\} \quad (30)$$

$\omega^n = \omega^x$ is set at 0.265. As a result, set $\zeta^n = \zeta^x = 0.90$.

The preference parameter ξ governing the intertemporal elasticity of substitution in labor supply is set equal to 1.60, consistent with an elasticity of 1.7 adopted by Greenwood, Hercowitz, and Huffman (1988) as a reasonable compromise. The parameter κ was calibrated from the conditions with respect to n_t^n and n_t^x :

$$\kappa = \frac{\alpha(1 - (1 + \eta)\tau^p)\gamma^n(N^n + N^x)^{1-\xi}(VA_{va}^n + S_{va}^{mn})(C_{va}^n)^{-v-1}[\alpha(C_{va}^n)^{-v} + (1 - \alpha)(C_{va}^m)^{-v}]^{-1}}{(1 + \tau^c)N^n} \quad (31)$$

This expression includes various tax code parameters. The benchmark tax structure is calibrated as follows, and implicit effective tax rates are calculated using these accounting and model definitions:

$$\begin{aligned} \tau^c &= \frac{CTR_{va}}{(1 - \varepsilon^c)C_{va}} \\ \tau^k &= \frac{KTR_{va}}{r^n K_{va}^n + r^x K_{va}^x - \mu I_{va}} \\ \tau^p &= \frac{PTR_{va}}{(1 - \varepsilon^p)(N^n + N^x)w_{va}^n} \end{aligned} \quad (32)$$

Because of the lack of detailed and reliable data about important features of the tax codes in the region, it is necessary to assign somewhat arbitrary, though plausible, values to various policy parameters. However, the objective of the study in the next section is to remedy this faulty calibration procedure by assessing, on the basis of a thorough sensitivity analysis, how the business cycle properties of the economy change along with changes in the different parameters of the tax code. The slope of the personal income tax schedule for the representative LAC economy, η , is set equal to 0.¹⁵ The tax code parameters ε^p and ε^c , which represent the fractions of personal income and consumption that are tax deductible or exempted from taxation, are set at $\varepsilon^p = 0.50$ and $\varepsilon^c = 0.20$, respectively. μ , the fraction of physical investment that can be deducted from taxable business income, is set equal to 1. Once these parameter values are set, the remaining fiscal parameters can be calibrated. Set $\tau^c = 0.15$, $\tau^k = 0.095$, and $\tau^p = 0.157$. After putting this information together, set $\kappa = 3.24$. The computation of the real wage-to-output ratio in the preceding expression defining τ^p is based on the definition of the labor income share in output.

The scaling parameter λ^j is calibrated by using the specified production technology and an assumption about the size of the economy. Thus, total value added is normalized at 100. This merely amounts to a choice of units and does not affect the cyclical properties of the model. Set $\lambda^n = \lambda^x = 14.86$. Export demand elasticities are taken from Senhadji and Montenegro (1999), who report estimates for individual developing countries.¹⁶ The average long-run price and income elasticities are -1.25 and 1.06 , respectively.

The proportion of restricted households (π) is taken from López, Schmidt-Hebbel, and Servén (2000). These authors provide panel data estimates for the proportion of non-Ricardian consumers in developing countries in the range of 60 percent to 64 percent. Set $\pi = 0.60$. To compute the steady-state allocations of the two types of households, labor effort and consumption are treated symmetrically: $N^j = N_o^j = N_r^j$, $j \in \{n, x\}$, $C^n = C_o^n = C_r^n$, and $C^m = C_o^m = C_r^m$. Table 3.1 summarizes the results of the calibration exercise.

It remains to calibrate the stochastic structure of the economy. Shocks are jointly covariance-stationary stochastic processes. The vector of exogenous shocks, represented by $Z_t = [Y_t^*, p_t^x, s_t, Z_t^n, Z_t^x, G_t^n]^T$, has the following time-series representation:

$$\log Z_{t+1} = (I - \Xi) \log Z + \Xi \log Z_t + \zeta_{t+1} \quad \text{with} \quad E_t \zeta_{t+1} = 0, \quad E_t \zeta \zeta^T = \Omega \quad (33)$$

The elements of ζ_t are normally distributed and uncorrelated with ζ_{t-q} , $q > 0$, and the eigenvalues of Ξ lie inside the unit circle. Z is the vector of unconditional means given by $Z = [1, 1, 0.055, 1, 1, 14.5]^T$. The autocorrelation matrix Ξ and the variance-covariance matrix of innovations Ω are computed individually for nine LAC countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Honduras, Mexico, and Peru) and then averaged to get a representative estimate for the region. The entries in the autocorrelation matrix and in the main diagonal of matrix Ω are obtained from fitting univariate first-order autoregressive (AR(1)) processes. The remaining parameters—the off-diagonal elements of Ω —are computed by using the residual terms of these regressions. The exceptions are the covariances associated with the LEI spread s_t for which there is not sufficiently long, annual time-series information. Y_t^* is measured by the U.S. per capita GDP and taken from the WDI database; s_t is the average LAC LEI spread taken from the JP Morgan bond database; individual country data for the terms of trade (p_t^x) and government spending (G_t^n), as well as the data required to compute sectoral Solow residuals (Z_t^n , Z_t^x), are retrieved from the WDI database. Solow residuals are estimated as in Kose (2002). The set of yearly data generally spans the period from 1972 to 2000. The results of this parameterization strategy are summarized by the following matrixes:

$$\Xi = \begin{bmatrix} 0.96 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.67 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.76 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.86 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.93 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.91 \end{bmatrix}$$

$$\Omega = \begin{bmatrix} 0.0259^2 & & & & & & \\ 0.0170^2 & 0.1005^2 & & & & & \\ 0 & 0 & 0.2253^2 & & & & \\ 0.0084^2 & -(0.0388)^2 & 0 & 0.0688^2 & & & \\ 0.0144^2 & 0.0335^2 & 0 & -(0.0220)^2 & 0.0636^2 & & \\ -(0.0130)^2 & 0.0326^2 & 0 & 0.0406^2 & 0.0106^2 & 0.1850^2 & \end{bmatrix}$$

(34)

Solution Method

There is no analytical solution to the described optimization problem. To obtain an approximate solution, the system of first-order conditions is log-linearized around its deterministic steady state and the resulting multivariate, linear, rational expectations equation system is solved numerically with the Quadratic Determinantal Equation method developed by Binder and Pesaran (1997).

V. Simulation Results

Cyclical Properties

Before using an experimental simulation of the model economy to assess the stabilizing role of different parameters of the tax code, I first address the question of whether the model can mimic the observed cyclical behavior of the economies in the LAC region. This section compares the cyclical behavior of the simulated economies with that of the representative LAC economy. Table 3.2 presents the statistics summarizing the cyclical properties of three economies: (a) the representative LAC economy, which has a cyclical behavior that is simply the average of the observed behavior across LAC economies; and two artificial economies, including (b) the benchmark economy in which Ricardian and myopic consumers coexist and (c) a Barro-Ramsey-type economy inhabited by fully optimizing households. The artificial model economies are subject to all six sources of business cycle fluctuations.

Table 3.1 Calibrated Parameter Values

<i>Parameter</i>	<i>Description</i>	<i>Value</i>
r^*	Foreign interest rate	0.0400
β	Subjective discount factor	0.9132
ν	Parameter determining elasticity of substitution between consumption goods	-0.2200
α	Share parameter in CES consumption aggregator	0.8529
$\nu^n = \nu^x$	Parameter determining elasticity of substitution between investment goods	-0.2200
$\phi^n = \phi^x$	Share parameter in CES investment function	0.6212
$\chi^n = \chi^x$	Scale parameter in Armington-type CES investment function	1.9260
$\delta^n = \delta^x$	Rate of depreciation of the stock of physical capital	0.0633
$n = x$	Labor share parameter in the production function	0.5013
$\omega^n = \omega^x$	Parameter determining elasticity of substitution between capital and intermediate inputs	0.2650
$\zeta^n = \zeta^x$	Relative weight of capital in CES aggregator of capital-intermediate input services	0.8970
ξ	Parameter determining intertemporal elasticity of substitution in labor supply	1.6000
κ	Weighting parameter for the disutility of working time	3.2350
$\lambda^n = \lambda^x$	Production function scaling parameter	14.8627
ω^{y^*}	Export demand function price elasticity	-1.25
ω^*	Export demand function income elasticity	1.06
π	Fraction of constrained households	0.60
<i>Benchmark Tax Code Parameters</i>		
τ^c	Consumption tax rate	0.1495
τ^k	Corporate income tax rate	0.0947
τ^p	Personal income average tax rate	0.1572
μ	Fraction of physical investment deducted from business taxable income	1.0
η	Parameter determining the slope of the personal income tax schedule	0.0
ε^c	Fraction of consumption exempted from the consumption tax	0.2
ε^p	Fraction of personal income exempted from income taxation	0.5

Source: Author's calculations.

Note: CES = constant elasticity of substitution.

Table 3.2 Cyclical Properties of the Representative Latin America and the Caribbean and Model Economies

Variable (x)	Latin America and the Caribbean averages			Model (benchmark parameterization) ^a			Economy of Ricardian households		
	Relative volatility σ_x/σ_y	Output correlation $\text{corr}(x,y)$	First-order autocorrelation $\text{corr}(x_t, x_{t-1})$	Relative volatility σ_x/σ_y	Output correlation $\text{corr}(x,y)$	First-order autocorrelation $\text{corr}(x_t, x_{t-1})$	Relative volatility σ_x/σ_y	Output correlation $\text{corr}(x,y)$	First-order autocorrelation $\text{corr}(x_t, x_{t-1})$
Output (y = GDP)	1.00	1.00	0.63	1.00	1.00	0.38	1.00	1.00	0.41
Disposable income	1.04	0.95	0.61	1.08	1.00	0.37	1.09	1.00	0.40
Consumption	1.26	0.76	0.51	0.92	0.55	0.44	0.91	0.43	0.49
Investment	4.16	0.76	0.46	4.16	0.71	0.30	4.16	0.67	0.26
Trade balance-output ratio	0.71	-0.52	0.35	0.24	-0.21	0.30	0.36	-0.20	0.28
Primary government spending	2.83	0.50	0.38	2.83	0.32	0.37	2.83	0.32	0.37

(continued)

Table 3.2 Cyclical Properties of the Representative Latin America and the Caribbean and Model Economies
(continued)

Variable (x)	Latin America and the Caribbean averages			Model (benchmark parameterization) ^a			Economy of Ricardian households*		
	Relative volatility σ_x/σ_y	Output correlation $\text{corr}(x,y)$	First-order autocorrelation $\text{corr}(x_t, x_{t-1})$	Relative volatility σ_x/σ_y	Output correlation $\text{corr}(x,y)$	First-order autocorrelation $\text{corr}(x_t, x_{t-1})$	Relative volatility σ_x/σ_y	Output correlation $\text{corr}(x,y)$	First-order autocorrelation $\text{corr}(x_t, x_{t-1})$
Tax revenue	2.71	0.49	0.41	0.69	-0.49	0.32	0.74	0.71	0.53
Government debt-output ratio	1.23	-0.75	0.73	1.23	-0.47	0.38	1.00	-0.54	0.36

Source: Latin America and the Caribbean averages are taken from tables 8, 9, and 10 of the working paper version of this chapter.

a. The model's second moments are means of statistics computed for each of 200 simulations. Each simulation is 228 periods long and to compute statistics the first 200 observations are discarded; 28 periods is the average number of observations in the sample of Latin American and Caribbean countries. Before computing second moments, each simulated time series (except for GDP ratios) is logged and then Hodrick-Prescott filtered following the same procedure applied to compute Latin American and Caribbean statistics.

As usual in this literature, the business cycle properties are described by a set of unconditional second moments: (a) the relative amplitude of fluctuations in aggregate variables (relative standard deviation of each aggregate to the standard deviation of GDP); (b) the contemporaneous correlations of aggregate variables with output; and (c) the persistence of macroeconomic aggregates, measured by the first-order autocorrelation. To compute statistics, all variables, except GDP ratios, are expressed in per capita terms and logged, and then all are filtered using the Hodrick-Prescott filter with the smoothing parameter set at 100, the value commonly used for annual data. Statistics for the simulated economies are the means of statistics computed for each of 200 replications. Each simulation is 228 periods long and the first 200 observations are dropped so that the results do not depend on initial conditions. Second moments are computed using the remaining 28 observations, which are equal to the average sample size of 28 yearly periods in the database used to compute Latin America's business cycle facts.

In general, the benchmark model economy matches the core of business cycle frequency properties for the typical LAC economy. The ability of the benchmark model economy to mimic key qualitative aspects related to persistence and comovements in actual cyclical behavior is remarkable. The model correctly predicts that disposable income, consumption, and investment are strongly procyclical, whereas the trade balance-to-output ratio and the government debt-to-output ratio behave countercyclically. Even from a quantitative point of view, the model is quite successful in replicating some of these cyclical correlations. The model accounts for the strong persistence observed in most macroeconomic aggregates.

The model matches the relative volatility of disposable income, but it does not quite succeed in reproducing the volatility of consumption and tax revenue.¹⁷ The inability to mimic these features, however, cannot be considered a major failure of the model. The volatility of consumption is overestimated in the data because it includes durable goods consumption, which tends to behave more like investment and therefore exhibits much higher volatility. Tax revenue volatility is understated because the model does not allow for tax disturbances. WoldeMariam and Stotsky (2002) report significant changes in the region's tax systems over the last two decades. As a result, the inclusion of stochastic tax changes may not only increase the predicted volatility of tax revenue but also that of consumption. This avenue is not pursued here because the primary objective of the chapter is to evaluate the automatic stabilization role of a given tax structure.

Interestingly, the model economy inhabited exclusively by Ricardian households yields similar unconditional second moments. There is only one important difference to underscore. When the fraction of low-wealth households is 0.60 ($\pi = 0.60$), the (benchmark) model economy counterfactually predicts that tax revenues are countercyclical. Instead, the Ricardian economy ($\pi = 0$) displays a significantly larger procyclicality

of tax proceeds, roughly in line with observed behavior in the region. As shown below, the volatility levels predicted by the two economies are quite different and conditioned by both the tax structure and the source of fluctuations.

As in the data, the model correctly predicts a high positive correlation between government spending and output. This prediction remains unchanged when using the first difference filter instead of the Hodrick-Prescott filter to detrend simulated government spending and output. The match of this feature is interesting not only because some authors have claimed that the “procyclicality of fiscal policy is a puzzle in search of explanation” (Talvi and Végh 2000), but also because this type of evidence has been reported as proof of the destabilizing conduct of fiscal policy. For instance, based on a positive correlation between the growth rate of real government spending and output, Gavin, Hausmann, Perotti, and Talvi (1996) concluded that the volatility of the LAC economies had been augmented by highly procyclical fiscal responses. Agénor, McDermott, and Prasad (1999) and Talvi and Végh (2000) reported a positive correlation between Hodrick-Prescott filtered components of government spending and output to draw conclusions on how fiscal policy behaves over the business cycle. The striking result generated by the model economy is that the presence of such a feature says nothing about how policies are conducted over the business cycle. In the model economy, government spending follows an exogenous Markov process, which, by definition, does not take into account the endogenous state of the economy. The model proves that attributing intentionality to fiscal policy (that is, policy makers increase government consumption during expansions and decrease it during recessions) on the basis of the above-mentioned correlation is incorrect. This sheds doubt on how well grounded the generally accepted claim that fiscal policy is procyclical in the developing world really is.

Lane (2003) proposes a regression-based measure of cyclicity of fiscal policy for OECD countries. To that end, he estimated an OLS regression of the growth rate of government spending against the growth rate of output (and a constant). I used Monte Carlo experiments to assess the power of this approach. A total of 1,200 sets of time series were created by simulations, following the general procedure previously described. Using unfiltered data, Lane’s regression was estimated as many times and a significance test was repeatedly applied to examine whether the approach rejects the hypothesis of no response of government spending to cyclical conditions, as should be the case in our model. The average estimated regression coefficient was 0.87 (0.62), and in 48 percent (37 percent) of the 1,200 trials, it turned out to be significantly different from zero using a *t*-test with a nominal size of 5 percent for the economy populated by both Ricardian and non-Ricardian (Ricardian) households. This exercise suggests—based on the difference between the nominal and empirical sizes of the *t*-test—that Lane’s approach fails

to make the correct inference more often than expected. Additional Monte Carlo experiments indicated that regression-based measures of cyclicity are correct when current output growth is instrumented to control for the possible endogeneity bias. This methodology has not been employed until recently (for industrial countries, see Galí and Perotti 2003; for a sample of industrial and developing countries, see Fatás and Mihov 2004).

Automatic Stabilizers in the LAC Region

Automatic revenue stabilizers. The issue of the degree of stabilization provided by the tax structure is addressed by comparing the volatility of aggregate output in an economy with a given tax structure to that of an economy with lump-sum taxation (that is, with $\varphi = 0$). In each simulated economy (including the reference economy with nondistortionary taxation), the level of tax collection is the same (15.7 percent of GDP, as in the benchmark parameterization). This implies that economies under alternative tax structures combine distortionary taxation with lump-sum taxation (or transfers) to ensure a constant level of tax proceeds. The unconditional mean of government spending is held constant. Notice that the ensuing discussion focuses exclusively on stabilization issues, yet disregards efficiency and distribution implications, to use Musgrave's (1959) famous division of the state into its three functional branches.

Figures 3.4 and 3.5 depict relative output volatilities when a given parameter of the tax code is changed, while keeping the other tax parameters constant at their baseline calibration values and when the business cycle is driven by alternative forcing processes. In the economy depicted in figure 3.4, households are fully optimizing; the economy depicted in figure 3.5 is inhabited by both Ricardian and non-Ricardian households. In the Barro-Ramsey economy, income taxes are strongly destabilizing in the sense that tax rate increases rapidly translate into higher output volatilities across most sources of business fluctuations. When the business cycle is driven by technology shocks to the nontradable sector and to a lesser extent by technology shocks to the exportable sector, the positive relationship lessens considerably—to the point at which the destabilizing effect practically disappears. In other words, tax rates are more destabilizing when the business cycle is driven primarily by fluctuations such as terms-of-trade shocks, lending spread shocks, world business cycle shocks, and government spending shocks, and much less so when driven by technology shocks. The same applies to the parameter determining the slope of the personal tax schedule—for example, the degree of progressivity of the personal income tax is more destabilizing when the business cycle is driven primarily by terms-of-trade shocks, lending spread shocks, world business cycle shocks, and government spending shocks, and much less so when driven by technology shocks.

Other features of the tax code to consider are the personal exemption level and the level exemption in the consumption tax base. Both features are unrelated to the business cycle, for example, they neither smooth nor destabilize the business cycle. Regarding the deduction of new investment expenses, simulation results show that relative output volatilities are a

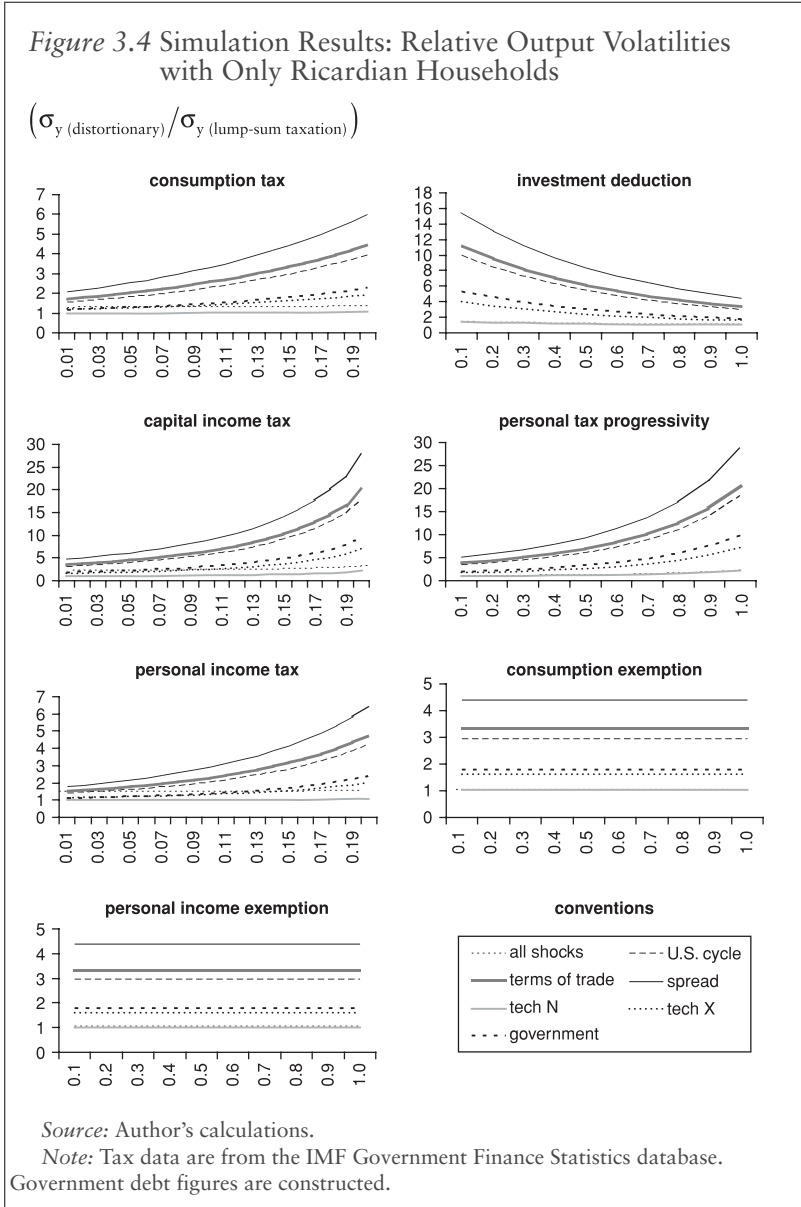
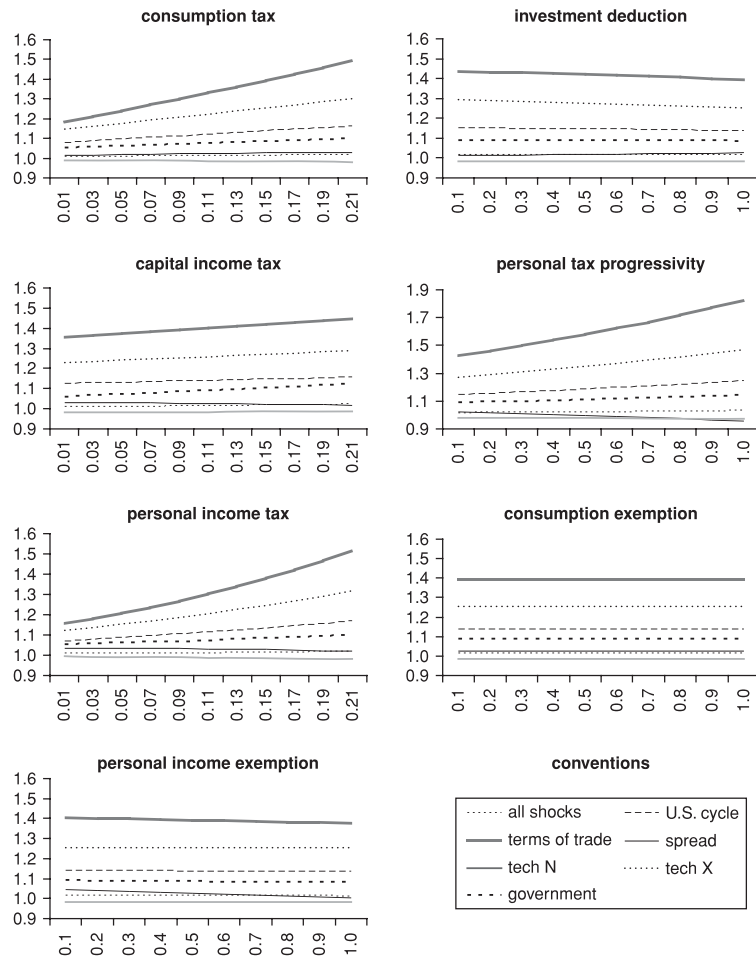


Figure 3.5 Simulation Results: Tax Structure and Relative Output Volatilities

$$\left(\frac{\sigma_y (\text{distortional})}{\sigma_y (\text{lump-sum taxation})} \right)$$



Source: Tax data are from the IMF Government Finance Statistic database. Government debt figures are constructed as indicated in the main text. The remaining data are taken from the World Development Indicators database.

decreasing function of the fraction of investment in physical capital that can be deducted from corporate income. This is the only feature of the tax code that, in an economy inhabited by fully optimizing households and hit by multiple shocks, operates like an automatic stabilizer.

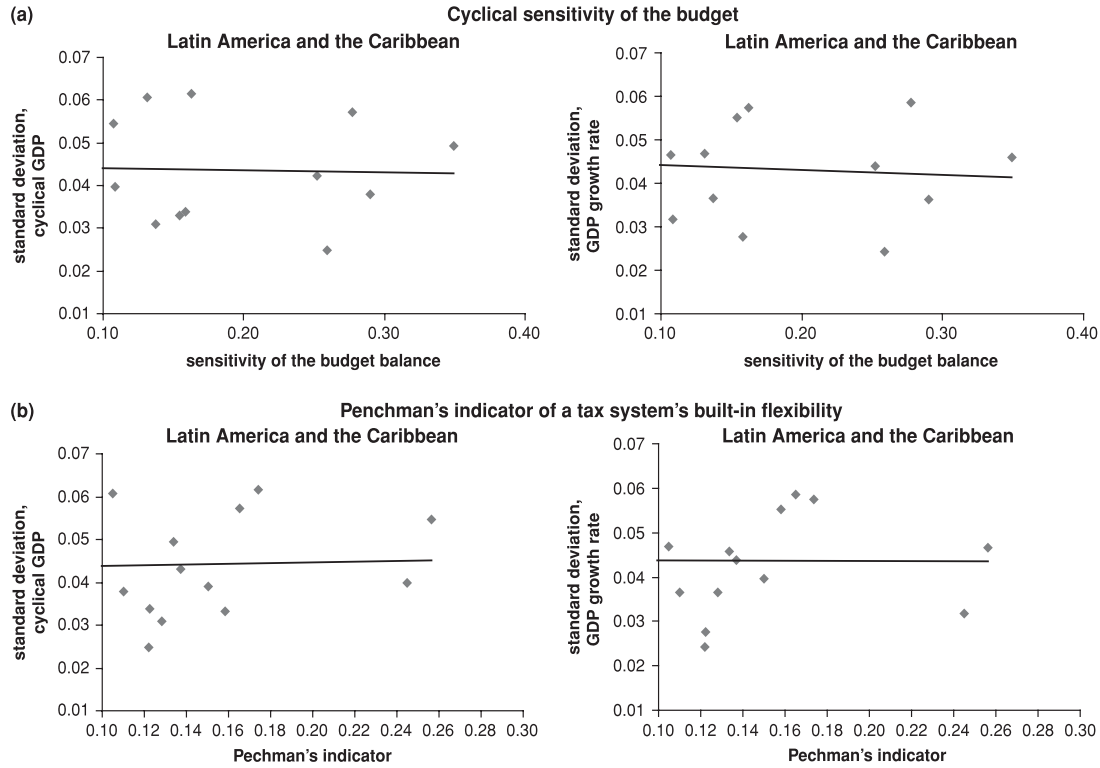
The introduction of nonoptimizing households (figure 3.5) flattens the relative volatility schedules quite dramatically (note the difference in the scale of the y-axes in figures 3.4 and 3.5). Under most alternative sources of business fluctuations, relative volatilities do not respond (or respond only slightly) to changes in tax code parameters. There is one salient exception to this. The consumption tax, the personal income tax rate, and the degree of progressivity of the income tax tend to increase the volatility of the economy when the business cycle is driven mainly by terms-of-trade shocks. Otherwise, results seem to suggest an invariance property: the amplitude of the business cycle is independent of the tax structure. The obvious consequence is that business cycle swings are not dampened by the automatic revenue stabilizers. A cursory look at the LAC data reveals that a case can be made for this theory. Figure 3.6 relates the two measures of the size of the automatic revenue stabilizers (see SBB and PI in section II) to two measures of GDP volatility (standard deviation of the Hodrick-Prescott filtered log-GDP and the volatility of the growth rate of GDP). The figure seems to support the view that automatic revenue stabilizers in the LAC region do not smooth nor exacerbate business cycle fluctuations.

The stabilizing role of government size. Figure 12 of the working paper version (not included here) plots relative output volatilities when the unconditional mean ratio of government spending to GDP is changed in the benchmark economy, although the tax parameters remain constant at their baseline calibration values and when the business cycle is driven by alternative forcing processes. Government size indeed plays the role of an automatic stabilizer that works across most sources of business fluctuations, unless the source of fluctuations is government spending innovations. However, its smoothing effect is weak.

Greater effects are observed when the business cycle is mainly a result of lending spread and world business cycle innovations. In these cases, the doubling of the government sector share in the economy from 15 percent to 30 percent of GDP will reduce relative output volatilities by 25 percent and 18 percent, respectively. For the remaining shocks, other than government spending shocks, the reduction in volatility is lower than 9 percent.

An increase in the size of government makes the economy more vulnerable to the government shock process. The government size variable is destabilizing when the business cycle is mainly due to government spending shocks. Simulations with multiple shocks indicate that relative output volatilities slowly decrease until the size of government reaches about 12 percent of GDP. Thereafter, the destabilizing effect of government shocks

Figure 3.6 Automatic Revenue Stabilizers and Business Cycle Volatility



Source: Author's calculations.

dominate other stabilizing forces, and relative volatilities slowly increase with government size.

At first glance, the overall results seem to be at odds with figure 3.1, which shows that in the LAC region there is a positive relationship between government size and output volatility. Figure 3.7 shows that, in a broader sample of developing countries, the relationship between government size and volatility is weak, as the model predicts. The model's predictions provide a rough and reasonable portrait of what is observed in middle-income countries.

VI. Concluding Remarks

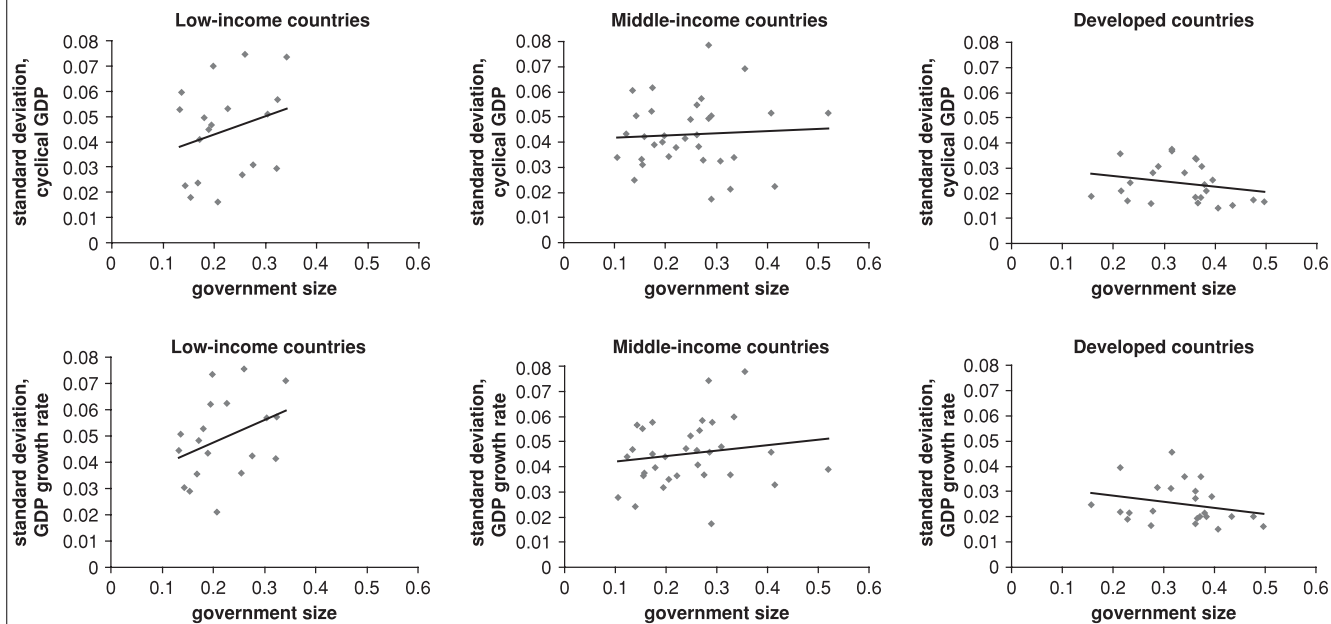
Earlier work on LAC fiscal policy is complemented and extended in this chapter in several key respects. Previous work has singled out the issue of procyclicality of discretionary policy as its main focus. Here, the existing characterization has been enriched by focusing on the nondiscretionary component of fiscal policy. To do so, the size of the automatic revenue stabilizers in Latin America has been measured following standard methodologies and the analysis has found that they are small relative to industrial economies and not responsive to cyclical conditions.

Despite the small size of the stabilizers, policy makers as well as analysts attribute—in a mechanistic fashion—a certain capacity to offset fluctuations to automatic stabilizers of a given size. In this chapter, the smoothing role of the automatic revenue stabilizers has been assessed within a dynamic, stochastic, small open-economy model with multiple shocks, capturing the fact that the region's business cycle is far from being driven by purely demand shocks. This chapter shows that standard measures of the size of the automatic stabilizers do not provide useful information about the potential stabilizing role of the tax system. In a typical LAC economy, in contrast to Keynesian predictions, this chapter also shows that the degree of smoothing provided by the automatic revenue stabilizers, described by various properties of the tax system, is negligible. All in all, the simulation results seem to suggest an invariance property for middle-income countries: the amplitude of the business cycle is independent of the tax structure.

The model economy lent itself to evaluating the stabilizing effect of government size as measured by the GDP ratio of primary government spending. Simulation results suggest that government size indeed plays the role of an automatic stabilizer that works across most sources of business fluctuations, but the overall smoothing effect is weak. In addition, as the size of government increases, government spending shocks become a strong destabilizing force, which ends up offsetting the smoothing effect.

The usual policy claim that the adoption of a given structural fiscal rule lets the automatic fiscal stabilizers work is vacuous in practice. Fiscal rules

Figure 3.7 The Stabilizing Role of Government Size in a Broader Sample



Source: Author's calculations.

Table 3.3 Latin America and the Caribbean: Standard Deviations (Volatilities) Relative to Output

	<i>Disposable income</i>	<i>Consumption</i>	<i>Investment</i>	<i>Trade balance to GDP</i>	<i>Government spending</i>	<i>Tax revenue</i>	<i>Government debt to GDP</i>
Argentina	0.94	1.10	2.73	0.32	3.41	3.99	0.82
Bolivia	0.94	1.01	4.62	0.66	outlier	outlier	3.07
Brazil	1.00	1.28	3.10	0.24	4.00	2.88	1.64
Chile	1.06	1.84	3.85	0.96	1.67	1.43	1.62
Colombia	1.11	1.08	5.64	1.00	3.06	2.95	1.24
Costa Rica	1.12	1.43	4.17	0.93	3.12	1.98	0.97
Dominican Republic	0.98	1.45	3.93	0.74	3.65	3.47	0.71
Ecuador	1.28	1.00	3.94	0.79	3.44	3.06	1.53
El Salvador	0.91	1.44	3.25	0.65	2.24	2.34	0.64
Guatemala	0.96	0.87	4.62	0.43	3.31	4.02	0.44
Mexico	0.98	1.17	3.58	0.71	3.19	1.62	1.17
Nicaragua	1.06	1.44	outlier	0.86	3.31	2.34	2.21
Panama	0.86	1.50	6.91	0.70	1.61	2.65	1.22
Paraguay	0.95	1.44	3.28	0.98	2.61	2.49	0.83
Peru	1.00	0.97	3.32	0.34	1.46	1.97	0.55
Uruguay	0.93	1.24	3.79	0.56	2.12	2.19	0.73
Venezuela, R. B. de	1.53	1.16	5.78	1.15	3.01	4.02	1.50

(continued)

Table 3.3 Latin America and the Caribbean: Standard Deviations (Volatilities) Relative to Output (continued)

	<i>Disposable income</i>	<i>Consumption</i>	<i>Investment</i>	<i>Trade balance to GDP</i>	<i>Government spending</i>	<i>Tax revenue</i>	<i>Government debt to GDP</i>
Average	1.04	1.26	4.16	0.71	2.83	2.71	1.23
Median	0.98	1.24	3.93	0.71	3.12	2.65	1.17
Maximum	1.53	1.84	19.07	1.15	7.29	7.90	3.07
Minimum	0.86	0.87	2.73	0.24	1.46	1.43	0.44

Source: Tax data are from the IMF Government Finance Statistics database. Government debt figures are constructed as indicated in the main text. The remaining data are taken from the World Development Indicators database.

Note: Disposable income = GDP – taxes revenue; consumption = household final consumption; investment = gross capital formation; trade balance = exports of goods and services – imports of goods and services. All variables except net exports and government debt are in per capita terms and in logarithms; all variables filtered with the Hodrick-Prescott filter. Volatility is the percentage deviation from the Hodrick-Prescott trend.

Table 3.4 Latin America and the Caribbean: Output Correlations

	<i>Disposable income</i>	<i>Consumption</i>	<i>Investment</i>	<i>Trade balance to GDP</i>	<i>Government spending</i>	<i>Tax revenue</i>	<i>Government debt to GDP</i>
Argentina	0.97	0.93	0.91	-0.88	0.68	0.59	-0.94
Bolivia	0.90	0.74	0.43	0.02	0.15	0.40	-0.48
Brazil	0.91	0.30	0.83	-0.64	0.38	0.51	-0.55
Chile	0.97	0.93	0.72	-0.90	0.51	0.60	-0.91
Colombia	0.96	0.84	0.68	-0.49	-0.01	0.18	-0.79
Costa Rica	0.97	0.83	0.87	-0.64	0.63	0.23	-0.87
Dominican Republic	0.91	0.53	0.69	-0.26	0.61	0.53	-0.67
Ecuador	0.91	0.86	0.68	-0.44	0.51	0.01	-0.92
El Salvador	0.98	0.89	0.84	-0.65	0.36	0.78	-0.59
Guatemala	0.95	0.98	0.67	-0.24	0.66	0.52	-0.88
Mexico	0.98	0.95	0.85	-0.66	0.62	0.76	-0.46
Nicaragua	0.88	0.27	0.59	-0.17	0.34	0.47	-0.48
Panama	0.98	0.51	0.83	-0.60	0.63	0.85	-0.88
Paraguay	0.98	0.64	0.92	-0.52	0.52	0.69	-0.94
Peru	0.97	0.95	0.70	-0.51	0.80	0.56	-0.71
Uruguay	0.95	0.92	0.91	-0.79	0.54	0.73	-0.86
Venezuela, R. B. de	outlier	0.82	0.82	-0.55	0.56	-0.03	-0.81

(continued)

Table 3.4 Latin America and the Caribbean: Output Correlations (continued)

	Disposable income	Consumption	Investment	Trade balance to GDP	Government spending	Tax revenue	Government debt to GDP
Average	0.95	0.76	0.76	-0.52	0.50	0.49	-0.75
Median	0.96	0.84	0.77	-0.53	0.53	0.53	-0.80
Maximum	0.98	0.98	0.92	0.02	0.80	0.85	-0.46
Minimum	0.82	0.27	0.43	-0.90	-0.01	-0.03	-0.94

Source: Tax data are from the IMF Government Finance Statistics database. Government debt figures are constructed as indicated in the main text. The remaining data are taken from the World Development Indicators database.

Note: Disposable income = GDP – taxes revenue; consumption = household final consumption; investment = gross capital formation; trade balance = exports of goods and services – imports of goods and services. All variables except net exports and government debt are in per capita terms and in logarithms; all variables filtered with the Hodrick-Prescott filter. Output correlation is the contemporaneous correlation with GDP.

Table 3.5 Latin America and the Caribbean: Persistence of Macroeconomic Aggregates

	GDP	Disposable income	Consumption	Investment	Trade balance to GDP	Government spending	Tax revenue	Government debt to GDP
Argentina	0.43	0.32	0.46	0.50	0.48	0.48	0.43	0.60
Bolivia	0.84	0.79	0.74	0.26	0.47	0.40	0.42	0.76
Brazil	0.64	0.52	0.49	0.56	0.37	0.28	0.43	0.72
Chile	0.58	0.52	0.47	0.26	0.50	0.60	0.56	0.61
Colombia	0.67	0.61	0.53	0.61	0.71	0.34	0.48	0.82
Costa Rica	0.64	0.71	0.53	0.56	0.50	0.39	0.19	0.73
Dominican Republic	0.47	0.52	-0.02	0.40	-0.05	0.46	0.30	0.66
Ecuador	0.48	0.50	0.63	0.18	0.08	0.26	0.04	0.67
El Salvador	0.80	0.77	0.74	0.60	0.51	0.56	0.65	0.83
Guatemala	0.83	0.80	0.82	0.47	0.29	0.54	0.64	0.80
Mexico	0.64	0.59	0.62	0.44	0.54	0.46	0.48	0.83
Nicaragua	0.54	0.56	0.30	outlier	-0.08	0.29	0.49	0.79
Panama	0.61	0.61	0.16	0.38	0.12	0.08	0.39	0.61
Paraguay	0.73	0.70	0.27	0.67	0.20	0.60	0.55	0.81
Peru	0.62	0.57	0.67	0.51	0.51	0.47	0.33	0.80
Uruguay	0.68	0.66	0.58	0.77	0.56	0.20	0.41	0.66
Venezuela, R. B. de	0.54	outlier	0.66	0.26	0.16	0.09	0.14	0.66

(continued)

Table 3.5 Latin America and the Caribbean: Persistence of Macroeconomic Aggregates (continued)

	GDP	Disposable income	Consumption	Investment	Trade balance to GDP	Government spending	Tax revenue	Government debt to GDP
Average	0.63	0.61	0.51	0.46	0.35	0.38	0.41	0.73
Median	0.64	0.60	0.55	0.45	0.42	0.40	0.42	0.75
Maximum	0.84	0.80	0.82	0.77	0.71	0.60	0.65	0.83
Minimum	0.43	0.50	-0.02	-0.05	-0.08	0.08	0.04	0.61

Source: Tax data are from the IMF Government Finance Statistics database. Government debt figures are constructed as indicated in the main text. The remaining data are taken from the World Development Indicators database.

Note: Disposable income = GDP – taxes revenue; consumption = household final consumption; investment = gross capital formation; trade balance = exports of goods and services – imports of goods and services. All variables except net exports and government debt are expressed in per capita terms and in logarithms; all variables filtered with the Hodrick-Prescott filter. Persistence is defined as first order autocorrelation.

of the type embedded in the Maastricht Treaty and Stability and Growth Pact, for instance, when adopted by an average LAC economy, will not allow public sector nondiscretionary finances to play a countercyclical role in the economy. The design of fiscal rules or the design of an institutional framework for the region's fiscal policies that can provide the required discipline, while preserving enough flexibility, is still an open question. This is likely to be an important direction for future research.

Notes

1. Mankiw (2000) introduces this sort of heterogeneity to overcome the failure of the Barro-Ramsey model (and the Diamond-Samuelson model) to explain why consumption closely follows the evolution of current income and the fact that the net worth of many households is near zero. LAC countries are also confronted with these undeniable facts. A growing body of literature shows that this form of heterogeneity provides insight into the effect of macroeconomic policies, which happens to be consistent with other observed facts at the macro level (see Andrés, Domenech, and Fatás 2004; Galí, López-Salido, and Vallés 2004).

2. Unemployment-related expenditures are small in industrial countries. For instance, this budget category amounts to 1.3 percent of GDP in the Euro Area and 1.4 percent in the EU-15 countries in 1999. However, it is highly responsive to cyclical variations in output (Bouthevillain et al. 2001).

3. A zero elasticity with respect to the business cycle is implicitly attached to other revenue categories.

4. The inflation rate is defined as $\text{inflation rate}/(1+\text{inflation rate})$.

5. In a strict sense, this is not a tax elasticity measure but a tax buoyancy measure. The latter incorporates the impact of any discretionary changes in tax rates on revenue collection data.

6. In some cases, the described general methodology to compute SBB did not work satisfactorily. In those cases, Hodrick-Prescott filtered (logged) series (budget categories, tax bases, and output) are used to estimate elasticities.

7. The sample of LAC countries includes 16 countries: Argentina, Bolivia, Brazil, Chile, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and República Bolivariana de Venezuela.

8. The sample of industrial countries includes the following: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Turkey, the United Kingdom, and the United States.

9. This message is consistent with two additional pieces of widely known information that, by definition, are incorporated into the construction of the preceding indicators: government size and the structure of taxation. Governments (tax revenue or the primary expenditures-to-GDP ratio) are bigger in industrial countries and the relative share of taxation of cyclically sensitive tax bases or the degree of progressivity of the tax system, proxied by the share of income taxes, is greater in industrial countries. This additional evidence suggests that automatic stabilizers are stronger in industrial countries.

10. Schmitt-Grohé and Uribe (2003) prove that alternative stationarity-inducing approaches (for instance, endogenous discount factor or debt-elastic interest rate premium) yield exactly the same dynamics at business cycle frequencies. It remains

to be shown, however, whether their result carries over into richer environments than the canonical small open economy model simulated in their paper.

11. See table 1 in the working paper version of this paper (Suescún 2007).
12. See table 2 in the working paper version (Suescún 2007).
13. See table 3 in the working paper version (Suescún 2007).
14. See table 4 in the working paper version (Suescún 2007).
15. For comparison, Cassou and Lansing (2004) econometrically estimate the parameters for the U.S. income tax schedule. Their results yield a slope parameter of $\eta = 0.214$.
16. See table 5 in the working paper version (Suescún 2007).
17. The capital adjustment cost parameter ψ^{kx} is calibrated to match the volatility of investment generated by the model to that of aggregate investment in the data.

References

- Agénor, P., J. McDermott, and E. Prasad. (1999) "Macroeconomic Fluctuations in Developing Countries: Some Stylized Facts." IMF Working Paper No. WP/99/35, International Monetary Fund, Washington, DC.
- Andrés, J., and R. Domenéch. 2006. "Automatic Stabilizers, Fiscal Rules and Macroeconomic Stability." *European Economic Review* 50: 1487–506.
- Andrés, J., R. Domenéch, and A. Fatás. 2004. "The Stabilizing Role of Government Size." CEPR Discussion Paper No. 4384, Centre for Economic Policy Research, London.
- Auerbach, A. 2002. "Is There a Role for Discretionary Fiscal Policy?" NBER Working Paper No. 9306, National Bureau of Economic Research, Cambridge.
- Auerbach, A., and D. Feenberg. 2000. "The Significance of Federal Taxes as Automatic Stabilizers." *Journal of Economic Perspectives* 14: 37–56.
- Backus, D., P. Kehoe, and F. Kydland. 1994. "Dynamics of the Trade Balance and the Terms of Trade: The J-Curve?" *American Economic Review* 84: 84–103.
- Berndt, E., and D. Wood. 1975. "Technology, Prices, and the Derived Demand for Energy." *Review of Economics and Statistics* 57: 259–68.
- Binder, M., and M. Pesaran. 1997. "Multivariate Linear Rational Expectations Models: Characterization of the Nature of the Solutions and Their Fully Recursive Computation." *Econometric Theory* 13: 877–88.
- Bouthevillain, C., P. Cour-Thimann, G. Van Den Dool, P. Hernández, G. Langenus, M. Mohr, S. Momigliano, and M. Tujula. 2001. "Cyclically Adjusted Budget Balances: An Alternative Approach." European Central Bank Working Paper No. 77, Frankfurt.
- Cassou, S., and K. Lansing. 2004. "Growth Effects of Shifting From a Graduated-Rate Tax System to a Flat Tax." *Economic Inquiry* 42: 194–213.
- Correia, I. J. Neves, and S. Rebelo. 1995. "Business Cycles in a Small Open Economy." *European Economic Review* 39: 1089–113.
- De Ferranti, D., G. Perry, I. Gill, and L. Servén. 2000. *Securing Our Future in a Global Economy*. Washington, DC: World Bank.
- Ellery, R., V. Gomes, and A. Sachsida. 2002. "Business Cycle Fluctuations in Brazil." *Revista Brasileira de Economia* 56: 269–308.
- Fatás, A., and I. Mihov. 2001. "Government Size and Automatic Stabilizers." *Journal of International Economics* 55: 3–28.

- . 2003. “The Case for Restricting Fiscal Policy Discretion.” *Quarterly Journal of Economics* 118: 1419–47.
- . 2004. “Fiscal Discipline, Volatility and Growth.” Unpublished paper, World Bank, Washington, DC.
- Galí, J. 1994. “Government Size and Macroeconomic Stability.” *European Economic Review* 38: 117–32.
- Galí, J., J. López-Salido, and J. Vallés. 2004. “Understanding the Effects of Government Spending on Consumption.” European Central Bank Working Paper No. 339, Frankfurt, Germany.
- Galí, J., and R. Perotti. 2003. “Fiscal Policy and Monetary Integration in Europe.” *Economic Policy* 18: 533–72.
- Gavin, M., R. Hausmann, R. Perotti, and E. Talvi. 1996. “Managing Fiscal Policy in Latin America and the Caribbean: Volatility, Procyclicality, and Limited Creditworthiness.” OCE Working Paper No. 326, Inter-American Development Bank, Washington, DC.
- Gavin, M., and R. Perotti. 1997. “Fiscal Policy in Latin America.” In *NBER Macroeconomics Annual*, eds. B. Bernanke and J. Rotemberg, 11–61. Cambridge, MA: MIT Press.
- Greenwood, J., Z. Hercowitz, and G. Huffman. 1998. “Investment, Capacity Utilization and the Real Business Cycle.” *American Economic Review* 78: 402–16.
- Guo, J., and S. Harrison. 2004. “Real Business Cycles and Automatic Stabilizers.” Unpublished paper, Econometric Society 2004 North American Summer Meetings.
- Guo, J., and K. Lansing. 1998. “Indeterminacy and Stabilization Policy.” *Journal of Economic Theory* 82: 481–90.
- Jonsson, G., and P. Klein. 1996. “Stochastic Fiscal Policy and the Swedish Business Cycle.” *Journal of Monetary Economics* 38: 245–68.
- Kose, A. 2002. “Explaining Business Cycles in Small Open Economies: ‘How Much Do World Prices Matter?’.” *Journal of International Economics* 56: 299–327.
- Lane, P. 2003. “The Cyclical Behaviour of Fiscal Policy: Evidence from the OECD.” *Journal of Public Economics* 87: 2661–75.
- López, H., K. Schmidt-Hebbel, and L. Servén. 2000. “How Effective is Fiscal Policy in Raising National Saving?” *Review of Economics and Statistics* 82: 226–38.
- Mankiw, G. 2000. “The Savers-Spenders Theory of Fiscal Policy.” *American Economic Review* 90: 121–25.
- Mendoza, E. 1991. “Real Business Cycles in a Small Open Economy.” *American Economic Review* 81: 797–889.
- . 1995. “The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations.” *International Economic Review* 36: 101–37.
- Musgrave, R. 1959. *The Theory of Public Finance*. New York: McGraw-Hill.
- Ostry, J., and C. Reinhart. 1992. “Private Savings and Terms of Trade Shocks. Evidence from Developing Countries.” *IMF Staff Papers* 39: 495–517.
- Pechman, J. 1973. “Responsiveness of the Federal Individual Income Tax to Changes in Income.” *Brookings Papers on Economic Activity* 2: 385–421.
- Romer, C., and D. Romer. 1994. “What Ends Recessions?” In *NBER Macroeconomics Annual*, eds. S. Fischer and J. Rotemberg, 13–57. Cambridge, MA: MIT Press.

- Sato, K. 1967. "A Two-Level Constant-Elasticity-of-Substitution Production Function." *Review of Economic Studies* 34: 201–218.
- Schmitt-Grohé, S., and M. Uribe. 2003. "Closing Small Open Economy Models." *Journal of International Economics* 61: 163–85.
- Senhadji, A. 1998. "Dynamics of the Trade Balance and the Terms of Trade in LDCs: The S-Curve." *Journal of International Economics* 46: 105–31.
- Senhadji, A., and C. Montenegro. 1999. "Time Series Analysis of Export Demand Equations: A Cross-Country Analysis." *IMF Staff Papers* 46: 259–73.
- Suescún, R. 2007. "The Size and Effectiveness of Automatic Fiscal Stabilizers in Latin America." Policy Research Working Paper No. 4244, World Bank, Washington, DC.
- Talvi, E., and C. Végh. 2000. "Tax Base Variability and Procyclical Fiscal Policy." NBER Working Paper No. 7499, National Bureau of Economic Research, Cambridge.
- Taylor, J. B. 2000. "Reassessing Discretionary Fiscal Policy." *Journal of Economic Perspectives* 14: 21–36.
- Van den Noord, P. 2000. "The Size and Role of Automatic Fiscal Stabilizers in the 1990s and Beyond." OECD Working Paper No. 230, Organisation for Economic Co-operation and Development, Paris.
- WoldeMariam, A., and J. Stotsky. 2002. "Central American Tax Reform: Trends and Possibilities." IMF Working Paper No. WP/02/227, International Monetary Fund, Washington, DC.
- World Bank. 2006. World Development Indicators. CD-ROM. Washington, DC.

Fiscal Federalism and Procyclical Spending: The Cases of Argentina and Brazil

*Federico Sturzenegger and
Rogério L. F. Werneck**

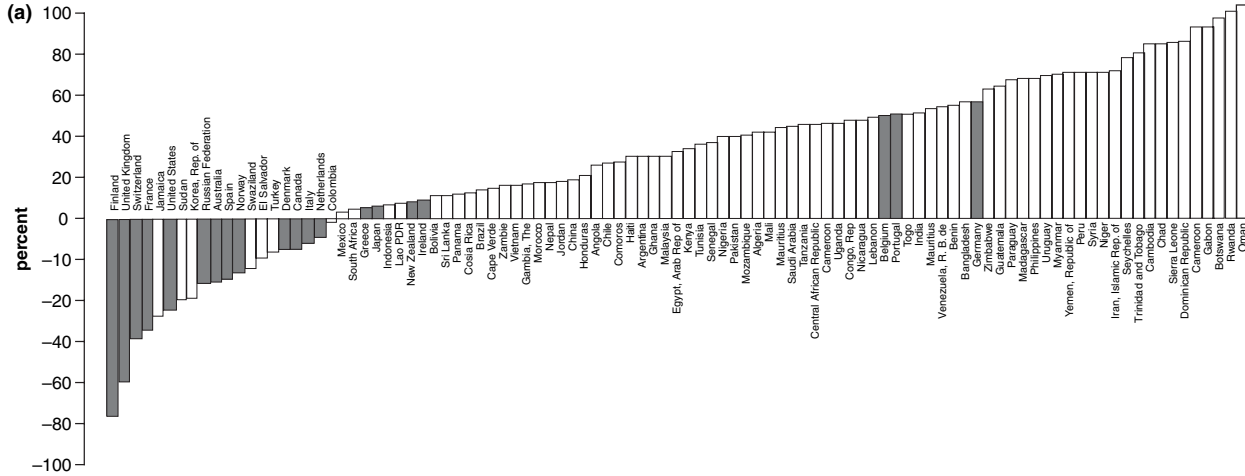
I. Introduction

It is well known that government consumption in emerging countries is typically procyclical, and Latin America is no exception to this trend. Figures 4.1a and 4.1b show the correlation between the cyclical component of government expenditure and gross domestic product (GDP),¹ which in general is positive. The contrast between developing and emerging countries and member countries of the Organisation for Economic Co-operation and Development (OECD) (indicated by a darker bar), for which procyclicality is much smaller, is particularly striking.

The fact that government spending is procyclical precludes the stabilizing role that fiscal policy should play in macroeconomic management. Even though neoclassical tax smoothing, Keynesian framework, or new growth theory would all argue for the benefits of a countercyclical fiscal result, for many countries the procyclicality of fiscal expenditures is so strong that it implies that *fiscal results* actually deteriorate with

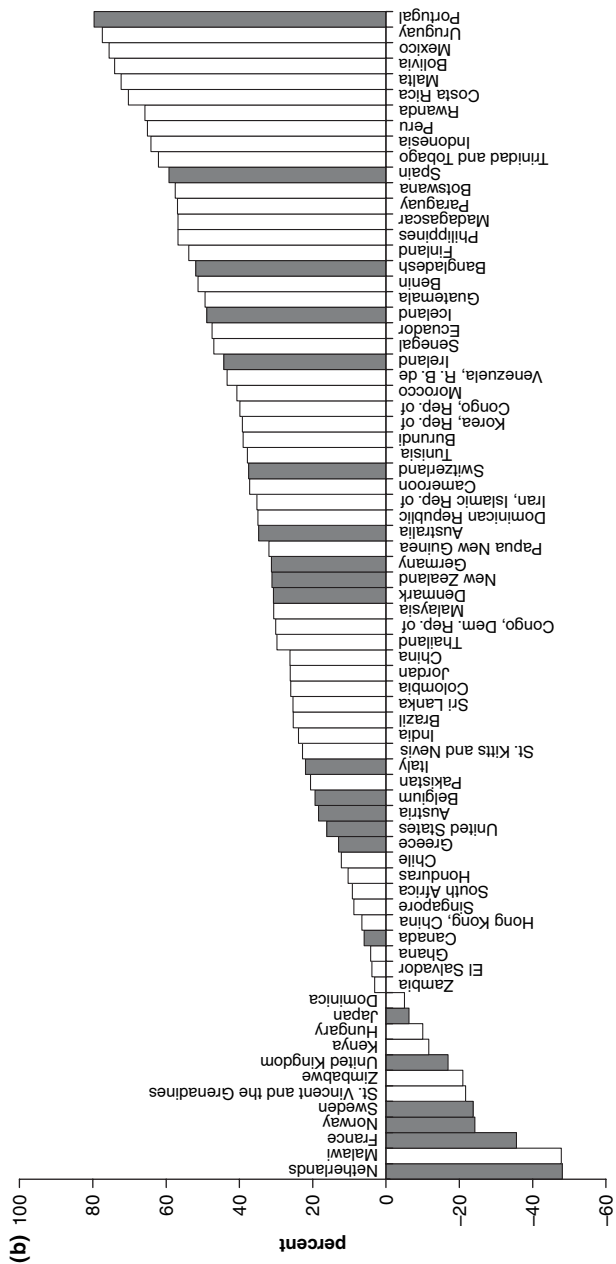
* The authors thank Daniel Artana, Cynthia Moskovits, Fernando Navajas, Andy Neumeyer, Alberto Porto, Rodrigo Suescun, and Abel Viglione for valuable comments. Sofia Zerbarini, Victoria Vanasco, and Federico Dorso provided able research assistance. This chapter was written for the World Bank. The comments expressed here reflect the views of the authors and not those of the World Bank. Reprinted from *Economica* LII (1-2): 151–94.

Figure 4.1 Procyclicality of Fiscal Policy



Source: Kaminsky, Reinhart, and Végh 2004.

Figure 4.1 Procyclicality of Fiscal Policy



Source: IMF World Economic Outlook database.

expansions. Notice that this requires fiscal expenditure to grow above and beyond the natural increase in tax revenues during an expansion (and to fall even more than revenues during a contraction). Figure 4.2 shows the procyclicality of fiscal results by showing the correlation over the last 30 years between fiscal results and the cyclical component of GDP.² Again, the fact that fiscal results deteriorate when economic conditions improve seems to be an almost exclusive feature of developing and emerging economies, whereas OECD countries show the expected procyclical result.

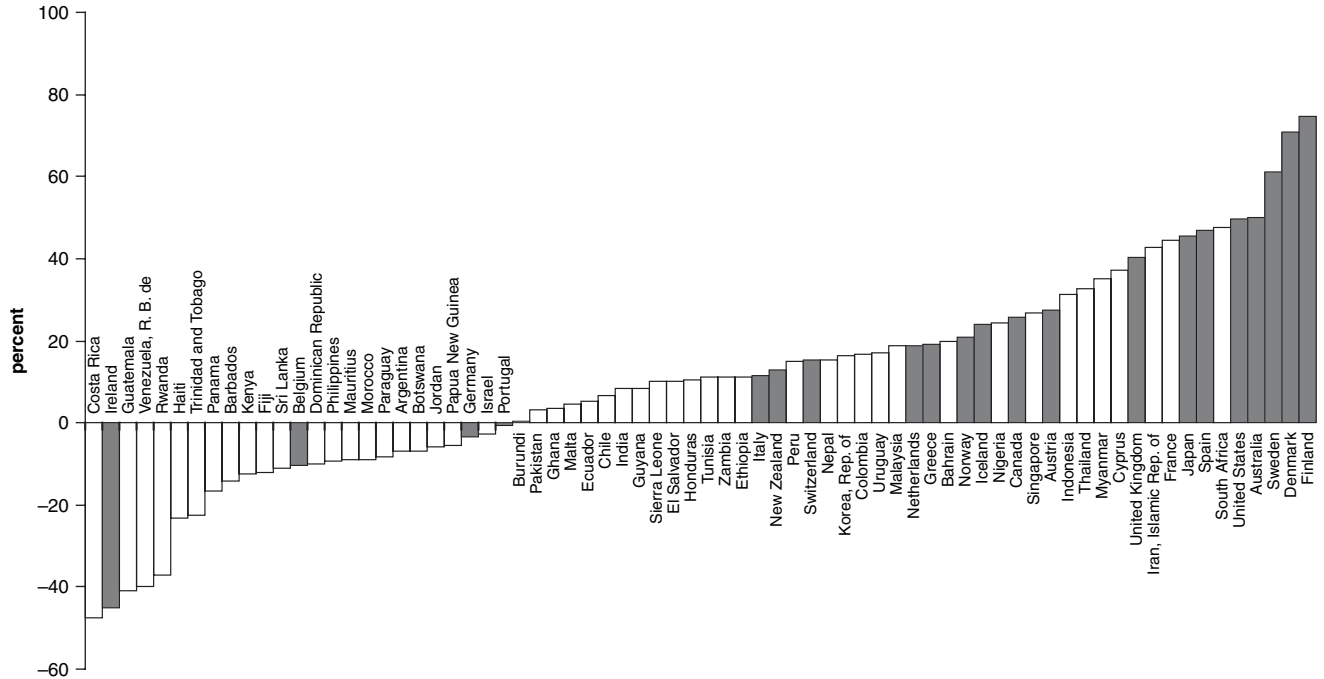
This feature not only has obvious implications in terms of macroeconomic stabilization, but it also may have a detrimental effect on growth. An ample body of literature suggests that more economic instability is associated with slower growth (for example, Ramey and Ramey 1995), thus, the procyclicality of government expenditure and fiscal results not only worsens the cyclical behavior of the economy but also hurts its growth potential. More recently, Aghion and Marinescu (2006) have made the point that a countercyclical fiscal policy is essential for growth because research and development (R&D) expenditures are the first to be cut in a recession (for an application to South Africa, see Frankel, Smit, and Sturzenegger 2007).

There is an extensive literature on the procyclicality of fiscal policy at large, including its effect on macrostabilization and growth. But one aspect that has been relatively less studied is the connection between so-called “vertical imbalances” in fiscal policy across different levels of government³ and the effect of these imbalances on the overall procyclicality of fiscal policies.

The conventional wisdom goes something like this: because subnational authorities are subject to some degree of vertical fiscal imbalance (they spend resources collected by the national authority), they have little incentive to collect taxes (both national and local) and have an incentive to increase spending above socially optimal levels, to run high and unsustainable deficits, and to have excessively procyclical fiscal behavior. At an anecdotal level, this view seems to be confirmed. In the cases of Brazil and Argentina, to take two countries that constitute the focus of this work, several examples illustrate how subnational governments worsened the overall fiscal picture. In Brazil, the default of the state of Minas Gerais in early 1999 prompted the sharp devaluation of the Brazilian real, and in Argentina, the fiscal behavior of the provinces were key in the process of fiscal deterioration, which led to the late-2001 crisis that forced the collapse of convertibility. This conventional wisdom has been the basis on which international financial institutions have supported their demands for clearer and more precise fiscal rules governing the relationship between the different levels of government, as well as in stressing the need to reduce the degree of vertical imbalances.

This chapter attempts to provide a fresh look at the conceptual issues and the evidence governing the relationship between procyclicality and

Figure 4.2 Procyclicality of Fiscal Results



Source: IMF International Financial Statistics database.

fiscal federalism. In section II, we discuss the reasons why government spending is procyclical and why these effects may be compounded when taking into account the existence of subnational units. Section III describes the specific relation between different levels of governments for the cases of Argentina and Brazil. Because ample references describe fiscal institutions in both countries, we present only a barebones sketch here. Both sections can be skipped by readers familiar with the literature and with the cases of Argentina and Brazil. Section IV, the core of the chapter, provides evidence of the procyclicality of fiscal policy in Argentina and Brazil. We explore a time-series and a cross-section dimension (how procyclicality changes across jurisdictions) at the local level. The richness of a cross-section allows us to test for the sources of procyclicality by exploiting the information contained in the different levels of procyclicality observed across subnational jurisdictions. We argue that procyclicality is mostly related to the nature of the local tax base of subnational jurisdictions rather than fiscal federalism. Section V concludes by arguing that the focus on changing fiscal-sharing rules has been misguided. The attention should be placed in developing better financial institutions that may allow for smoothing of fiscal variables across the business cycle with the resources collected by each jurisdiction, as well as potentially designing fewer procyclical revenue sources.

II. Why Is Spending Procyclical?

Traditional macroeconomic theory suggests that fiscal results should be countercyclical. On the one hand, neoclassical theory argues that spending and tax rates should be determined on the basis of efficiency considerations, and therefore mostly unrelated to the business cycle. Furthermore, to reduce the distortions of taxation, the theory shows that tax rates should be either maintained constant over time or reduced during a recession. As a result, tax revenues should increase during expansions and fall during recessions. With a relatively stable expenditure policy, the theory implies that governments should run deficits in recessions and surpluses during expansions (see Barro 1979). For different reasons, the Keynesian framework delivers the same recommendation. According to this view, fiscal policy should counteract business cycle fluctuations, increasing expenditures and reducing taxes during recessions. Again, the government should run deficits during recessions and surpluses during booms.

More recently, Aghion and Marinescu (2006) have argued that procyclical fiscal policy has detrimental effects on growth because firms curtail research and development expenditures during recessions. Thus, exacerbating the business cycle with fiscal policy reduces the level of R&D investment and reduces growth.

The evidence suggests that developed economies mostly fit the recommendations of theoretical models (see, for example, Gavin, Hausmann,

Perotti, and Talvi 1996; Hercowitz and Strawczynski 1999; Lane 2003; Talvi and Végh 2000). Figures 4.1 and 4.2 provide some cursory evidence. Talvi and Végh (2000) show that tax collection increases during an expansion and falls during recessions, that government spending is countercyclical in G-7 countries, and that although spending is procyclical in other industrial countries, it is less procyclical than tax revenues. Gavin and colleagues (1996) show that fiscal surpluses are procyclical in OECD countries, also confirming that these countries fit the theory. Arreaza, Sørensen, and Yosha (1999) find a similar result.

The pattern, however, does not fit emerging countries at large and Latin America in particular. In Latin American countries, tax collection is strongly procyclical, but this policy comes with extremely procyclical government expenditure, thus rendering budget results that either show no relation to the budget cycle as found in Gavin and colleagues (1996) or Talvi and Végh (2000), or are countercyclical as shown in figure 4.2.

There are several explanations why fiscal expenditure may be so procyclical. Gavin and colleagues (1996) suggest that the procyclicality arises from limited access to capital markets during downturns, thus forcing the government to contract expenditures when it needs them most. This interpretation seems to find some support in the fact that spending appears to be much more procyclical during recessions than during booms.

While there is ample evidence on the procyclicality of capital flows (see Kaminsky, Reinhart, and Végh 2004; Levy Yeyati 2006), the capital market channel does not require that governments be totally cut off from capital markets. Assume two types of government—a defaulting type and a nondefaulting type—and assume also that investors do not know which type of government is in power. When capital market conditions tighten, a nondefaulting-type government is hard pressed to show to the investor community its commitment to fulfill its obligations. Thus, the government follows excessively contractionary policies to signal its type at a time in which it most needs to be expansionary.⁴

Alternatively, Talvi and Végh (2000) argue that fiscal policies are procyclical because weak governments cannot face the political pressures to increase spending when in a boom, that is, when tax collection is on the rise or the economy benefits from an improvement in its terms of trade. Therefore, governments increase expenditures and reduce taxation to fend off such pressure, which delivers the result that both tax and expenditure policies become procyclical. The strong increase in fiscal demands during expansions can be rationalized by the so-called “voracity effect” proposed by Lane and Tornell (1999). According to their interpretation, if a group does not increase its appropriation during a boom, other groups will. Lane and Tornell (1999) show that there is a strong incentive to grab part of the newly available resources before other groups do, and that the incentives to do so increase with the size of the pie. Thus, this common pool problem becomes stronger in an expansion delivering the procyclical result.

Cukierman, Edwards, and Tabellini (1992) place the responsibility of procyclicality in the equilibrium, resulting in a political game between politically opposed governments. According to them, a government may run up debt levels (if capital flows are procyclical, this financing is available during booms) to constrain the spending policies of future governments (the Reagan tax cut, for example, can be interpreted as a way to condition the spending ability of future governments). If so, countries may build up debt during boom periods, thus generating a procyclical fiscal policy.

How does fiscal federalism affect the procyclicality of government expenditures? To explore this, we can revisit the explanations of procyclicality and see how they apply to subnational institutions. For example, the credit crunch hypothesis implies that subnational governments should be more procyclical than the national government under the (reasonable) assumption that their access to credit becomes even more difficult under credit constraint circumstances.⁵ However, this story cuts both ways: if a subnational government has a limited amount of debt because it never had *any* access to financing, domestic or international, then it should exhibit a lower degree of procyclicality than the national government. Below, we will test this theory by looking at the effect of provincial indebtedness on procyclicality.

The fiscal voracity effect is probably at work in the case of subnational governments, usually suspected of being subject to a higher degree of cronyism and corruption than the national government. This effect can be related to the procyclicality of provincial taxes (more volatility more procyclicality). We test below whether the procyclicality of government spending relates to that of provincial income.

How does the existence of bailouts and discretionary transfers affect the procyclicality of fiscal policy at the national and subnational levels? If discretionary transfers operate as an insurance mechanism over the business cycle, then these transfers will reduce the procyclicality of subnational government resources. Nicolini, Posadas, Sanguinetti, Sanguinetti, and Tommasi (2000) provide evidence that to some extent this is the case. The recent restructuring of provincial debt in Argentina, after the 2001 crisis, is another example. However, if transfers are subject to typical fiscal voracity effects—this time with subnational governments themselves preying on the pool of national resources—their existence will exacerbate the procyclicality of expenditures. How could we test for this channel? To the extent that bailouts are usually related to strong political links and that it is more costly to allow larger jurisdictions to fail, we can test the relevance of this explanation by relating the degree of procyclicality to the size of the jurisdiction (larger size should imply more procyclicality) as well as to the links between the governors and the national power (with stronger links potentially correlated with more procyclicality). If it is possible to free ride on the opening of capital markets for the national government, then subnational units will try to appropriate resources from

the federal government when this financing is available. Thus, periods with access to capital markets should show an increase in the procyclicality through this channel.

III. Fiscal Federalism Specificities: Argentina and Brazil

There are many extensive descriptions of the specific fiscal federalism arrangements in Argentina (see, for example, FIEL 2003; Gómez Sabaini and Gaggero 1997; Iaryczower and Tommasi 2002; Jones, Tommasi, and Sanguinetti 1999; Nuñez Miñana 1998; Piffano 1998; Porto 2004; Tommasi, Saiegh, and Sanguinetti 2001) and in Brazil (for example, Afonso and Mello 2000; Ter-Minassian 1997). We provide the minimum sketches here and relate the reader to more detailed and comprehensive assessments.

*Argentina*⁶

Argentina is a federal republic with a presidential government and a bicameral legislature. In the Chamber of Deputies, representatives for 24 provinces are chosen in closed party lists. Although the Chamber supposedly elects deputies in proportion to their provinces' populations, the Argentine system overrepresents the participation of small provinces through a minimum number of five deputies per jurisdiction. The Senate is represented by three senators each, two from the first majority and a third from the second party. Provincial governments have ample powers to decide their own rules of governance as well as taxing and spending decisions, while municipalities report to the provincial governments. Tommasi (2002) argues that this system, in which municipalities and deputies of each jurisdiction respond to the provincial executive, makes governors key players in the political equilibrium.

Although the Argentine Constitution establishes substantial room for subnational taxation, in practice, provinces have delegated to the national government the responsibility of raising a large share of their taxes. This revenue concentration contrasts with a spending decentralization process whereby the responsibility for key social functions is in provincial hands. For example, provinces have exclusive competence in primary and secondary education and in the provision of local public goods (accounting for most of the social expenditures in education, health, poverty programs, and housing).

Given expenditure decentralization and tax centralization, a high degree of vertical fiscal imbalance did result. In 2000, for example, 56 percent of total resources received by the provinces came from nationally collected taxes, while only 44 percent was financed directly by provincial revenues. Fifteen of the 24 provinces finance less than 30 percent of their spending with their own resources.

Argentina addresses this large vertical fiscal imbalance through a complex system of intergovernmental transfers. The most important component of this system is the tax-sharing agreement called *coparticipación* (coparticipation), which refers to the process by which part of the taxes collected by the central government are reallocated to the provinces. Over time, the system has tended to redistribute in favor of the most backward and low-density provinces.

The last Coparticipation Law, sanctioned in 1988, established a set of sharing rules. According to this law, the federal government would retain 42 percent of the revenue from the shared taxes, while 57 percent would be distributed among the provinces, with 1 percent set aside “to finance unforeseen crises in the provinces.” The law sets the percentages of “secondary” distribution, that is, the share of the 57 percent going to each province. This law stipulates most of the transfers, which dramatically reduces the scope for discretionary policies and redistribution.

Unfortunately, several other laws regulating the distribution of specific taxes to finance predetermined activities have supplemented the basic Coparticipation Law. These include a series of “fiscal pacts.” For example, in 1992–93, the national government was able to obtain a 15 percent reduction in the amount of tax resources to be shared with the provinces in exchange for financing the deficits in the local pension systems, which were transferred to the national budget.

According to Cetrángolo and Jiménez (2003), during the 1990s, as the economy recovered and tax collection increased, different schemes were pursued by both provinces and the federal government in order to appropriate a larger share of these resources. For example, although value added tax (VAT) and income taxes increased 152 percent between 1991 and 1995, and direct transfers increased by 122 percent, the federal government managed to keep coparticipation transfers constant.

These various reforms introduced new types of transfers besides coparticipation. In addition, a variety of specific channels earmarked the resources from some taxes for specific and often economically unrelated spending. This practice came to be known as the “fiscal labyrinth,” because of the intricacies and complexity of the resulting system. In some cases, the direct transfers appeared to be determined by political considerations. Cetrángolo and Jiménez (2003), for example, show that the distribution of discretionary funds between 1989 and 2001 favored politically protected provinces. For example, the province of La Rioja, from where the president at the time had built his political career, received 26.5 percent of all transfers to the provinces, with the next closest province receiving less than 6 percent.

The 1994 Constitutional reform stipulated that a new tax revenue-sharing agreement had to be decided and put in place by January 1, 1997. However, this constitutional mandate remains unfulfilled. As a result, new

fiscal pacts were signed in 1999 and 2000. In these pacts, the national government promised to the provinces some fixed-sum transfers and some minimum revenue guarantees, assuming the role of residual claimant. These clauses were violated by the national government during the 2001 crisis, when faltering tax revenues did not allow the government even to fulfill the minimum guarantee.

Further fiscal pacts were signed after exiting convertibility, and included a freeing from the fix transfer amount, an obligation for the federal government to coparticipate the financial transactions tax, debt restructuring, and, yet again, a pledge from provinces to balance the budget.

Within Argentina's federal structure, all levels of government are generally permitted to borrow domestically and abroad. In many provinces, however, the provincial Constitution imposes some restrictions on the borrowing ability of the government. In some jurisdictions, these restrictions are quite demanding, and in some cases there are restrictions on the level of indebtedness and on the uses of debt.⁷ Nevertheless, more often than not these restrictions are violated, and in many provinces they are too loose to be binding (Braun and Tommasi 2002). It is therefore not surprising to find that borrowing limits have little effect on the fiscal behavior of provinces (Jones, Tommasi, and Sanguinetti 1999).⁸

Provincial debt placements are subject to ex ante federal government controls, but the central government seldom aborts a provincial issue (Dillinger and Webb 1999). In recent years, the main borrowing control mechanism centered on the arrangements that the provinces made to collateralize their debt, by pledging *coparticipación* resources as collateral. As tax-sharing proceeds are distributed by the Banco de la Nación, provinces with a weak credit position grant an irrevocable order for Banco de la Nación to deduct the debt-service payments upfront from their *coparticipación* resources. For an idea of the extent to which this mechanism was used, consider that the percentage of tax revenues withheld for this purpose in 2000 ran from 2 percent in Buenos Aires and La Pampa, to 85 percent in Tucumán, 92 percent in Jujuy, and 97 percent in Rio Negro.

During 2001 and 2002, there was a large increase in the emission of provincial bonds in the form of quasi-money, which was used to pay wages and other inputs, with stock prices quickly increasing to about one-third of the monetary base at the time. This operation was started by several provinces, most notably Buenos Aires, and it was followed by a similar attempt of the national government that, to comply with the requirements of the various fiscal pacts, started issuing a "federal" bond (Letras de Canelación de Obligaciones Provinciales [LECOP]) of national circulation. Because it was used as money, it had a direct impact on the demand for the Argentine peso, which fueled the run on the peso that eventually led to the collapse of convertibility.

Brazil

Brazil has an extremely complex federation. The three government levels include the Union, 26 states and the federal district, and more than 5,500 municipalities. The Constitution explicitly considers municipalities to be members of the federation, giving them a much higher status than is generally observed in other federative countries.

The republic has a presidential regime and a bicameral legislature. Each state is equally represented in the upper chamber by three senators. Representation in the Chamber of Deputies is not strictly proportional to state constituencies, because the Constitution establishes that no state may have fewer than 8 deputies or more than 70. This constraint basically leads to an overrepresentation of the unpopulated northern states and a marked underrepresentation of the state of São Paulo.

The fiscal federalism arrangement has undergone great changes over the country's history. There have been alternating phases of decentralization and recentralization. During most of the nineteenth century, when the country had a parliamentary monarchy, a high degree of centralization prevailed. The Proclamation of Republic, in 1889, would bring extensive devolution of taxes and spending to the states. But the central government was strengthened again during the authoritarian Vargas regime in the 1930–45 period. Redemocratization brought a new decentralization wave, which would be reversed yet again from 1964 on, this time by 20 years of military government. The end of the military regime in 1985 opened room for yet another diastolic movement. The interests of subnational governments dominated the redesign of the fiscal federalism arrangement established by the 1988 Constitution.

Although the Constitution was unclear in its assignment of expenditures to the three levels of government, which left ample room for concurrent responsibilities, it was quite clear how revenues were assigned. Subnational governments, municipalities in particular, were directly or indirectly given a much more generous share of the aggregate taxes collected in the country. States and municipalities had their taxing power enhanced, but much of the redistribution involved intergovernmental transfers based on clear cut revenue-sharing rules established in the Constitution.

Drafted without minimum consistency guidelines, which a politically crippled executive branch was unable to defend, the new Constitution failed to endow the public sector with a coherent mechanism to protect the interests of the majority of the population against the multiple pressures of an emerging mass democracy. Instead, it amplified the scope for the historic widespread rent-seeking behavior of many segments of the Brazilian society, imposing on the federal budget a considerable additional burden. This burden came exactly when the Union's fiscal resources were being reduced in favor of state and local governments and in the wake of a newly introduced, but basically inconsistent, fiscal federalism.

As the new tax system designed in 1988 was phased in during the early 1990s, the central government faced growing financial difficulties. But it soon started an unrelenting reaction to avoid the scissors movement of shrinking revenues and swelling expenditures that had been imposed on the Union by the new Constitution. As expected, increasing revenues proved to be much easier than cutting back expenditures, especially when a large part of the federal spending could not be reduced unless politically costly constitutional amendments were approved by Congress.

Were it not for a big problem, the Union's consistent effort to increase its tax revenue—to recover what had been lost to state and local governments, to be able to properly finance its much enlarged spending responsibilities, and to attain a sizable fiscal-adjustment effort—would have been a tremendous success. Because the central government devised every kind of exotic taxation scheme that could raise revenues and that would not be shared with lower-level governments, it had to introduce low-quality taxes. These most commonly meant various forms of cascading turnover taxes, which seemed to have been definitely eliminated from the Brazilian tax system since the mid-1960s.

Brazil has a gross tax burden of more than 36 percent, unusually high for a developing country. In 2002, roughly 70 percent of the tax burden was imposed by the Union. Because the states' own revenue corresponded to slightly more than 25 percent, municipalities were left with a share of less than 5 percent of the total tax collection. When constitutional transfers are taken into account, however, the distribution of the aggregate tax revenue across jurisdictions changes dramatically. After all constitutionally mandated transfers were made in 2002, the Union ended up with only 60 percent of the aggregate tax proceeds. The states remained with roughly 25 percent, as constitutional transfers from the federal level were practically offset by their own transfers to municipalities. The great net beneficiary of the redistribution were the local governments. As a result of constitutional transfers from federal and state governments, municipalities could count on total revenue which was equivalent to almost 15 percent of the country's aggregate tax collection. In other words, local governments were able to have access to an amount of resources that roughly tripled their own revenue (see Secretaria da Receita Federal 2003).

Those aggregate shares conceal wide differences, at both the state and the local level. Although state-level governments as a whole only slightly benefit from constitutional transfers, individual states, the poorest ones in particular, have obtained a sizable net gain from the redistribution. Gains from transfers on the local government level vary widely among the extensive spectrum of thousands of extremely differentiated municipalities. That spectrum includes, at one end, the cities of São Paulo and Rio de Janeiro, and at the other, a variety of poor small towns, with no own revenue, completely dependent on intergovernmental transfers.

The revenue-sharing rules of federal- and state-level taxes embody a high degree of discrimination in favor of needier subnational governments.

More than three-fourths of all federal transfers to subnational governments are constitutionally mandated transfers. Most of these transfers stem from the revenue-sharing of the income tax and the Imposto Sobre Produtos Industrializados (IPI, the tax on industrial products), which are collected at the federal level. Transfers from states to municipalities are dominated by sheer compliance with revenue-sharing rules. Particularly important are the rules governing the sharing of the Impostos Sobre Circulação de Mercadorias e Prestação de Serviços (ICMS, taxes on goods and services), the state-level VAT, which is the highest-yielding source of revenue in the country. Discretionary, politically motivated grants have become much less important than in the past.

Undertaken to provide a sound basis for macroeconomic stability, the broad fiscal-adjustment effort that took place since the late 1990s required drastic changes in the fiscal-federalism arrangement, which were needed to impose hard budget constraints on subnational governments. The changes involved privatization of most state-owned banks and strict control on state borrowing. State debts were consolidated, transformed into debts to the Union, and rescheduled for 20 to 30 years (for details, see Bevilaqua 2000). Each state signed a separate agreement, in which its own revenue was offered in guarantee, and an explicit commitment to a detailed fiscal-adjustment program was made. This rescheduling created proper political conditions for the approval by Congress of the Fiscal Responsibility Law, which set up the institutional framework of a new fiscal regime.

The new legislation imposed several important constraints on subnational governments. Payroll outlays were limited to 60 percent of the net current revenue and debts were capped to a percentage of tax revenues, established by the Senate. Upon request of the federal executive branch, limits can be altered, but only in special circumstances. Currently, the debt stock as a proportion of the net current revenue is limited to 200 percent in the case of the states, and to 120 percent in the case of municipalities. Multiyear budgets, including explicit macroeconomic assumptions and contrasting scenarios, are required from all government levels. Budget limits have to be strictly respected. Fiscal crime legislation establishes penalties for mismanagement. Noncompliance exposes incumbent governors and mayors to fines, loss of office, legal prosecution, and reelection ban. Election-year provisions forbid borrowing based on anticipation of future revenue, expenditure without proper funding, and a ban on new hiring for 180 days before the election date. Emergency cash transfers among different government levels and any refinancing of debts are rigidly prohibited. To ensure greater transparency in management of public accounts, the law imposes detailed bookkeeping requirements on all government levels (for details, see Goldfajn and Guardia 2003). Approved in May 2000, the Fiscal Responsibility Law has proven to be an important advancement

in the evolution toward a rules-based fiscal policy, and has done so in a country with such a complex fiscal federalism arrangement as Brazil.⁹

IV. The Evidence: Procyclicality of Spending of Subnational Governments in Argentina and Brazil

Having reviewed the conceptual discussion and the institutional background of our analysis, we now tackle the question of how the degree of procyclicality of fiscal policy has been affected by the behavior of subnational governments in the cases of Argentina and Brazil.

Argentina

As discussed in section II, economic theory recommends that fiscal policy be countercyclical, that is, that government surpluses increase during expansions and decrease during contractions.¹⁰ To assess the extent to which this has been the case, we look at the aggregate fiscal results available for Argentina from a long-run perspective. And to do so, we look at a simple relationship:

$$\Delta Surplus_t = \alpha + \beta g_t + \varepsilon_t, \quad (1)$$

where the variable $\Delta Surplus$ represents the change in the overall fiscal balance (income minus expenditures) of the federal government between year t and $t-1$ in percentage points of GDP. The variable g_t represents the growth rate of the economy in year t . This simple relation cannot be interpreted as more than estimating the correlation between fiscal results and growth. Table 4.1 shows the results since the beginning of the twentieth century.¹¹

The results show that there is very little relationship between fiscal balances and output and, somewhat surprisingly, the 1990s show statistically significant evidence in favor of some countercyclical behavior of the fiscal result. Thus, the 1990s show *an improvement* in the management of fiscal policy, at least relative to previous decades. This may be due to the fact that the 1988 Coparticipation Law substantially restricted the degree of discretionary transfers, as explained in section II (also see Nuñez Miñana 1998). The results are very small, however, indicating that a 1 percent increase in output growth leads to an improvement of the fiscal result of 0.09 percent of GDP.

These results, however, are subject to important endogeneity concerns and can only provide a general overview. Table 4.2 focuses on the period since 1990, and disaggregates revenues and spending. By expanding on table 7 in Gavin and colleagues (1996), table 4.2 shows the procyclicality of the overall fiscal balance, as well as spending and revenues for the federal government and for large and small subnational governments.¹²

Table 4.1 Procyclicality in the Twentieth Century: Argentina

	<i>Change in surplus</i>									
	<i>1914–2001</i>	<i>1910s</i>	<i>1920s</i>	<i>1930s</i>	<i>1940s</i>	<i>1950s</i>	<i>1960s</i>	<i>1970s</i>	<i>1980s</i>	<i>1990s</i>
GDP growth	0.049 (0.036)	0.114* (0.053)	0.086 (0.16)	-0.051 (0.077)	0.136 (0.087)	-0.253* (0.115)	0.164 (0.137)	0.325 (0.304)	-0.022 (0.157)	0.089* (0.05)
Constant	-0.156 (0.206)	0.069 (0.484)	-0.678 (1.019)	-0.096 (0.379)	-0.645 (0.529)	0.536 (0.569)	-0.323 (0.844)	-1.256 (1.286)	0.085 (0.74)	-0.206 (0.275)
Observations	88	6	10	10	10	10	10	10	10	12
R ²	0.02	0.53	0.04	0.05	0.23	0.37	0.15	0.13	0.01	0.25

Sources: Authors' computations with data from Gerchunoff and Llach 2003.

*indicates significance at the 10 percent level.

Table 4.2 Cyclical Response of Fiscal Policy: Argentina 1992–2002

	OLS			Instrumental variables		
	Revenues	Expenditures	Surplus	Revenues	Expenditures	Surplus
OECD ^a	0.84	0.09	0.25			
Latin America	1.32	0.61	0.08			
with GDP						
Argentina	1.430 (0.293)***	1.500 (0.362)***	0.205 (0.073)**	1.196 (0.373)**	1.410 (0.447)**	0.243 (0.091)**
Total provinces	1.470 (0.091)***	1.391 (0.113)***	-0.056 (0.028)*	1.479 (0.112)***	1.276 (0.139)***	-0.016 (0.04)
Big provinces	1.832 (0.16)***	0.53 (0.43)	0.023 (0.03)	1.851 (0.229)***	0.062 (0.62)	0.013 (0.04)
Small provinces	1.389 (0.103)***	1.332 (0.127)***	-0.064 (0.034)*	1.404 (0.127)***	1.225 (0.157)***	-0.019 (0.04)
with local PBG						
Total provinces	1.124 (0.112)***	1.224 (0.123)***	-0.085 (0.029)***	2.011 (0.202)***	1.577 (0.205)***	0.063 (0.06)
Big provinces	1.792 (0.199)***	0.813 (0.441)*	-0.001 (0.031)	2.069 (0.316)***	0.147 (0.70)	0.016 (0.05)
Small provinces	1.000 (0.126)***	1.127 (0.140)**	-0.095 (0.034)***	2.041 (0.258)***	1.633 (0.258)**	0.003 (0.062)

Sources: Authors' computations with data from Ministry of Finance and unpublished data from CEPAL.

Note: OLS = ordinary least squares; PBG = producto bruto geografico.

a. Taken from Gavin, Hausmann, Perotti, and Talvi 1996.

*, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively.

In our version, the methodology looks, again, at a simple correlation between output and the fiscal variables, except that we now include fixed effects by jurisdiction in all the regressions that pool information from different provinces. The specification is simply,

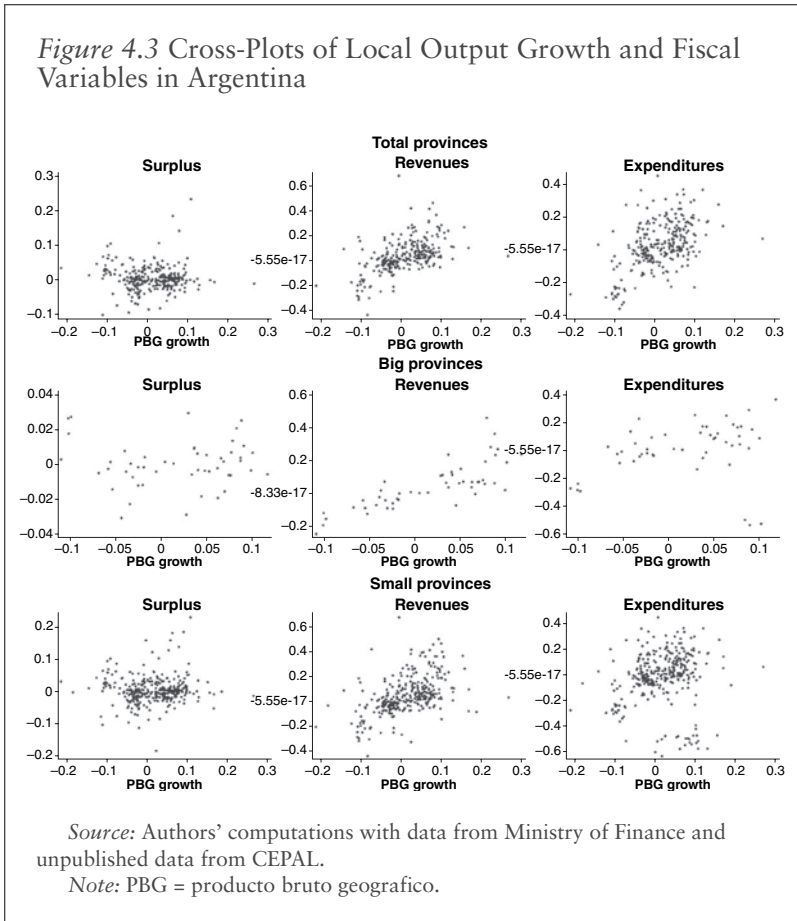
$$\begin{aligned}\Delta Surplus_t &= \alpha + \beta g_t + \mu_i + \varepsilon_t \\ \Delta Revenues_t &= \alpha + \beta g_t + \mu_i + \varepsilon_t \\ \Delta Expenditures_t &= \alpha + \beta g_t + \mu_i + \varepsilon_t\end{aligned}\tag{2}$$

where $\Delta Revenues$ and $\Delta Expenditures$ refer to the rate of change in each of those two variables and $\Delta Surplus$ refers to the change in the fiscal result as a percentage of local GDP. The coefficients should be interpreted as how much fiscal balances, revenues, and expenditures change in response to a 1 percent change in GDP; however, because of the fixed effect, these coefficients should be interpreted as “within” each jurisdiction. What is new in our analysis is that the interpretation of g_t may vary as we run these regressions by relating the fiscal variables not only to *national output*, as has been standard, but also to *provincial output*. It is surprising that this second exercise has not been implemented. An evaluation of the procyclicality of the fiscal policy of subnational governments should consider how resources smooth the local business cycle, not the national cycle.¹³ We also run a series of instrumental variables (IV) regressions to correct for the endogeneity of the right-hand-side variable (output) to the dependent variable (fiscal policy). We instrument using the international interest rate, world growth, and Argentina’s terms of trade.

Table 4.2 and Figure 4.3 show the results computed from the time series for each aggregate. As the correlation is computed as the coefficient of a simple regression, table 4.2 also indicates the statistical significance of the coefficient. The numbers show some evidence at the federal level of a countercyclical fiscal policy. Both tax revenues and expenditures appear to be much more procyclical than in either OECD or Latin American countries, but all in all, this delivers a fiscal policy that appears to be countercyclical in about the same range as in the OECD. Figure 4.3 shows the scatter plot with the results.

This pattern differs when considering the provinces, where we see equally highly procyclical income and revenues relative to national output. However, while the national government had an overall fiscal policy that was countercyclical, fiscal results for subnational governments show a procyclical result, that is, the surplus falls when output increases. Consistent with conventional wisdom, small provinces appear to be much more procyclical than larger provinces, particularly on the spending side. All results are virtually unchanged when IV estimation is used.

When looking at the relation among revenues, spending, and *local output*, far more important measures of procyclicality, the numbers are much



smaller, particularly for small provinces. The fact that the link weakens mostly for revenues increases the procyclicality of fiscal variables. In this case, the IV estimates deliver a different result, increasing the procyclicality of revenues significantly and leading to an overall acyclical policy. This important result modifies a fair amount of conventional wisdom in this area: once only exogenous changes in output are considered, fiscal policy of subnational jurisdictions becomes acyclical, rather than procyclical. The conclusion is that small provinces are more procyclical than larger provinces and that they exhibit a procyclical or acyclical fiscal policy depending on the estimation technique.

We next address the issue of the sources of procyclicality of provincial revenues by looking at the components that add up to total tax

collection. As the results in table 4.3 show, revenues are strongly procyclical. However, when dividing the sources of revenues in taxes and transfers from the central government (as well as the total of resources that are not transfers), we find that the tax component is uniformly more procyclical than the resources obtained from national sources. Among the taxes, the *ingresos brutos* (a cascading sales tax) has the highest degree of procyclicality, while property taxes, as expected, have little relation to the business cycle.¹⁴ This relationship suggests that the procyclicality of provincial governments may not be explained by the specifics of the current transfer scheme between the national government and the provinces.

These measures of procyclicality are computed by looking at the rate of change of each revenue source and how each relates to changes in local or national output. But which is more important as a source of procyclicality? Answering this question requires considering the relative size of each component. To do this, we look at how the change in the sources of income in terms of local GDP relates to the local and national business cycle. By referencing GDP, we can obtain a measure of the quantitative importance of each source. The results are presented in table 4.4, which again shows that most income sources are procyclical. For the provinces as a whole, both national and local resources are roughly equally important as sources of procyclicality. The relative importance for each jurisdiction depends on the size of the province. For large provinces, taxes collected at the jurisdiction level are more important as sources of procyclicality. For small provinces, national transfers are the key drivers of procyclicality. This outcome mimics the relative importance of revenue sources in a context in which all sources are procyclical.

The role of local taxation in Argentina's federal system had already been stressed in pioneering work by Horacio Nuñez Miñana almost 30 years ago (Nuñez Miñana 1974) who had already identified the (growing) importance of local resources in the analysis of fiscal federalism and in explaining its procyclicality (see also Nuñez Miñana and Porto 1980, 1982). More recently Piffano, Sanguinetti, and Zettner (1998) studied the cyclical properties of local taxes. Though they show that local revenues magnified the procyclicality of total resources, they fall short of quantifying one of the main conclusions of this work (particularly considering the amount of energy that has associated the coparticipation regime as the sole source of the procyclicality of government resources)—that is, that transfers and local sources of revenues are equally responsible for the procyclicality of local revenues.

Testing the Sources of Procyclicality

We have shown that government expenditure shows differing degrees of procyclicality across jurisdictions. If the objective is to reduce the degree

Table 4.3 Procyclicality of Provincial Resources in Argentina, 1992–2002, Growth Rates

	With local GDP						
	<i>Total revenues</i>	<i>Total revenues-transfers</i>	<i>Taxes</i>	<i>Ingresos brutos</i>	<i>Property tax</i>	<i>Coparticipación</i>	<i>Transfers from federal government</i>
Total provinces	1.164 (0.117)***	0.977 (0.245)***	1.551 (0.167)***	1.309 (0.222)***	0.63 (0.52)	1.412 (0.103)***	1.294 (0.103)***
Big provinces	1.013 (0.413)**	1.889 (0.300)***	1.879 (0.255)***	1.988 (0.892)**	1.225 (0.661)*	1.069 (0.64)	0.624 (0.42)
Small provinces	1.032 (0.133)***	0.786 (0.287)***	1.470 (0.194)***	1.143 (0.253)*	0.445 (0.63)	1.417 (0.117)***	1.273 (0.113)***
	With national GDP						
	<i>Total revenues</i>	<i>Total revenues-transfers</i>	<i>Taxes</i>	<i>Ingresos brutos</i>	<i>Property tax</i>	<i>Coparticipación</i>	<i>Transfers from federal government</i>
Total provinces	1.341 (0.100)***	1.359 (0.224)***	1.860 (0.140)***	1.996 (0.186)***	0.858 (0.493)*	1.363 (0.097)***	1.450 (0.083)***
Big provinces	1.831 (0.3943)**	1.938 (0.272)***	1.831 (0.228)***	2.049 (0.830)**	1.172 (0.618)*	0.982 (0.611)	0.5 (0.394)
Small provinces	1.236 (0.133)***	1.243 (0.263)***	1.825 (0.163)***	1.913 (0.213)***	0.721 (0.59)	1.362 (0.108)***	1.445 (0.090)***

Sources: Authors' computations with data from Ministry of Finance and unpublished data from CEPAL.

*, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Table 4.4 Procyclicality of Provincial Resources in Argentina, 1992–2002, Ratios to GDP

	With local GDP						
	<i>Total revenues</i>	Own resources			Transfers		
		<i>Total</i>	<i>Tax</i>	<i>Other</i>	<i>Total transfers</i>	<i>Discretionary</i>	<i>Coparticipación</i>
Total provinces (aggregate)	0.198 (0.026)***	0.089 (0.016)**	0.076 (0.010)***	0.012 (0.010)	0.110 (0.018)***	0.036 (0.016)***	0.073 (0.014)***
Big provinces	0.148 (0.018)***	0.082 (0.125)***	0.074 (0.007)***	0.008 (0.009)	0.065 (0.012)***	0.021 (0.008)***	0.045 (0.009)***
Small provinces	0.248 (0.030)***	0.044 (0.021)**	0.040 (0.004)***	0.002 (0.020)	0.206 (0.020)***	0.059 (0.004)***	0.148 (0.014)***
	With national GDP						
	<i>Total revenues</i>	Own resources			Transfers		
		<i>Total</i>	<i>Tax</i>	<i>Other</i>	<i>Total transfers</i>	<i>Discretionary</i>	<i>Coparticipación</i>
Total provinces (aggregate)	0.184 (0.016)***	0.084 (0.011)***	0.071 (0.006)***	0.013 (0.009)	0.100 (0.015)***	0.038 (0.013)**	0.062 (0.014)***
Big provinces	0.157 (0.014)***	0.083 (0.012)***	0.076 (0.006)***	0.007 (0.009)	0.074 (0.009)***	0.029 (0.007)***	0.046 (0.008)***
Small provinces	0.318 (0.024)***	0.059 (0.019)***	0.050 (0.004)***	0.006 (0.019)	0.262 (0.014)***	0.090 (0.010)***	0.172 (0.012)***

Sources: Authors' computations with data from Ministry of Finance and unpublished data from CEPAL.

, * indicate significance at the 5 and 1 percent levels, respectively.

of procyclicality when present, it is necessary to understand why this procyclicality occurs. In cross-country analysis, the literature has addressed this issue by relating the procyclicality of government expenditure, for example, to a number of economy characteristics (see, for example, Lane 2003; Stein, Talvi, and Grisanti 1999).

In this section, we take a similar approach, but focus on the subnational entities. In particular, we ask ourselves about the determinants of procyclicality for subnational entities in Argentina. In particular, we want to test the extent to which the theories discussed can explain the cross-jurisdiction variability in procyclicality. Similar exercises for a cross-section of countries include Stein, Talvi, and Grisanti (1999), Lane (2003), and Talvi and Végh (2000), among others.

For the case of subnational governments, we refer to the three channels by which spending becomes procyclical (as discussed in section II). One is the effect of changes in market access for the subnational governments, which argues that procyclicality arises from the fact that jurisdictions may get cut off from financial markets during downturns. Empirically, this suggests relating the degree of cyclicity to the stock of provincial debt, as well as to the size of the economy (under the weak assumption that larger jurisdictions are more likely to access credit). The fiscal voracity argument asserts that procyclicality arises from the fact that governments are subject to larger pressures for fiscal resources during booms. This assertion suggests a relationship between the procyclicality of public expenditure and the procyclicality of fiscal revenues. Similarly, a jurisdiction that receives a larger share of resources from the federal government could be subject to fiscal pressures and therefore is more likely to exhibit procyclicality. Finally, there is the possibility that provinces prey on the federal government. In this case, procyclicality arises because provinces seek national resources when the federal government has more resources or easier access to credit. Thus, market access of the national government is relevant, enticing subnational jurisdictions to prey on those resources. Predation of fiscal resources can also occur by engineering a crisis that forces a bailout from the national level. In this regard, size may imply a greater likelihood of a bailout, because the national government may perceive large jurisdictions as “too big to fail” (conversely, it may be easier to bail out a smaller jurisdiction, and the incentives to do so may exist if they are overrepresented in the political system). Coincidence of the presidential party with that of the governor may work in the same direction.¹⁵

Table 4.5 summarizes the different hypotheses and their implications on the expected degree of procyclicality. To analyze this issue, table 4.6 looks at the procyclicality of the three variables by province: expenditure, revenue, and fiscal balances. Again, procyclicality is measured relative to national output and to each province’s GDP and computed with ordinary least squares (OLS). The table shows that there is substantial volatility in

Table 4.5 Testing Procyclicality at the Subnational Level

<i>Market access</i>	<i>Fiscal voracity with provinces</i>	<i>Voracity on federal government</i>
Province	Procyclicality of revenue (+)	Market access of
debt (+)	Output volatility (+)	federal government (+)
Size (+)	Volatility of revenues (+)	Presidential party of
	Percentage of resources from	government
	transfers (+)	(+ if same as federal government size (?))

Source: Authors' compilation.

behavior. For example, during the 1990s, the procyclicality of government expenditures ranged from a low of 0.3 for Neuquén to a high of 1.9 for the province of Buenos Aires relative to national output (almost 3 relative to local output in Corrientes). Both government expenditure and revenues correlate more strongly with local output than with national output, the difference being stronger on the revenue side.

Table 4.7 shows the results of relating the coefficient of procyclicality of expenditures to the variables that may explain this behavior at the provincial level. Provincial debt is considered in 2001, because reliable data for that year can be obtained from Cetrángolo and Jiménez (2003). Size is measured as provincial output as a percentage of national GDP, also considered in 2001. The procyclicality of revenues is taken from table 4.6 and captures the response of revenues to output changes. The share of resources obtained from transfers is taken as the average for the period. The presidential party dummy adds the number of years in which the party of the president coincided with that of the governor. We also include a dummy for oil-producing provinces, which have an alternative, mostly exogenous, source of revenue.

As can be seen (either when the coefficients are obtained relative to national output or to local output), all variables are insignificant with the exception of the procyclicality of the revenues, which appears with the expected positive sign. The higher the degree of procyclicality of resources, the higher the degree of procyclicality of government expenditures. In all, the results seem to provide fairly strong evidence in favor of a procyclicality that comes from procyclical revenues at the provincial level, with little impact from other sources of procyclicality, such as the credit channel and the possibility of predation of national resources.

Table 4.6 Procyclicality by Province in Argentina, 1992–2002

	<i>Expenditures</i>		<i>Revenues</i>		<i>Surplus/local GDP</i>	
	<i>Local</i>	<i>National</i>	<i>Local</i>	<i>National</i>	<i>Local</i>	<i>National</i>
Buenos Aires	1.974***	1.885***	2.298***	2.255***	*0.029	-0.029
Buenos Aires Federal Capital	1.335**	1.463**	1.566***	1.772***	0.004	0.007
Catamarca	0.641	1.722***	0.431	1.647***	-0.112	-0.132
Chaco	1.491*	1.543***	1.364**	1.353***	-0.252	-0.178
Chubut	1.102**	1.180**	0.012	0.036	-0.210*	-0.222*
Cordoba	1.764**	1.788**	1.744***	1.968***	-0.044	-0.026
Corrientes	2.904***	1.693***	1.950**	1.590***	-0.232*	-0.06
Entre Rios	1.853***	1.477**	1.760***	1.916***	-0.079	0.021
Formosa	2.338***	1.339**	2.068***	1.394***	-0.544	-0.215
Jujuy	0.366	0.726	0.519	1.033**	-0.056	-0.011
La Pampa	1.598*	1.459*	1.164**	1.119***	-0.188	-0.155
La Rioja	1.699**	1.251**	1.733**	1.516***	-0.153	-0.048
Mendoza	1.437	1.796*	2.197*	2.440**	0.090	0.078
Misiones	1.683**	1.579**	1.789***	1.728***	-0.033	-0.028
Nuequen	0.819	0.366	0.204	0.062	-0.171	-0.100
Río Negro	0.547	1.461*	1.034	1.362**	0.061	-0.087
Salta	0.64	1.521***	0.179	1.706**	-0.067	0.088
San Juan	1.798**	1.648**	1.832***	1.863***	-0.085	-0.035
San Luis	0.899	0.714	1.242***	1.131***	-0.01	0.016
Santa Cruz	0.763*	0.861*	0.54	0.796	-0.082	-0.08
Santa Fe	2.176***	1.613***	1.556***	1.488***	-0.083	-0.022
Santigao del Estero	1.980***	1.449***	1.795***	1.123***	-0.165	-0.166
Tierra del Fuego	1.089*	1.716**	0.943	2.531***	-0.089	0.011
Tucumán	0.668	1.126*	1.387***	1.432***	0.077	0.030
Average	0.752	0.602	0.483	0.298	-0.091	-0.049

Sources: Authors' computations with data from Ministry of Finance and unpublished data from CEPAL.

Note: *, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Table 4.7 Sources of Procyclicality

	<i>Expenditures relative to local GDP</i>	<i>Expenditures relative to national GDP</i>
Income procyclicality	0.731*** (0.182)	0.451*** (0.098)
No. of years party of president = party of government	-0.015 (0.029)	-0.021 (0.015)
Province PBG/GDP	-0.006 (0.018)	0.015 (0.010)
Percent from coparticipacion	0.003 (0.008)	0.006 (0.004)
Province debt/PBG (2001)	-0.003 (0.007)	-0.003 (0.004)
Dummy-oil provinces	-0.287 (0.276)	-0.080 (0.151)
Constant	0.314 (0.452)	0.440 (0.279)
Observations	24	24
R ²	0.628	0.672

Sources: Authors' computations with data from Ministry of Finance and unpublished data from CEPAL and Centrngolo and Jimnez 2003.

Note: PBG = producto bruto geografico.

*** indicates significance at the 1 percent level.

Brazil

Because of the lack of data by jurisdiction, the analysis of the degree of procyclicality of the spending of subnational governments in Brazil will not be made along the same lines that were followed in the case of Argentina. However, the different approach provides a complementary analysis.

A good consistent data set is now available, with monthly series of aggregate fiscal variables for state and municipalities in Brazil. But the series are somewhat short as they start in January 1997.¹⁶ It could be argued, however, that there is no point in being too worried about detecting fiscal policy procyclicality during the 1980s and early 1990s. Under the fiscal regime that prevailed in Brazil over that period, there were all kinds of reasons for the existence of a high degree of procyclicality. A much

more interesting approach is to detect the extent to which procyclicality has subsisted throughout the drastic change of fiscal regime observed since the late 1990s in Brazil. From that perspective, the relevant period is also the most recent one, for which data are available.

Unfortunately, the mentioned data set does not include a series of aggregate primary expenditures of subnational governments. But it does include receipts of the three most important state taxes, accounting for more than 90 percent of the total tax revenue collected at the state level. It also includes data on federal transfers to subnational governments and on the aggregate primary balance of states and municipalities. Based on the available data, an acceptable estimate of the aggregate primary expenditures of state and municipalities was constructed as follows: revenue from the three most important state-level taxes, plus federal transfers to states and municipalities, minus aggregate primary balance of states and municipalities.

Because less important state-level taxes and taxes directly collected by municipalities are not taken into account, the true value of the aggregate primary expenditures of state and municipalities would surely be underestimated. However, the discrepancy would be relatively small (approximately 14 percent in 2002, which is acceptable, because it is the cyclical behavior of the variable that will be under analysis).

A reliable seasonally adjusted real GDP index is only available on a quarterly basis, and therefore a real seasonally adjusted quarterly series of the estimate was generated.¹⁷ A Hodrick-Prescott filter was used to obtain the cyclical components of both series to analyze the degree of procyclicality.¹⁸ A regression between these two components provides a measure of procyclicality. This and similar results for other fiscal variables are shown in table 4.8 and figure 4.4. As in the case of Argentina, the results suggest a substantial degree of procyclicality of primary expenditures.

Because there are only 28 observations, caution is needed when drawing conclusions about procyclicality. With that in mind, however, we can gain further insight by asking several interesting questions that mimic those asked for Argentina. What are the main factors behind the detected procyclicality of the primary expenditures of subnational governments in Brazil? To what extent may this procyclicality be attributed to the cyclical behavior of federal transfers? To what degree does it stem from the procyclicality of the tax revenue directly collected by subnational governments? What has been the effect of the primary balance?

First of all, it seems clear that the procyclicality of the primary expenditures of subnational governments simply reflects the highly procyclical behavior of their revenue (see table 4.8 and figure 4.4). Taking as an estimate of that revenue the sum of the receipts of the three most important state-level taxes and federal transfers to states and municipalities, one also finds a large level of procyclicality, although slightly smaller than for expenditures.

Table 4.8 Correlation Between Output and Fiscal Variables of Subnational Governments in Brazil

	<i>Coefficients</i>	R^2
Primary expenditures	2.555 (0.615)***	0.40
Revenue	2.174 (0.569)***	0.59
Tax revenue directly collected	2.061 (0.476)***	0.78
Revenue from ICMS	2.104 (0.484)***	0.78
Motor vehicle and property taxes	2.262 (0.937)***	0.18
Federal transfers	1.497 (1.061)	0.13
Constitutional transfers	1.442 (0.968)	0.07
Revenue from tax on industrial products	3.265 (0.854)***	0.56
Income tax revenue	-1.161 (1.238)	0.03

Source: Instituto de Pesquisa Economica Aplicada.

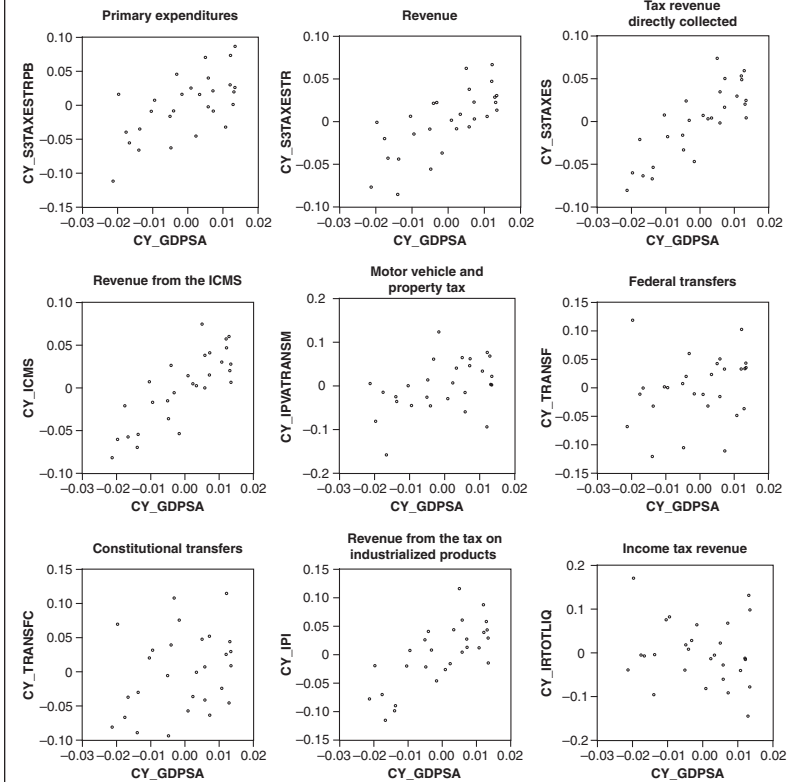
Note: ICMS = Impostos Sobre Circulação de Mercadorias e Prestação de Serviços (taxes on goods and services).

*** indicates significance at the 1 percent level.

Notice that R^2 of the revenues equation is much higher than that of primary expenditures. Thus, there seem to be grounds to affirm that the aggregate primary balance has been contributing to the avoidance of the high degree of synchronization observed between the cyclical movements of the aggregate revenue and the GDP, which shows up with the same intensity in the relationship between the cyclical components of the aggregate expenditures and the GDP. This is an interesting result that relates to a new fiscal regime imposed on subnational governments in Brazil since the late 1990s.

The main source of the procyclicality appears to be the behavior of the tax revenue directly collected by subnational governments. In fact, the

Figure 4.4 Cross-Plots of Output Growth and Fiscal Variables in Brazil



Source: IMF World Economic Outlook database.

strong procyclicality of the revenue from the three most important state-level taxes is also shown in table 4.8 and figure 4.4.

One may say that the procyclical behavior of the revenue from the three most important state-level taxes stems from the high procyclicality of the ICMS revenue. The ICMS, a VAT, is by far the most important state tax, and as shown in table 4.8 and figure 4.4, it is also procyclical.

Although the procyclicality of the revenue from the three most important state-level taxes seems to be dominated by the procyclical behavior of the ICMS, the combined revenue of the other two state taxes show some procyclicality. Those taxes are the Imposto Sobre a Propriedade de Veículos Automotores (IPVA, imposed on motor vehicles), and the property-transfer tax.

What about the cyclical behavior of the federal transfers? The results in table 4.8 and figure 4.4 suggest that it is hard to conclude that total federal transfers have been procyclical over the period. In fact, even if only constitutional transfers are considered, no procyclical pattern seems to emerge. Constitutional transfers are by far the most important part of total federal transfers. The revenue-sharing arrangement established by the Constitution is mainly based on two taxes collected by the federal government. One of them is the income tax, which in Brazil includes both a personal income tax and a profit tax imposed on firms. The other is the IPI. The federal government is supposed to transfer to states and municipalities 47 percent of the income tax revenue and 57 percent of the IPI revenue. In spite of the fact that the IPI revenue has proven to be highly procyclical, as confirmed in table 4.8, the cyclical behavior of constitutional transfers seems to have been dominated by the evolution of the income tax revenue, which has shown no evidence to date of procyclicality over the period.

In fact, it is not difficult to make sense of this seemingly erratic behavior. A spike in first quarter 1999, for example, is explained by the effects of the sharp exchange rate devaluation on the income tax collected on capital gains. The other spike in 2002 was caused by a sudden large payment of income tax in arrears by major pension funds, in the wake of a long judicial fight. If such explanations were taken into account and the effects of those outlying points eliminated, evidence may point to procyclicality in the behavior of constitutional transfers; however, if the current pattern remains, the tax should be expected to remain mostly unrelated to business fluctuations.

The analysis conducted above, provided to determine the extent to which subnational governments have been a source of fiscal policy procyclicality in Brazil, was based on aggregate fiscal variables, for which states and municipalities were taken as a whole. It would be interesting if the same kind of analysis could be replicated for each individual state. Unfortunately, that is not possible because reliable, reasonably frequent state-level fiscal data are not available. Though the aggregate value of the primary balance of state and municipal governments has been published monthly by the Central Bank of Brazil for quite some time, state government do not allow the bank to disclose each individual state's primary balance. For the most recent period since 2001, after the Fiscal Responsibility Law, good nonannual data are available. However, the series are irremediably short.

The picture that emerges from the analysis of the Brazilian evidence seems to be quite clear and fairly consistent with that of Argentina. The available fiscal data seem to indicate that the spending of subnational governments, at the state level in particular, has shown a marked degree of procyclicality. But the main reasons behind the procyclical pattern are not to be found in the behavior of federal transfers. They clearly stem from the tax revenues directly collected by subnational governments, particularly from the ICMS, the main state-level tax.

V. Conclusions

Having analyzed the extent to which subnational governments have been a source of fiscal policy procyclicality in both Argentina and Brazil, we are able to draw some interesting conclusions. Despite all the differences in the specificities of the fiscal-federalism arrangements of the two countries, the evidence that stems from our analysis suggests that subnational governments share important common features that have been affecting fiscal policy procyclicality in Argentina and Brazil.

The spending of subnational governments has been markedly procyclical in both countries. But contrary to what seems to be a widespread belief, the observed procyclicality cannot be attributed, or at least cannot be solely attributed, to the behavior of federal transfers. In both countries, though more so in Brazil than in Argentina, the main source of procyclicality is to be found in the highly procyclical pattern of tax revenues directly collected by subnational governments. So it is not the flow of federal transfers that makes the spending of subnational governments procyclical, but rather their tax structures.

In the case of Brazil, the sharp change in the fiscal regime that took place since the end of 1998 has dampened some of the procyclicality of the primary spending of subnational governments. The states and large municipalities have been put under a hard budget constraint and have been forced to generate a reasonably sizable primary surplus to service their rescheduled debt to the Union.

These results have an important implication. To reduce the procyclicality of the expenditures of Argentine provinces or Brazilian states, the focus should fall not on redesigning rules and practices of intergovernmental transfers, but on creating better institutions that reduce the degree to which this procyclical tax base becomes government expenditure. No small task in either country.

Countercyclical measures to smooth the resources collected by subnational governments should be considered. Unfortunately, many attempts to build these countercyclical measures are enshrined in the law but have little impact on real policies. The design of fiscal rules that work is a complex matter, particularly in societies subject to large instability. To illustrate how complex the anticipation of the effects of a particular fiscal design may be, just consider the following remarks from the World Bank study *Beyond the Center, Decentralizing the State*, issued in 1999 (Burki, Perry, and Dillinger 1999). This study referred to the experiences of Argentina and Brazil in the following way:

Argentina: the successful institutionalization of a hard budget constraint on provinces.

Fiscal deficits at the federal level were a major problem in Argentina before 1991, leading to hyperinflation, which reached over

5,000 percent in 1989. Provincial deficits and indirect bailouts of provincial banks, which had access to central bank credit, contributed to the financial difficulties of the period. Provinces accounted for at least half of the public sector deficits that fueled the hyperinflation.

In addition to major improvements at the national level—committing legally to currency convertibility at a fixed rate with the dollar (the Convertibility Law), cutting the budget deficit, and privatizing major industries—the steps to improve subnational finances in the 1990s were also important for the success of macroeconomic stabilization.

The strong anti-inflation commitment after 1991 and tight limits on central bank credit to the public sector in Argentina limited subnational spending and deficits in two ways. First, it allowed the federal government to reject provincial pleas for more resources after the Tequila shock, with the rationale that it could not increase transfers without endangering the stabilization gains and the survival of the Currency Board system. Second, it constrained the ability of the provinces to borrow from their own banks by tightening bank regulations and eliminating local government access to the central bank rediscount facility. After the 1994–95 economic shock, most provinces had to recapitalize or privatize their banks—borrowing from them was not an option. Eighteen of the provincial banks were privatized during 1994–96 and more have gone through the process since then (World Bank 1998).

The timing had been good. Making changes before the crisis had forced the provinces to adjust turned out to be of critical importance for the institutionalization of the hard budget constraint in subnational finances in Argentina.

Brazil: Repeated rescheduling. No hard budget constraint for the states.

A state debt crisis was not the main macroeconomic problem that observers expected from decentralization in Brazil.

They feared that the large increase in tax sharing mandated by the 1988 constitution would provoke federal deficits, because the federal government would not cut its ordinary (non-transfer) expenditures or raise federal taxes by an equivalent amount.

Nevertheless, fiscal adjustment ultimately occurred at the federal level.

The main macroeconomic problem with decentralization, however, arose from excessive state deficits and then mismanagement of the debt.

In the earlier debt crises, the debt agreements established three precedents that influenced subsequent agreements. First, the federal government actually put the state debt on its books and then provided relief in the form of rescheduling, rather than forgiveness. Second,

through the combination of grace periods, rescheduling, and debt service caps, the agreements reduce the debt service burden of sitting administrations, leaving the fiscal consequences to their successors.

The repeated cycle of the federal government refinancing state debt, coupled with caps on debt service, had the perverse incentive effects that one would expect. By the time some consensus for action had been reached, the number of bankrupt states was too large to allow them all to fail, and their debt had grown too large for any solution without substantial debt relief to work.

At the beginning of the 1990s, Brazilian subnational debt as a share of GDP was at a level similar to Argentina's, but by 1997 it had more than doubled. Unfortunately, the Brazilian stabilization program of 1994, the most successful to date, left unchanged many rules and institutions, which motivated the states to let their debt grow. Most of this debt was owed to the central government or to state banks, and until the debt-rescheduling agreements in 1998, much of it was not being serviced by the states. Interest was being capitalized. As a result, state debt and deficits were a direct fiscal problem for the central government and for the overall public sector. (Burki, Perry, and Dillinger 1999, p. 41–44)

As anticipated, just a few years later Argentina was in the midst of a large fiscal crisis. This crisis was mostly triggered by irresponsible behavior at the provincial level (the federal government had engineered during that year an adjustment of about 4 percent of GDP, through a combination of spending cuts and tax hikes, while provinces increased their imbalances). Meanwhile, Brazil appeared to be consolidating its fiscal position, both at the federal and subnational level, on the basis of stricter application of fiscal rules.

When rules were expected to work, they didn't; when they were not expected to work, they did. There are no clear-cut recommendations to build working fiscal systems; however, what is clear is that focusing on the wrong issue is not the way to start. If procyclicality of fiscal policy is the concern, the solution should not be pursued by revamping tax-sharing rules but rather by developing better fiscal institutions within each jurisdiction.

Notes

1. The measure is central government expenditure from the World Economic Outlook (WEO). In both cases, the cyclical component is defined as deviations from a Hodrick–Prescott trend. The first version of the figure is taken from Kaminsky, Reinhart, and Vegh (2004).

2. Data correspond to fiscal results in *International Financial Statistics* (IFS), correlated with the Hodrick–Prescott deviation of real GDP.

3. Vertical imbalance refers to the fact that the financing of expenditures at a given level of government is not done with resources collected by that jurisdiction but by another jurisdiction that transfers the resources to the other level of government.

4. We thank Andres Neumeyer for suggesting this interpretation to us.

5. Gonzalez, Rosenblatt, and Webb (2002) notice that, in Argentina, “even the better performing provinces consistently faced higher interest rates than the federal government.” Something similar could be said about well-run states in Brazil.

6. This section draws heavily from section I.2 of Tommasi (2002).

7. Cetrángolo and Jiménez (2003) provide a careful review of subnational fiscal rules.

8. One way in which these limits became nonbinding was through the use of provincial state banks that in most provinces were politically dependent on the provincial executive power. In practice, these banks acted as captive sources of financing for subnational governments. Given their portfolio of bad assets (to a significant extent, the result of lending to provincial governments), many provincial banks were privatized in the aftermath of the 1995 Tequila crisis that had induced a run against, mainly, provincial financial institutions. However, some provincial banks were kept in government hands. Not surprisingly, the bank run of 2001 was again strongly fueled by a run on the largest two public banks: the Banco de la Nación and the Banco Provincia that once again obtained large bailouts from the national government.

9. For misgivings about the Fiscal Responsibility Law and the defense of still more powerful institutions to ensure sound fiscal policy in Brazil, see Wyplosz (2005).

10. Kaminsky, Reinhart, and Végh (2004) define procyclicality in terms of policies: government expenditures and tax rates. We prefer to stick to outcomes: expenditure, total revenues, and fiscal surpluses. While these are endogenous variables, policy functions are adjusted to deliver a value for these variables.

11. Data have been taken from Gerchunoff and Llach (2003).

12. This work was possible because researchers at CEPAL generously provided the provincial GDP data.

13. Piffano, Sanguinetti, and Zettner (1998) provide the most careful analysis of procyclicality to date, but the analysis is squarely focused on the relation with national output.

14. Some provinces have transferred part of the property tax to local governments, thus reducing the degree of cyclicity of that income source.

15. As long as the two are not political rivals.

16. The data are available at www.ipeadata.gov.br.

17. The series were deflated by the Índices de Preços ao Consumidor (IPCA, a consumer price index).

18. To obtain the cyclical components, the Hodrick–Prescott filter was applied to the logarithms of both series. Braun and Gresia (2003) used the same procedure to study the degree of procyclicality of social expenditures in Latin America.

References

- Afonso, J. R. R., and L. Mello. 2000. “Brazil: An Evolving Federation.” Paper prepared for the IMF/FAD Seminar on Decentralization, November 20–21, Washington, DC.
- Aghion, Philippe, and Ioana Marinescu. 2006. “Cyclical Budgetary Policy and Economic Growth: What Do We Learn from OECD Panel Data?” Unpublished paper, Harvard University.

- Arreaza, A., B. E. Sørensen, and O. Yosha. 1999. "Consumption Smoothing through Fiscal Policy in OECD and EU Countries." In *Fiscal Institutions and Fiscal Performance*, eds. J. Poterba and J. von Hagen, 59–80. Chicago: Chicago University Press.
- Barro, Robert. 1979. "On the Determination of the Public Debt." *Journal of Political Economy* 87 (5): 940–71.
- Bevilaqua, A. S. 2000. "State-Government Bailouts in Brazil." Texto para Discussão No. 421, Departamento de Economia, PUC-Rio.
- Braun, M., and L. Gresia. 2003. "Towards Effective Social Insurance in Latin America: The Importance of Countercyclical Fiscal Policy." Inter-American Development Bank Working Paper No. 487, IADB, Washington, DC.
- Braun, M., and M. Tommasi. 2002. "Fiscal Rules For Subnational Governments: Some Organizing Principles and Latin American Experiences." Paper presented at a World Bank/IMF Conference on Fiscal Rules, February 14–16, Oaxaca, Mexico.
- Burki, S., G. Perry, and W. Dillinger. 1999. "Beyond the Center: Decentralizing the State." Latin American and Caribbean Studies, World Bank, Washington, DC.
- Cetrángolo, O., and J. P. Jiménez. 2003. "Política fiscal en Argentina durante el régimen de convertibilidad." Serie Gestión Pública, No. 35, CEPAL Santiago: ILPES.
- Cukierman, A., S. Edwards, and G. Tabellini. 1992. "Seigniorage and Political Instability." *American Economic Review* 82 (June): 537–55.
- Dillinger, William, and Steven B. Webb. 1999. "Fiscal Management in Federal Democracies: Argentina and Brazil." Policy Research Working Paper No. 2121, World Bank, Washington, DC.
- FIEL (Fundación de Investigaciones Económicas Latinoamericanas). 2003. *Instituciones Fiscales para Argentina*. Vol. 1. Buenos Aires: FIEL.
- Frankel, Jeffrey, Ben Smit, and F. Sturzenegger. 2007. "South Africa Macro Report: Managing Capital Flows." Kennedy School of Government Working Paper No. RWP 07-021, April.
- Gavin, M., R. Hausmann, R. Perotti, and E. Talvi. 1996. "Managing Fiscal Policy in Latin America and the Caribbean: Volatility, Procyclicality and Limited Creditworthiness." Inter-American Development Bank Working Paper No. 326, IADB, Washington, DC.
- Gerchunoff, P., and L. Llach. 2003. "El Ciclo de La Ilusion y El Desencanto: Un Siglo de Políticas Económicas Argentinas." Ariel Publications, Buenos Aires.
- Goldfajn, I., and E. R. Guardia. 2003. "Fiscal Rules and Debt Sustainability in Brazil." Banco Central do Brasil Technical Notes, No. 39, July.
- Gómez Sabaini, Juna C., and Jorge Gaggero. 1997. "Lineamientos para una Reforma del Sistema Tributario Argentino." Documento de Trabajo 37, Proyecto PNUD Arg 93/009 y CITAFÓEA.
- Gonzalez C., D. Rosenblatt, and S. Webb. 2002. "Stabilizing Intergovernmental Transfers in Latin America: A Complement to National/Subnational Fiscal Rules." Paper presented at a World Bank/IMF Conference on Fiscal Rules, February 14–16, Oaxaca, Mexico.
- Hercowitz, Z., and M. Strawczynski. 1999. "Cyclical Bias in Government Spending: Evidence from the OECD." Working Paper No. 6-99, Tel Aviv.

- Iaryczower, Pablo Spiller, and Mariano Tommasi. 2002. "Judicial Decision Making in Unstable Environments: Argentina 1938–1998." *American Journal of Political Science* 46 (4): 699–716.
- IMF (International Monetary Fund). *International Financial Statistics*. Washington, DC: IMF.
- . *World Economic Outlook*. Washington, DC: IMF.
- Jones, M., M. Tommasi, and P. Sanguinetti. 1999. "Política, Instituciones y Desempeño Fiscal en las Provincias Argentinas." In *Economía Política de las Finanzas Públicas en América Latina, 1999*, eds. Cárdenas and Montenegro. Bogotá: TM Editores.
- Kaminsky, G., C. Reinhart, and C. Végh. 2004. "When It Rains, It Pours: Pro-cyclical Capital Flows and Macroeconomic Policies." NBER Working Paper No. 10780, National Bureau of Economic Research, Cambridge.
- Lane, P. 2003. "The Cyclical Behaviour of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87 (12): 2661–75.
- Lane, P., and A. Tornell. 1999. "The Voracity Effect." *American Economic Review*, 89 (1): 22–46.
- Levy Yeyati, E. 2006. "Optimal Debt? On the Insurance Value of International Debt Flows to Developing Countries." Unpublished paper, Universidad Torcuato Di Tella.
- Nicolini, J. P., J. Posadas, J. Sanguinetti, P. Sanguinetti, and M. Tommasi. 2000. "Decentralization, Fiscal Discipline in Sub-National Governments, and the Bailout Problem: The Case of Argentina." Unpublished paper, Inter-American Development Bank, Washington, DC.
- Núñez Miñana, Horacio. 1974. "Desequilibrios de las Finanzas Públicas Provinciales en la Argentina." In *Problemas Económicos Argentinos. Diagnóstico y Política*. Editorial Macchi, Buenos Aires.
- . 1998. *Finanzas Públicas*. Editorial Macchi, Buenos Aires.
- Núñez Miñana, Horacio, and Alberto Porto. 1980. "Capacidad y esfuerzo tributario relativos: el caso de los Municipios de la Provincia de Buenos Aires." *Economía XXVI* (3).
- . 1982. "Evolución de ingresos y gastos públicos de la Provincia de Buenos Aires, 1885-1979." *Economía XXVIII* (1-2): 65–84.
- Piffano, Horacio. 1998. "Federalismo Fiscal en Argentina: Ideas y Propuestas sobre el Nuevo Acuerdo Fiscal Federal." Documentos de Trabajo, CEDI No. 2, Buenos Aires.
- Piffano, Horacio, Juan Sanguinetti, and Alejandro Zettner. 1998. "Las Finanzas Provinciales y el Ciclo Económico." Documentos de Trabajo, CEDI No. 3, Buenos Aires.
- Porto, Alberto. 2004. *Disparidades Regionales y Federalismo Fiscal*. Editorial Universidad La Plata (Edulp), La Plata.
- Ramey, Garey, and Valerie Ramey. 1995. "Cross-Country Evidence on the Link Between Volatility and Growth." *American Economic Review* 85 (5): 1138–151.
- Secretaria da Receita Federal. 2003. "Carga tributária do Brasil, 2002." Brasília, Abr. (Estudos Tributários 11).
- Stein, E., E. Talvi, and A. Grisanti. 1999. "Institutional Arrangements and Fiscal Performance: The Latin American Experience." Unpublished paper, Inter-American Development Bank, Washington, DC.

- Talvi, E., and C. A. Végh. 2000. "Tax Base Variability and Procyclical Fiscal Policy." NBER Working Paper No. 7499, National Bureau of Economic Research, Cambridge.
- Ter-Minassian, T. 1997. "Brazil." In *Fiscal Federalism in Theory and Practice*, ed. Ter-Minassian. Washington, DC: International Monetary Fund.
- Tommasi, M. 2002. "Federalism in Argentina and the Reforms of the 1990s." Working Paper No. 147, Center for Research on Economic Development and Policy Reform, Stanford University.
- Tommasi, M., S. Saiegh, and P. Sanguinetti. 2001. "Fiscal Federalism in Argentina: Policies, Politics, and Institutional Reform." *Economía: Journal of the Latin American and Caribbean Economic Association* 1 (2): 157–211.
- Wyplosz, C. 2005. "Institutions for Debt Sustainability in Brazil." In *Inflation Targeting, Debt, and the Brazilian Experience, 1999 to 2003*, eds. F. Giavazzi, I. Goldfajn, and S. Herrera. Cambridge: MIT Press.

Fiscal Rules and Procyclicality

*Guillermo E. Perry**

I. Introduction

The debate on fiscal policy in Europe around the performance of the Stability and Growth Pact (SGP) and its recent reform¹ centered on how to facilitate the workings of automatic stabilizers while achieving fiscal consolidation. In particular, the discussion hinged on whether the goal of *medium-term equilibrium* established in the SGP should be interpreted as a *cyclically adjusted structural balance*, as Eichengreen and Wyplosz (1998) and the International Monetary Fund (IMF) argued (Hagemann 1999). The discussion also focused on the extent to which the Maastricht limit of 3 percent of gross domestic product (GDP) for eventual deficits² (waived only under “exceptional circumstances,” such as a contraction of 2 percent of GDP or more) was enough for countries affected by strong asymmetric shocks.

The richness of the debate, which led to more than 100 proposals for reform of the pact, shows that there is significant agreement within the European Union (EU) on the importance of using fiscal policy as a countercyclical instrument, and more specifically, of letting the automatic stabilizers do their job, as monetary policy can no longer play this role. The debate also highlights the generalized consensus on the need to have fiscal rules and procedures to avoid a deficit bias and the differences of

* An earlier version of this chapter was prepared for the IMF/World Bank Conference on Fiscal Rules and Institutions, Oaxaca, Mexico, February 2002. The author appreciates thank the useful comments of Nick Stern, Luis Servén, Augusto de la Torre, Rodrigo Suescún, Mauricio Carrizosa, Sergio Schmukler, and George Kopits. The author also acknowledges the excellent research support of María Fernanda Rosales.

opinion centered on the relative emphasis attached to long-term sustainability and countercyclical/growth objectives, as well as on specific details of design and implementation of the common rules (see Fischer, Jonung, and Larch 2007).

Enacted reforms opted to maintain the previous statutory parameters (3 percent of GDP and 60 percent of GDP reference values for deficits and debts, respectively) but introduced significant additional flexibility on both medium-term goals and corrective mechanisms, in particular distinguishing between countries with different debt levels and growth prospects. Although there are diverging assessments on the adequacy of the reform (see, among others, in addition to Fischer, Jonung, and Larch 2007; Alves and Afonso 2006; Buti 2006; Calmfors 2005; Deutsche Bundesbank 2005), the political process and the outcome show again the centrality of both issues of sustainability and countercyclicality to fiscal policy concerns in Europe.

In contrast, most of the discussion on fiscal policy in Latin America deals solely with sustainability issues, largely ignoring the effects of fiscal policies on the economic cycle.³ Furthermore, the discussion actually centers on short-term indicators of fiscal health (current primary surpluses and debt-to-GDP ratios), without due consideration of the effects on the economic cycle of such indicators. This is rather surprising given that the region's economies are much more volatile than their European counterparts and generally have been applying procyclical fiscal policies that exacerbate volatility. See chapter 3 by Suescún in this volume, as well as Alberola and Montero 2006, among recent contributions. Previous contributions include Gavin, Hausmann, Perotti, and Talvi (1996), Gavin and Perotti (1997), Talvi and Végh (2000), and Tornell and Lane (1999). Some analysts and policy makers appear to think that countercyclical fiscal policies are a luxury in which only industrial countries can indulge or, at least, that Latin American countries (with the exception of Chile, which has successfully implemented a countercyclical fiscal policy) need to deal first with pressing adjustment and solvency issues before they attempt to reduce the highly procyclical character of their fiscal policies.

In this chapter, I present several arguments against this view (section II). First, the costs of procyclical fiscal policies in Latin America are likely to be large in growth and welfare terms, specifically for the poor. But, second, and most important, procyclical policies and rules tend to develop anti-investment and deficit biases and thus end up being unsustainable and non-credible. I then examine, in section III, the causes of the procyclicality of fiscal policies in Latin America. In section IV, I discuss how well-designed fiscal rules may help deal with the political economy and credibility factors behind the observed procyclicality of fiscal policies. Then, in section V, I examine conflicts between flexibility and credibility in rules, showing how a good design may facilitate the operation of automatic stabilizers, while at the same time supporting solvency goals and enhancing credibility.

With these elements, I survey in section VI the experience with different fiscal rules and institutions in Latin America (commodity stabilization funds, fiscal responsibility laws, stabilizing transfers, the Chilean one-percent-of-GDP structural surplus rule), analyzing the extent to which they have helped or can help achieve the twin goals of avoiding deficits and procyclical biases. I conclude in section VII with a summary of the policy implications of this analysis.

II. Why Care About Fiscal Procyclicality?

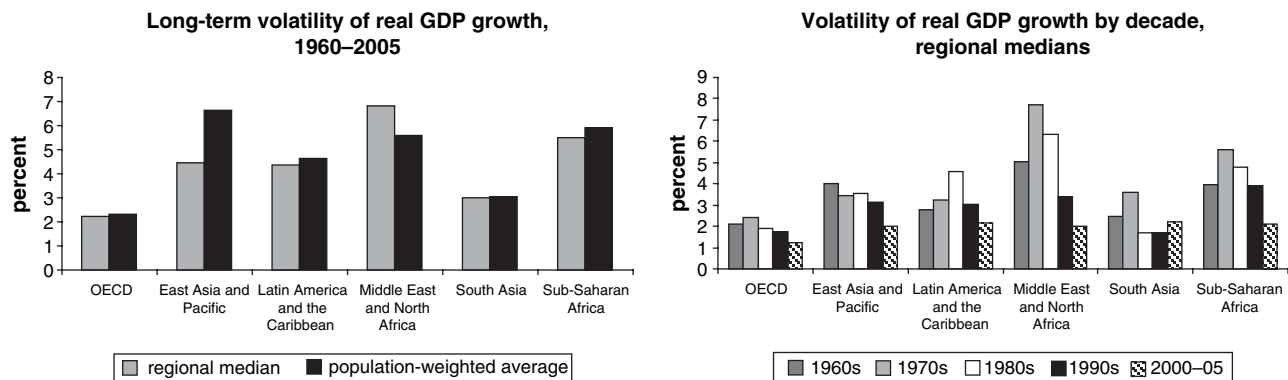
Excess macroeconomic volatility in Latin America reduces growth and is especially harmful for the poor

Volatility has long been a trademark of Latin America's economic performance. By whatever measure, Latin American economies have been more volatile than those of most other industrial regions (see figure 5.1), and although the region's volatility decreased during the 1990s, after significant increases in the 1970s and 1980s, it remains twice as volatile as member countries of the Organisation for Economic Co-operation and Development (OECD), significantly more volatile than South Asia, and slightly more volatile than East Asia in terms of real GDP growth volatility. The picture is roughly the same when macroeconomic performance is measured by aggregate consumption or spending.

Economic instability can affect growth through different channels. Most of the existing empirical evidence shows that this impact is generally negative. Servén (1998) finds that all five of his alternative definitions of economic instability—measured by the volatility of innovations to macroeconomic variables, such as inflation, terms of trade, real exchange rate, growth rate, and price of capital goods—are strongly negatively correlated with investment ratios. High volatility tends to skew investment toward short-run returns in a nonoptimal way. Destruction of firms' and banks' informational and organizational capital during deep recessions has long-lasting effects. Human capital investments are reduced in an environment of high volatility, as shown in Perry, Arias, López, Maloney, and Servén (2006). A report by the Inter-American Development Bank (IADB 1995) found statistical evidence of a significantly negative effect of macrovolatility on long-term growth in the region, but also of a perverse relation among volatility and poverty, education, income distribution, and financial deepening. Chapter 2 by Fatás and Mihov, in this volume, also finds a significant negative effect of output volatility on growth performance in a large cross-section of countries.

High volatility is especially harmful for the poor. The poor have less human capital to adapt to downturns in labor markets. They have fewer assets and limited access to credit to facilitate consumption smoothing.

Figure 5.1 Volatility of Real GDP Growth



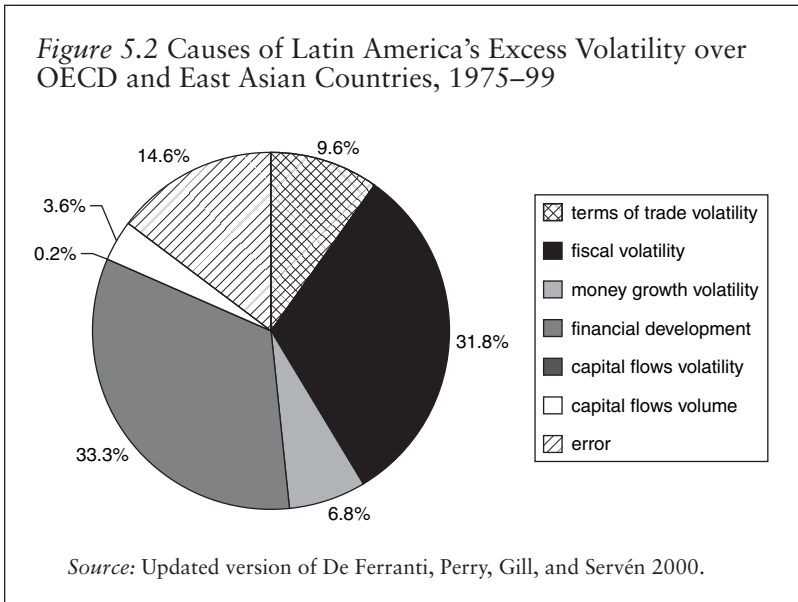
Source: World Development Indicators and author's calculations.

Without appropriate safety nets, irreversible losses in nutrition and educational levels may be experienced, as is usually the case in Latin America. It comes as no surprise, then, that we find an asymmetric behavior of poverty levels during deep cycles: poverty levels increase sharply in deep recessions and often do not come back to previous levels after output recovers (see Lustig 2000; World Bank 2001).⁴

Procyclical fiscal policies may exacerbate macrovolatility in Latin America

In a World Bank study in 2000 (see De Ferranti, Perry, Gill, and Servén 2000), we estimated the causes of excess volatility in Latin America, taking volatility in OECD and East Asian countries as a benchmark. We found that nearly one-third of the volatility was due to insufficient financial integration and development of domestic financial markets and one-third to volatility in fiscal policy (see figure 5.2). The importance of volatile monetary policies has fallen over time, but that is not the case with fiscal policies. This World Bank study does not identify the kind of policies explaining this result, but fiscal policies conducted in a procyclical manner are possible candidates.

Fiscal policies indeed remain highly procyclical, as found by Gavin, Hausmann, Perotti, and Talvi (1996), Gavin and Perotti (1997), and more recently, by Suescún (2005) and Alberola and Montero (2006), among others. Gavin and colleagues (1996) show that not only are fiscal out-



comes procyclical but also that fiscal responses have deepened the cycle, particularly during recessions when they have tended to generate upright surpluses as major financing crises usually leave no other choice. For example, Gavin and colleagues (1996) argue that during recessions Latin American countries tend to generate a small surplus of 2.2 cents for every dollar of real output fall. In contrast, OECD countries tend to generate significant countercyclical deficits of 61 cents. Suescún (2005) and Alberola and Montero (2006) find that discretionary fiscal policies, after adjusting for the effect of automatic revenue stabilizers, are highly procyclical in most Latin American countries. Furthermore, Suescún (2005) finds that, given the small effect of automatic stabilizers in Latin America, the net effect of the actual fiscal position is destabilizing.

Table 5.1 presents estimates of the “coefficient of procyclicality” for real current expenditures and total primary expenditures based on country-by-country regressions for a sample of 80 countries with at least 15 years of data each,⁵ following Fatás and Mihov’s methodology and presented in chapter 2 in this volume:

$$\Delta G_t = \alpha + \beta \Delta Y_t + \phi \Delta G_{t-1} + \delta W_t + \varepsilon_t \quad (1)$$

where G is the logarithm of real current government expenditure (or primary spending) and Y is the logarithm of real GDP. W represents a vector of two control variables: the inflation rate and a time trend. To avoid endogeneity problems, current output growth is instrumented with its own lag, an index of oil prices, lagged inflation, and the lagged value of current government expenditure growth. The coefficient β measures the degree of procyclicality for a given country.

As seen in table 5.1, most Latin American countries have a positive β , especially when considering current expenditures. For comparison, I also include in the table recent results from Suescún (2005) and Alberola and Montero (2006), estimating the cyclical response of the structural primary surplus. Although there are differences in a few cases, only Bolivia and Nicaragua in the sample show consistent countercyclicality of public expenditures. These are the only two countries in the sample whose external financing depends on aid flows and not on private capital markets and, hence, their fiscal performance is basically led by the well-known countercyclicality of aid flows.

Procyclical fiscal policies add policy risk to the income risk of the poor

Procyclical fiscal policies not only accentuate the cycle but also are especially harmful for the poor. Indeed, social expenditures are kept at best constant as a percentage of GDP during downturns, and the more targeted social expenditures tend to fall relative to GDP, when they should expand

Table 5.1 Indicators of Cyclical Sensitivity of Fiscal Aggregates

<i>Country</i>	<i>Fiscal procyclicality (using real public current expenditure)</i>	<i>Fiscal procyclicality (using real public primary expenditure)</i>	<i>Structural primary surplus response to cyclical conditions (Alberola and Montero 2006)</i>	<i>Structural primary surplus response to cyclical conditions (Suescún 2005)</i>
Argentina	2.882	3.553	-0.077	-0.028
Bahamas, The	0.329	0.265		
Bolivia	-1.782	-3.042		0.161
Brazil	5.818	-2.607	-0.235	-0.524
Chile	-0.566	1.109	0.243	-0.091
Colombia	1.018	1.615	-0.095	-0.052
Costa Rica	1.003	1.461		-0.381
Ecuador			-0.062	-0.707
Dominican Republic	2.896	6.390		-1.284
Mexico	-0.499	2.137	0.008	-0.403
Nicaragua	-1.528	-4.693		0.160
Panama	2.539	2.764		-0.137
Paraguay	1.749	1.231		-0.027
Peru	-0.629	0.377	-0.194	-0.033
St. Vincent and the Grenadines	-2.658			
Uruguay	2.598	2.694	-0.212	-0.146
Venezuela, R.B. de	1.586	3.842	-0.177	-0.385

Source: Author's calculations.

as the number of poor increases (De Ferranti, Perry, Gill, and Servén 2000). As a consequence, in a typical downturn, social expenditures per poor person are reduced by 2 percent for each 1 percent reduction in output. By contrast, social expenditures usually grow as a percentage of GDP in upturns, when they are less needed. That is, the procyclicality of safety nets—as a consequence of the procyclicality of fiscal policies—adds substantial policy risk to the income risk for the poor. Thus, they suffer both from higher consumption losses and from higher cuts in social transfers during deep recessions.

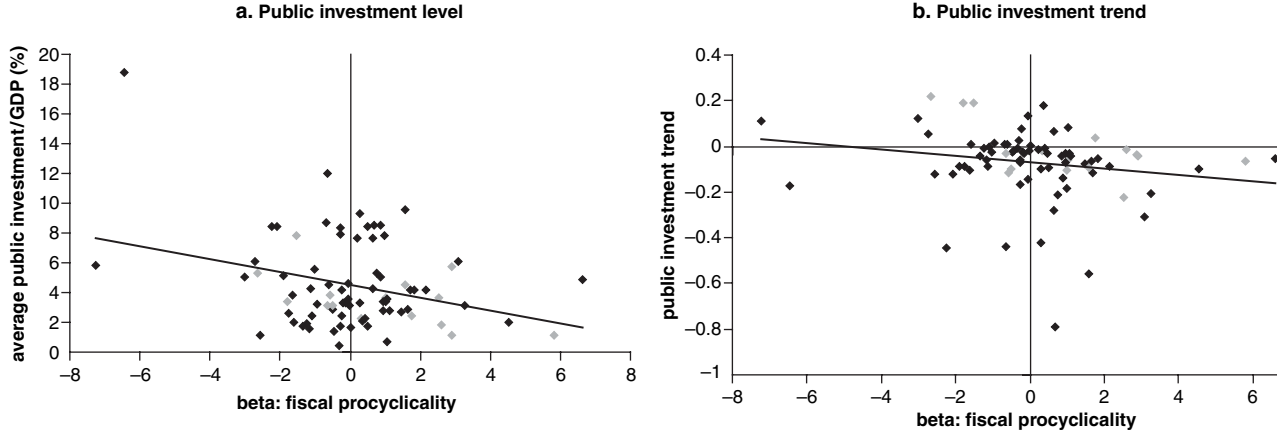
Procyclical biases may lead to deficit and anti-investment biases in fiscal policies

Procyclical fiscal policies often have been found to produce a deficit bias. Indeed, whenever countries do not generate surpluses in booms, as they should, they will be forced by markets to compensate for the workings of automatic stabilizers and reduce deficits by cutting expenditures during downturns. However, there are political and legal limits to what countries can do in such cases. Thus, the procyclical character of fiscal policies often ends up generating unsustainable fiscal results over the cycle—as proven to be the case in several countries in Europe (for example, Italy and Spain) before the EU fiscal consolidation arrangements—or major macroeconomic crisis. This has been the experience in many Latin American countries, most recently in Argentina, Ecuador, and Colombia in the 1990s, where expansionary fiscal policies during the booms in the first half of the decade contributed to deep fiscal and macroeconomic crisis afterward (for a detailed analysis of the Argentine case, see Mussa 2002; Perry and Servén 2003).

Calderón and Servén (2004) and Calderón, Easterly, and Servén (2003) have found that Latin American fiscal adjustments in the 1980s and 1990s were largely achieved at the expense of public investment in infrastructure. As increases in private investment in infrastructure during the period did not compensate for the reduction in public investment, fiscal adjustments came with a significant cost in terms of forgone growth. Calderón, Easterly, and Servén (2003) estimate that the lag in infrastructure investment in Latin America can explain up to one-third of the difference of growth rates with better-performing East Asia.

This section explores whether procyclical fiscal policies contribute to the anti-investment bias in Latin American fiscal policies, an issue also discussed in Servén (2006). Figure 5.3 shows that public investment is negatively related with the indicator of procyclicality. In this figure, Latin American countries are identified by darker points. The first panel relates public investment-to-GDP ratios with the degree of procyclicality and the second panel depicts the relation of a measure of public investment bias and the same measure of procyclicality. Similar results are obtained when the indicator of procyclicality based on total primary expenditures is used.

Figure 5.3 Fiscal Procyclicality and Public Investment (levels and trends)



Source: Author's calculations.

Table 5.2 Public Investment Trends and Procyclicality of Fiscal Policies

<i>Dependent variable: (PubInvBias=ϕ_i)</i>			
<i>OLS robust standard errors</i>			
	(1)	(2)	(3)
β_i	-0.009 (0.031)**	-0.017 (0.03)**	-0.013 (0.139)
D_Lac		0.086 (0.02)**	0.100 (0.007)***
D_Lac X β_i			-0.019 (0.234)
Constant	-0.072 (0.00)***	-0.088 (0.00)***	-0.088 (0.00)***

Source: Author's calculations.

Note: OLS = ordinary least squares. P-values are in parentheses (based on heteroscedasticity-robust standard errors. **, *** denote significance at the 5 and 1 percent levels, respectively.

Table 5.3 Public Investment Levels and Procyclicality of Fiscal Policies

<i>Depended variable: (PubInv/GDP)</i>	
<i>OLS robust standard errors</i>	
β_i	-0.169 (0.09)*
Secenrollmentg	-0.033 (0.000)***
(Fiscal balance/GDP)	-0.179 (0.024)**
GDP growth	
GDP per capital growth	0.406 (0.006)***
Constant	5.471 (0.000)***
Observations	79
R ²	0.246
F(3,17) (P-value)	0.000

Source: Author's calculations.

Note: P-values in parentheses: **, *** denote significance at the 5 and 1 percent levels, respectively.

The public investment bias in figure 5.3 is measured by the coefficient ϕ associated with the trend variable in the following regression:

$$\left(\frac{\text{Public Investment}}{\text{GDP}} \right)_t = \alpha + \phi T_t + \omega_t \quad (2)$$

The trend coefficient is then regressed against the indicator of the degree of procyclicality, as shown in the following regression of a cross-section of countries:

$$\phi_i = \alpha + \xi \beta_i + \bar{\omega}_t \quad (3)$$

Results are shown in table 5.2. The coefficient on β_i is negative and significant, indicating that countries with higher procyclicality of fiscal policies tend to have more negative trends of public investment relative to GDP. Results in column 3 seem to suggest that this effect is more pronounced in the Latin American region, although the difference is not statistically significant.

The negative relation between the degree of procyclicality and public investment ratios survives the inclusion of other potential determinants of public investment ratios and trends as shown in table 5.3, where $(\text{Secenrollmentg})_i$ denotes the gross secondary education enrollment rate and $(\text{Fiscal Balance/GDP})_i$ represents the average fiscal balance to GDP ratio for country i .

The negative association between procyclical fiscal policies and public investment ratios and trends is due to the fact that an asymmetric response of the composition of public expenditures to the business cycle is often found in countries with procyclical fiscal policies. As discussed in the next section, in such countries both current and capital expenditures increase in good times, but most, if not all, of the burden of adjustment in bad times falls on public investment. Reducing wages and firing employees are more politically costly than suspending or delaying public works whose benefits accrue in the future.

To test the hypothesis of asymmetric response of current and capital expenditures through the business cycle, I proceed as follows. I first construct indicators of the asymmetric behavior of public investment by country. Then, the following three alternative models were estimated.

Model I:

$$\left(\frac{\text{Public Investment}}{\text{GDP}} \right)_t = \alpha_1 + \alpha_2 (D_pos)^* (GDPgrowth_t) + \alpha_3 (D_neg)^* (GDPgrowth_t) + T_t + v_t \quad (4)$$

where D_neg stands for a dummy variable, which takes on the value of one when the growth rate of $(GDPgrowth_t)$ is lower than its average value minus one standard deviation and zero otherwise. D_pos represents a

dummy variable that takes on the value of one when the observed rate of growth is greater than its average value plus one standard deviation. The variable T denotes a time trend.

Model II:

$$\left(\frac{\text{Public Investment}}{\text{GDP}} \right) = \alpha_1 + \alpha_2(D_pos) * (\text{Cycle_GDP}_t) + \alpha_3(D_neg) * (\text{Cycle_GDP}_t) + T_t + v_t \quad (5)$$

where D_neg denotes a dummy variable that takes the value of one if the cyclical component of GDP (Cycle_GDP_t) is lower than its average value over negative cycles. D_pos denotes a dummy variable that takes on the value of one if $\text{Cycle_GDP}_t > \text{mean}(\text{Cycle_GDP}_t)$ (over positive cycles)).

Model III:

$$\left(\frac{\text{Public Investment}}{\text{Primary Spending}} \right) = \alpha_1 + \alpha_2(D_pos) * (\text{GDPgrowth}_t) + \alpha_3(D_neg) * (\text{GDPgrowth}_t) + T_t + v_t \quad (6)$$

D_neg denotes a dummy variable that takes the value of one when $\text{GDP}_t < \text{GDP_trend}$, where GDP_trend is the trend component of GDP and D_pos denotes a dummy variable that takes the value of one when $\text{GDP}_t > \text{GDP_trend}$.

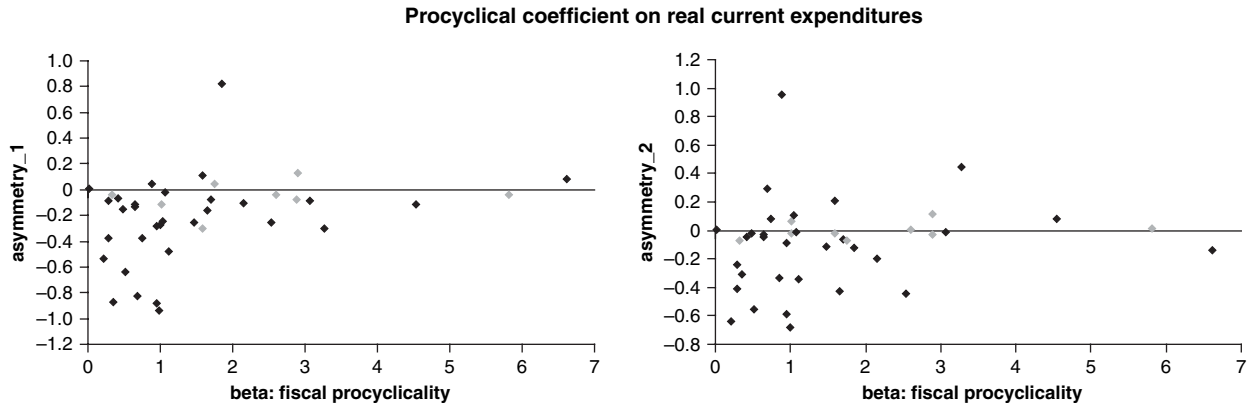
The asymmetry indicator is then constructed on a country-by-country basis according to the following expression:

$$\text{Asymmetry} = \alpha_2 - |\alpha_3| \quad (7)$$

Results are shown in figures 5.4 and 5.5. Figure 5.4 presents the results of Models I and II for the indicator of procyclicality based on current expenditures. Results are similar for the indicator of procyclicality based on total primary expenditures. Figure 5.5 presents the results of Model III for our two indicators of the degree of procyclicality. As expected, most countries with procyclical fiscal policies have an asymmetric response of public investment during the cycle: stronger in busts than in booms (a negative value of the indicator of Asymmetry). These results are especially strong when the indicator of procyclicality of total primary expenditures is used. Figures 5.4 and 5.5 also indicate that, although it is true that most countries with procyclical fiscal policies indeed show the expected asymmetric response of public expenditures along the business cycle, the degree of asymmetry is not necessarily higher in countries with more procyclical fiscal policies (trends in the plots are not statistically significant).

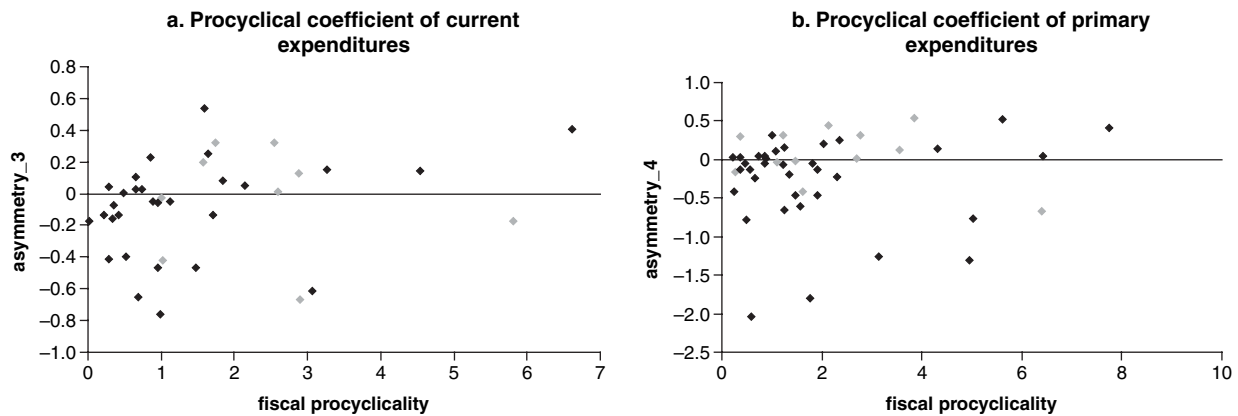
In summary, evidence suggests that countries with procyclical fiscal policies exhibit an asymmetric response of current and capital expenditures along the business cycle, leading to sharper declining trends of

Figure 5.4 Procyclicality and Asymmetry of Public Investment Responses: Models I and II



Source: Author's calculations.

Figure 5.5 Fiscal Procyclicality and Asymmetry of Public Investment Responses: Model III



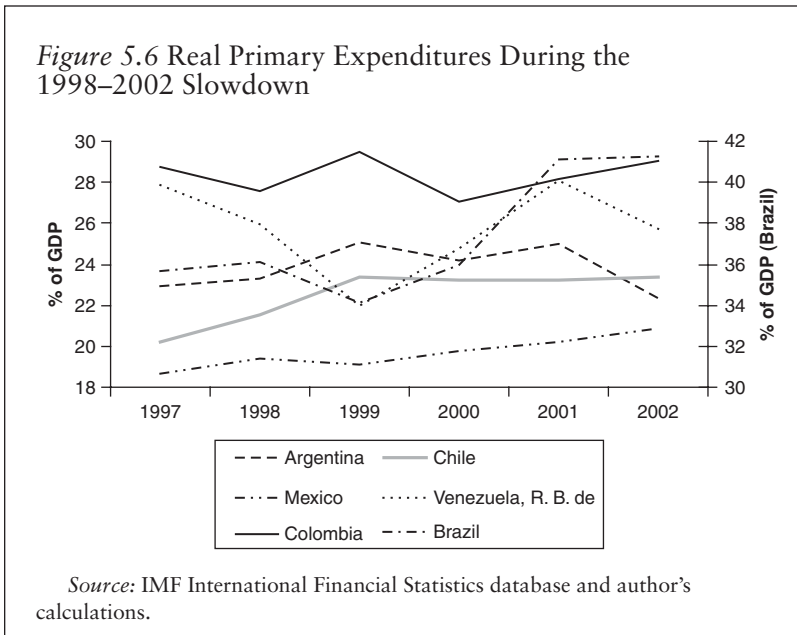
Source: Author's calculations.

public investment-to-GDP or public investment-to-total expenditures ratios and thus to lower levels of public investment-to-GDP ratios in the long term (even after controlling for other potential determinants of these ratios). This is probably an important channel through which procyclicality of fiscal policies negatively affects long-term growth and weakens efforts to achieve long-term public sustainability, as discussed in Servén (2006).

III. What Are the Causes of the Procyclical Bias of Fiscal Policies in Latin America?

Historically, fiscal policies have been strongly procyclical in the region, in sharp contrast to what has happened in many (though not all) OECD countries. During the recent regional downturn, 1998–2002, only Chile was able to apply a consistent countercyclical fiscal policy (real primary expenditures increasing at the beginning of the downturn in 1997–99 and then leveling off). In contrast, public expenditures of Brazil and República Bolivariana de Venezuela highly procyclical and those of Colombia and Argentina showed more variability than consistent countercyclicality in their performance. See figure 5.6.

The reason for this behavior is a mutually reinforcing vicious circle conformed by the volatility of macroeconomic outcomes, the procyclicality of



the fiscal response, and the limited and procyclical access to international financial markets. Indeed, as discussed below, procyclicality in fiscal policies in Latin America can be explained by the combination of faulty policies and weak budgetary institutions with asymmetric information problems in international financial markets.

First, most countries in the region face a serious credibility problem when they attempt expansionary fiscal policies in a bust. Not only do most of them arrive at the end of booms in fragile fiscal positions (high or moderate deficits and relatively high debt stocks), but they also face an obvious time inconsistency problem. Governments may borrow today and choose not to pay back in good times; that is, they may continue to increase indebtedness in good times. Indeed, most of them have not reduced indebtedness in past booms, so there is no reason for a financier to expect that they would do so next time. Almost no country in Latin America, except for Chile, has been able to run surpluses in booms. As an example, fiscal crises in both Colombia and Argentina at the end of the 1990s can be traced to excessive expenditure increases during the booms—that is, to the incapacity to achieve or maintain surpluses in good times. If that is the case, expansionary policies during bad times can be expected to lead to an intertemporally unsustainable outcome—a deficit bias—and can be rightly interpreted as leading to an increase in default risk. In these conditions, the proper response of responsible creditors is not to finance an increased deficit during busts or to do so at significantly high spreads.

In summary, the core of the problem would appear to be the incapacity to maintain surpluses in good times. As Gavin, Hausmann, Perotti, and Talvi (1996) put it, “It is during booms that the seeds of crisis often are sown, although the crisis becomes evident only when the boom subsides.”

But why is fiscal policy procyclical in booms? The main reasons lie in the political economy of fiscal policy and the lack of strong budgetary institutions. It is hard enough for a responsible minister of finance to avoid a deficit—particularly in periods in which financing is readily available, which is usually the case in booms. It is much harder to maintain a too visible surplus through discretionary budgetary decisions. As Schick’s (2002) paper has shown, there are strong pressures in any normal discretionary budget process to increase expenditures. Political incentives are aligned with spending out any potential surplus in a boom.

Such political pressures may inhibit a responsible minister of finance from indulging in an explicit discretionary countercyclical policy (or from permitting automatic stabilizers to operate) during downturns. Once Pandora’s box (of a deliberate increase in expenditures or an increase in the deficit) is opened, it may not be easy to close: the political pressures may be too strong. As explained, markets will punish any such move, because they cannot distinguish easily between a responsible countercyclical policy and outright fiscal laxity.

Financial market failures also contribute to fiscal procyclicality. Markets often finance outright deficits in booms that exacerbate the trend

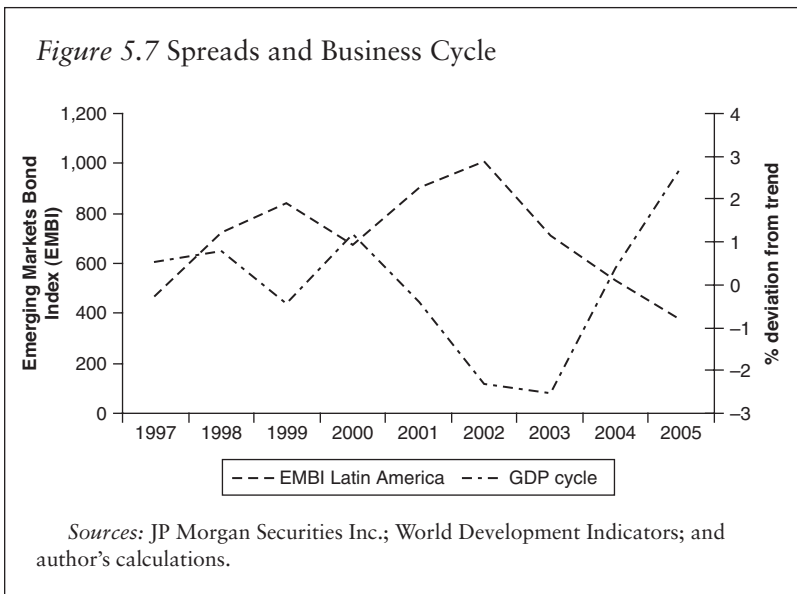
toward deficit biases. Capital flows are found to be highly procyclical and spreads countercyclical (see figure 5.7). Such behavior may be explained by underlying problems of asymmetric information, but this is not our focus here. Analysts commonly explain procyclical policies either by “voracity effects” (Tornell and Lane 1999) or “capital markets behavior” (Gavin, Hausmann, Perotti, and Talvi 1996). Actually, these two phenomena reinforce each other as discussed above.

IV. Why Fiscal Rules May Help

For all these reasons, authorities may well want to tie their hands and resort to automatic rules that allow at least the automatic stabilizers to work over the business cycle and eventually to go farther into a regulated, rules-based countercyclical fiscal policy.

Such rules would help to keep any surplus in good times out of sight and out of reach from the political process in normal discretionary budgetary decisions. But why would they work? Why would policy makers stand by the rule when it bites and forces tough decisions that they are not able to make on their own “free will”? Wouldn’t they ignore and change the rule or at least be tempted to “cheat” by “creative accounting”? More precisely and to our point, are rules capable of changing the incentives to spend out potential surpluses in good times?

Incentives may change if they impose high enough exit costs to compensate for the perverse incentives to spend that result from the normal budgetary political process. How can these incentives impose high exit costs?



Executive authorities will have strong incentives to comply with the rule if enforceable penalties are in place (as with the Brazilian Fiscal Crimes Law) and if the rule is clear and simple enough that it does not leave room for cheating. More important, “breaking” an explicit rule may indeed be more costly than just indulging in silent discretionary expansionary policies when there are no rules due to the visibility of such a decision. This is particularly true if breaking the rule requires changing the law and especially if it is a constitutional law that requires a qualified majority. Opposition parties and the press will find a golden political opportunity to criticize the lack of responsibility of the governing political coalitions. For a responsible finance minister, the preexistence of such a rule is a gift, because it will facilitate the resistance of pressures for excessive spending in booms from peers and politicians and shift the political cost of an explicit break of the rule. Chile’s experience, at the beginning of the democratic period during a major boom in copper prices, exemplifies the usefulness of a tight legal rule for responsible economic authorities.

In downturns, a well-designed rule may facilitate the operation of automatic stabilizers and enhance the credibility of a well-limited countercyclical fiscal policy. This will be the case particularly in situations in which the rule permits a surplus in the previous boom. If such surpluses were saved in a stabilization fund for bad times, the government will have resources at its disposal to fully or partially finance the deficit in bad times, reducing the need to resort to market finance in a difficult period. The fact that the deficit in the downturn is predictable and limited by the rule—and that the same rule may credibly limit spending in future booms—may give a clear signal that the government is not indulging in unsustainable lax policies, but rather is following an established sustainable rule, which may help convince markets to cover any remaining financing requirement. In other words, financiers will face clear signals that distinguish a responsible and sustainable (limited and predictable) countercyclical rules-based fiscal policy from outright indulgence in intertemporally unsustainable policies. A good rule may reduce problems associated with asymmetric information and facilitate the financing of deficits in bad times.

In addition, such a rule will enable a responsible minister of finance to prevent expenditure pressures from running wild and thus allowing too much expansionary policy during downturns.

V. Conflicts Between Flexibility and Credibility: Toward Fiscal Rules That Reduce the Procyclical and Deficit Biases

Any rule may entail a dilemma between flexibility and credibility. Too rigid a rule in the pursuit of credibility may lead to high costs in forgone flexibility. Furthermore, an excessively rigid rule may become altogether

nonviable. If this is the case, economic actors may anticipate the unsustainability of the rule, and it will not lead to more credibility. In other words, an excessively rigid rule may limit flexibility and not enhance credibility; it may entail only costs and few benefits if any at all. It would just be a bad rule.

I argue that this situation is the case with most rigid fiscal rules that attempt to reduce the deficit bias and thus to enhance solvency without correcting for the potential effects of shocks and the economic cycle, as has happened with some of the Fiscal Responsibility and Stabilizing Transfers Laws recently enacted in Latin America (see below for additional discussion). In such cases, if there is a positive shock (an increase in the price of oil for an oil-exporting country, for instance) or a boom in economic activity, the rule will not be binding: it will be too easy to comply with, it will not help improve the true underlying fiscal position, and it will permit a procyclical fiscal stance to accentuate the boom. Conversely, if there is a negative shock or a downturn in economic activity, the rule will become excessively tight and would exacerbate the downturn. Thus, the rule may turn out to be too difficult to comply with and be abandoned altogether (as happened in both Argentina and Peru with the Fiscal Responsibility Laws [FRLs] of the late 1990s). In other words, such rigid rules may not help avoid a deficit bias precisely because they accentuate the procyclicality of fiscal policies. They are just not useful rules. A rule that attempts to support countercyclical fiscal policies but is not designed to achieve long-term debt sustainability will also be unsustainable and noncredible. In the end, it would not serve any purpose.

A well-designed rule must, as a consequence, attempt to facilitate the operation of automatic stabilizers and avoid a deficit bias. It may permit a limited active countercyclical fiscal policy. This will by necessity make the rule somewhat more complex, but realistic and eventually useful.

In what follows, I review some Latin American attempts at applying fiscal rules that have tried either to cope with the procyclicality issue or with the deficit bias, or both, and draw some practical policy conclusions.

VI. The Experience with Fiscal Rules in Latin America

The experience with commodity stabilization funds

Perry (2003) reviews the operation of the Chilean Copper Stabilization Fund, the Colombian Coffee and Oil Stabilization Funds, and the Macroeconomic Stabilization Oil Funds in Ecuador and República Bolivariana de Venezuela. Based on this review, I can draw some general conclusions.

Stabilization funds are easier to institute before the fact (that is, when prices are low or before expected increases in quantities take place) and, in the case of shared revenues, when they treat all beneficiaries (central

or federal governments and subnationals) in a symmetric way. This is highlighted by the experience of the Colombian Oil Stabilization Fund and was a major political consideration in the design of the Ecuadorian Macroeconomic Stabilization Oil Fund.

Stabilization funds may be useful in ensuring that some savings are retained from fiscal revenues associated with commodity export booms, especially in situations in which automatic saving rules are in place and the accumulated net surplus remains “out of sight and out of reach” of the normal discretionary budget process. Most stabilization funds accumulated important savings during at least part of the booms in Latin America. The Chilean Copper Stabilization Fund performed exceptionally well in this regard. The Chilean Copper Stabilization Fund was instrumental in enabling the Ministry of Finance to maintain high surpluses during the initial years after the return of democracy, when repressed social and political aspirations could have made it extremely difficult to maintain such high surpluses. Its savings rules were stable and helped maintain high surpluses during a long period of high copper prices.

The rules of the Colombian Oil Stabilization Fund have remained quite stable since its creation in 1995 and the fund has accumulated important savings during booms in oil prices. Because it covered only a fraction of overall revenues, however, it was not an effective instrument to stabilize overall expenditures, and Colombia actually saw a severe deterioration of its public finances in the second half of the decade. It must be mentioned that Colombia had had a relatively successful experience with the Coffee Fund, when coffee was the main export of the country. That was different in nature from the rest of funds reviewed here, as it was a mechanism of stabilization of the private income of coffee growers, rather than of public revenues and expenditures.

In other instances, however, rules were drastically changed either to reduce further savings or to use part of the assets in the funds to finance additional expenditures during booms. In particular, the Venezuelan Macroeconomic Stabilization Fund rules were relaxed so many times that the fund ended up not having any useful purpose and public expenditures were sharply increased during the recent boom (from 20.4 percent of GDP in 1999 to 31.4 percent in 2005) leading to a deterioration of the nonoil public sector deficit from 5.4 percent of GDP in 1999 to 22.6 percent of GDP in 2006 (Rigobón 2004; World Bank 2005, 2006a).

The Ecuadoran Macroeconomic Stabilization Fund and companion Fiscal Responsibility Law had a strong start that led to substantial savings and debt reduction (the primary surplus increased from 1.2 percent of GDP between 1995 and 1999 to 4.6 percent between 2000 and 2005, and the public debt-to-GDP ratio fell from 70.2 percent in 2001 to 44.1 percent in 2005). However, they were then severely weakened by initiatives of the government in 2005, when today's President Correa was in charge of the Ministry of Finance, leading to a temporary halt in lending by

international financial institutions (IFIs) with whom there was an explicit commitment with respect to the previously established rules. The previous rules required the use of 70 percent of the Fund's (Fund for Stabilization, Social and Productive Investment and Reduction of Public Debt [FEIREP]) revenues for debt buybacks and to pay the government debt to the Social Security Institute and 20 percent to be saved for stabilization purposes and emergencies, but the new rules have no minimum allocation for debt buybacks and both revenues and resources accumulated in the fund can be used more freely to finance expenditures (World Bank 2006b). Although it is still too early to assess the effects of these changes, most analysts predict a substantial increase in expenditures going forward.

The experience of the more recent Oil Stabilization Fund in Mexico is somewhere in between the Chilean/Colombian and the Ecuadorian/Venezuelan cases. Although the saving rules have been marginally relaxed as savings accumulate, the fund has accumulated substantial assets and has been an important support for the Ministry of Finance to be able to achieve a continuous reduction of the overall public sector borrowing requirements in spite of strong political pressures for increased expenditures (Latin Source 2007).

As mentioned above, even in some cases in which funds were successful in accumulating assets, they could not by themselves ensure aggregate expenditure restraint during booms in economic activity. In addition to the Colombian experience in the second half of the 1990s, this was also the case in República Bolivariana de Venezuela even during the period in which the stabilization fund was accumulating assets. In such cases, public finances ended up with some savings in the fund but at the same time with an unsustainable deterioration of the nonoil budget. To avoid such a problem, a complementary rule is needed to require that nonoil (noncommodity) deficits be limited to the interest yield of the oil fund (as in Norway) or that otherwise restrict overall expenditures, as in the fiscal responsibility laws discussed below.

Even in those cases in which stabilization funds are effective in keeping an overall expenditure restraint in the booms (as in the case of Chile), if they do not include an automatic rule for divestitures, they may play a too limited role in executing countercyclical policies in downturns, because markets cannot distinguish well between a responsible countercyclical policy and the beginning of fiscal laxness. Indeed, Chile was not able to run a significant countercyclical fiscal policy against the 1999 recession, partly as a consequence of this fact.⁶

These facts conform to our previous conceptual discussion, and led the Chilean government to the adoption of the structural budget rule and led other countries in the region to adopt or to plan to adopt fiscal responsibility laws to keep the growth in public expenditures under control. We discuss these experiences in the next section.

Before that, a brief technical digression is in order. Some stabilization funds have attempted to deal with the difficult issue of distinguishing

between temporary and permanent shocks in commodity prices by adopting as a reference price either a fixed price (as in the early years of the Chilean Copper Fund), or a long-term projection done by independent experts (as is presently the case in Chile), or a moving average of past prices that smooth out the effect of cycles and gradually adapt the level of expenditures to permanent shocks (which are welfare enhancing due to the inefficiencies associated with sharp increases or cuts in expenditures). For a similar reason, some (as the Colombian and Ecuadorian Oil Stabilization Funds) attempted to smooth out (or gradually adapt to a new level of) total revenues from oil exports either using a moving average of past dollar revenues as a benchmark (in the case of the Colombian Fund) or by earmarking additional production (as in the case of Ecuador where revenues associated with oil transported by a second major pipeline from the main area of production were destined as fund income). In both cases, there was an explicit objective to adapt expenditures gradually to a sharp expected increase in the volume of exports. The Colombian law stipulated that in years in which oil revenues would be below the moving average, the government could use an amount equal to this difference to finance expenditures, although limited to a fixed fraction of accumulated assets.

However, either fixed-price or moving average rules might be problematic when, as shown by empirical evidence (see Cashin, Liang, and McDermott 2000; Cuddington 1992), commodity prices do not tend to revert toward a constant mean, but rather tend to experience random shocks of long durations. This means that when the shocks bring the prices down during a long period, an expenditure rule based on a fixed price or a moving average might lead to the exhaustion of the accumulated resources in the fund. If the shocks to the prices are positive and long-lasting, the fund might tend to accumulate overly large savings and thus produce costs in terms of forgone investment. Nevertheless, even a fixed-price or a moving average rule might be better than no rule, given that political pressures tend to lead toward a deficit bias and the quality of public investments tend to deteriorate remarkably during times of increases in the prices or volumes of commodity exports (or other types of booms). Moreover, these risks can be ameliorated by establishing rules that set ceilings and floors on the total savings of the fund.

More generally, as discussed, fiscal rules should aim to smooth overall government expenditures and eliminate the deficit bias, rather than just stabilize the portion related to commodity exports. This can be accomplished in other ways, as discussed below.

The experience with fiscal responsibility and stabilizing transfers laws

Fiscal responsibility laws adopted in Brazil, Argentina, and Peru in the late 1990s and more recently in Colombia, Ecuador, and other countries in the

region were designed to avoid deficit bias and thus achieve and maintain fiscal solvency. We will not detail their potential virtues with respect to this objective; however, in contrast to the evident failure in the Argentinean and Peruvian cases, we will note that the Brazilian law was more successful. It was a product of a broad political consensus and was accompanied by a law of fiscal crimes that could effectively punish deviations from the Law 101.

I will refer more to the potential effects of these laws on the procyclical stance of fiscal policy. To the extent that some of these laws set rigid specific targets for deficits or debt levels, they may turn out to reinforce the procyclical character of fiscal policy or become nonviable. If the country in question faces an unexpected negative shock to its public finances, such as a fall in a major revenue source or a sharp downturn in activity, adherence to the rule would force authorities to cut public spending—thereby impeding the operation of “automatic stabilizers” and deepening the downturn. Or, authorities may end up not being able to comply and the rule will be superseded, as happened in Argentina and Peru. A rule that does not take into account such possibilities may end up trading long-term solvency benefits for short-term costs, but it also may become unsustainable in the long term and thus noncredible.

The Ecuadorian law that created the Oil Stabilization Fund set a maximum 3.5 percent annual growth in overall expenditures and, as mentioned, was initially highly successful in keeping overall expenditures under restraint. Subsequent revisions of the law in 2005, however, raised this ceiling to 5 percent for capital expenditures and further exempted infrastructure and financial investments. These revised rules left ample room for major increases in expenditures during good times.

Some of these rules and similar legislation at the turn of the century (specifically in Argentina and Colombia) included provisions intended to achieve control of expenditures by states or provinces (Braun and Tommasi 2002; González, Rosenblatt, and Webb 2002). However, they offered a guarantee of minimum transfers that could end up creating a serious fiscal contingency for the federal (central) government. Such a proviso led to the incapacity to observe the commitment in the case of Argentina in 2001 as the economic crises progressed. A constitutional reform in Colombia was more successful. After an initial period of low economic growth, in which the reformed statute actually led to higher transfers than under the previous rule in a period of major fiscal stress, the posterior recovery of economic activity led to important savings under the new rule, which stipulated a fixed growth rate of 2.5 percent annually in transfers in real terms. It has a limited horizon, however, after which the rule will revert to a fixed proportion of current revenues, slightly smoothed through a three-year moving average. To avoid a large jump in transfers, a new constitutional reform is currently being processed. The current draft already accepts higher minimum (around 4 percent) and maximum growth rates

of transfers (equal to the economy's growth rate). The statute may achieve some limited stabilization of transfers during the cycle, at the expense of creating an ever higher contingency for the central government than the previous transitional law.

Once the recovery from the crises was under way, the Argentine government attempted to consolidate the achievements of ad hoc agreements with provinces through a new fiscal responsibility law enacted in 2004. Provinces that adhere to this federal law must keep the budgeted growth of expenditures lower than GDP growth projections, except if their debt service is below 15 percent of net current revenues, where this restriction only applies to current expenditures. When debt service exceeds this value, provinces must achieve a primary surplus and present a transition program to reduce debt service. Provincial fiscal programs must be approved by the Federal Council on Fiscal Responsibility, composed of members from both federal and provincial governments, which can impose penalties. Such a constitutional law may be effective in helping maintain solvency, but it has no provisions for stabilization across the business cycle.

The Chilean structural balance rule

In 2000, Chile adopted a more ambitious rule designed to facilitate credible countercyclical policies and enhance fiscal solvency. It is elegant and simple: an explicit commitment to keep a 1 percent structural surplus each year. The structural balance is estimated by removing the effects of variations in copper prices (by using a panel of experts to estimate the long-term price trend) and the effects of the economic cycle on revenues (by using revenue elasticity estimates and a measure of potential output).

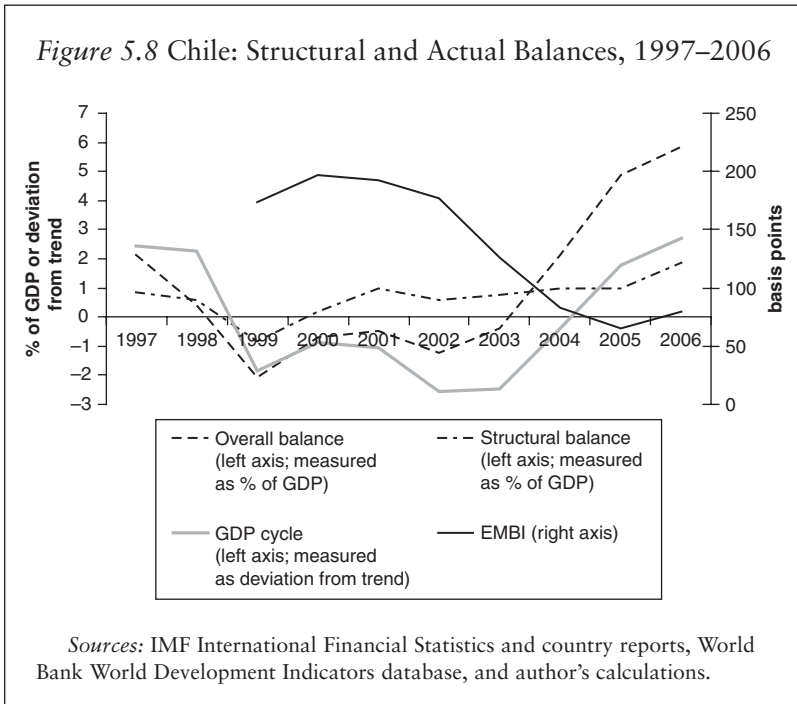
This rule forces the government to maintain high surpluses and high copper prices during booms and allows it to run moderate deficits and maintain low copper prices during downturns. For example, the actual budget deficits for 2001 to 2003 (between 0.6 percent and 1.2 percent of GDP) were consistent with the structural surplus required by the rule and thus were the actual high surpluses obtained in 2004 to 2006 (2.2 percent, 4.7 percent, and around 6 percent of GDP, respectively) (see figure 5.8).

The fact that the size of the surplus in good times and the deficit in bad times are constrained and predictable has curbed political pressures to use the surpluses or enlarge the deficits (as it would imply the breaching of the 1 percent surplus rule). It has enhanced the credibility of fiscal policy relative to the markets—the deficits in bad times can be clearly anticipated and do not signal a relaxation of the fiscal stance.

The use of this rule helped Chile to conduct a credible countercyclical fiscal policy during the global slowdown in 2001–02 and following the strong recovery. Credibility gains from this new rule were largely immediate, given

the track record of Chile and the fact that authorities used credible measures and projections of potential output (which had long been used to conduct monetary policy) and revenue elasticities.⁷

The Chilean rule was closely observed by the government, in spite of the fact that it was not obliged by any law. In 2006, the new government decided to institutionalize the rule and the use of its proceeds through an FRL. The new FRL establishes that, when the application of the fiscal rule leads to actual surpluses, up to 0.5 percent of GDP will be placed in a Pension Reserve Fund to finance the estimated cost of Minimum Assistance Pensions, which are to be universalized through a proposed Law on Pensions. If the actual surplus is larger, up to 0.5 percent of GDP will be used to recapitalize the Central Bank, which has carried a quasi-fiscal deficit since it absorbed the losses of the financial crises of 1983. (Incidentally, this was the reason to set a 1 percent of GDP structural surplus goal in the first place, instead of just a neutral goal of structural balance.) When the actual surplus is above 1 percent of GDP, the remainder will be saved in a Stabilization Fund that will replace the former Copper Stabilization Fund. These resources are presently being managed by the Central Bank



(invested outside Chile to avoid excessive pressures of appreciation of the exchange rate) but will be managed by private agents to be selected by auction from 2007 onward.

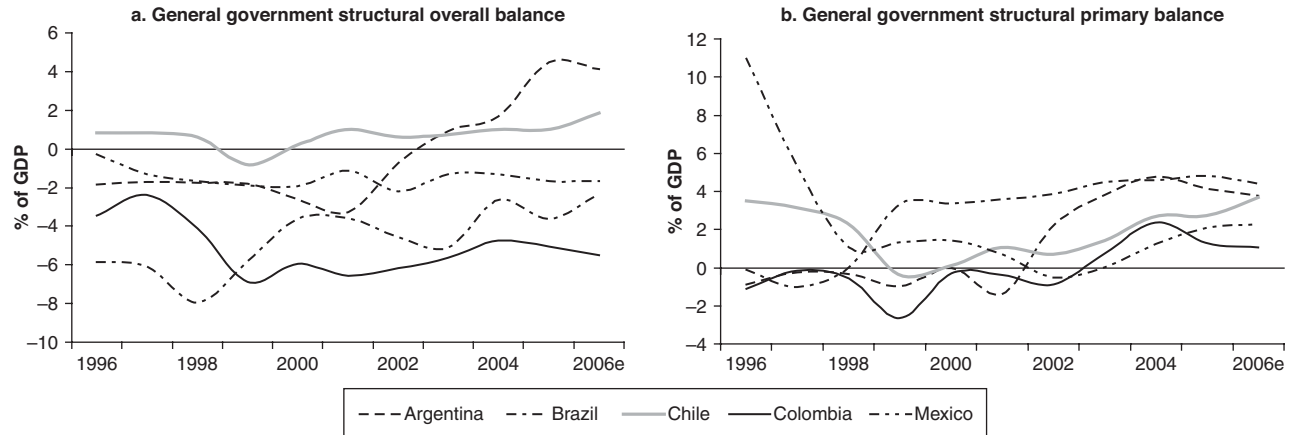
Traditionally, the Chilean economy was highly sensitive to copper price shocks and cycles (economic activity closely followed the high volatility of copper prices). From 2000 onward, the operation of the fiscal rule and the floating exchange rate regime has sharply reduced the impact of shocks in the price of copper on economic activity.⁸

Other countries willing to follow this successful example would probably have to first establish a sound analytical and statistical basis (to be able to credibly predict or assess potential output). Also, when there is a need to correct for commodity prices, countries must set a credible process of long-term projections through an independent respected panel of experts, as in the Chilean case, or else use a long-term moving average of prices (or revenues) as in the case of the Colombian Oil Stabilization Fund. They will also likely need to include a correction on interest payments, which may be the most procyclical component of the fiscal balance, a problem that Chile does not face. Alternately, countries would have to define the structural balance in *primary* terms, altogether excluding interest payments. These countries should probably adopt such a rule in good times, allowing them to establish a track record before the bad times come, and establish it with force of law and adequate enforcing measures (such as a penalty for noncompliance).

Figure 5.9 shows an estimate of structural primary and overall balances for several Latin American countries' central governments. Structural primary balances have become positive everywhere during the present boom, reflecting some degree of fiscal prudence, but only Chile has kept a structural overall balance or surplus during the 1996–2006 period. The Argentine structural balance became positive from 2003 onward as a consequence of both the debt default and restructuring and the imposition of export taxes at a time of high commodity prices. Mexico, Brazil, and especially Colombia show negative structural balances during the whole period. Figure 5.10 shows a tendency toward a procyclical rise in real current expenditures in most countries in the region during the early 1990s and the present booms.

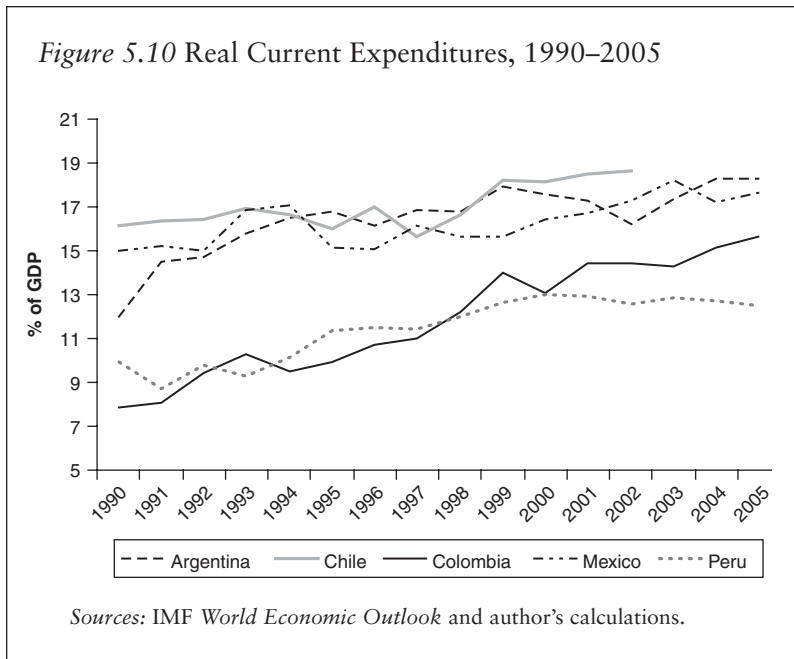
The case of Argentina is illustrative, particularly as the structural primary balance of the federal government actually deteriorated during the strong boom from 1993 to 1998. Afterward, the government was forced to achieve a major improvement during the recession years, which was not enough to reduce the overall structural deficit (see figure 5.11). In addition, the strong contraction of real expenditures from 2000 onward aggravated the recession, adding to expectations of fiscal crises that became unavoidable after the currency crises erupted (IMF 2004; Mussa 2002; Perry and Servén 2003).

Figure 5.9 Estimates of Structural Primary and Overall Balance, Latin America



Sources: IMF World Economic Outlook, World Bank World Development Indicators database, and author's calculations.

Note: e = estimated.



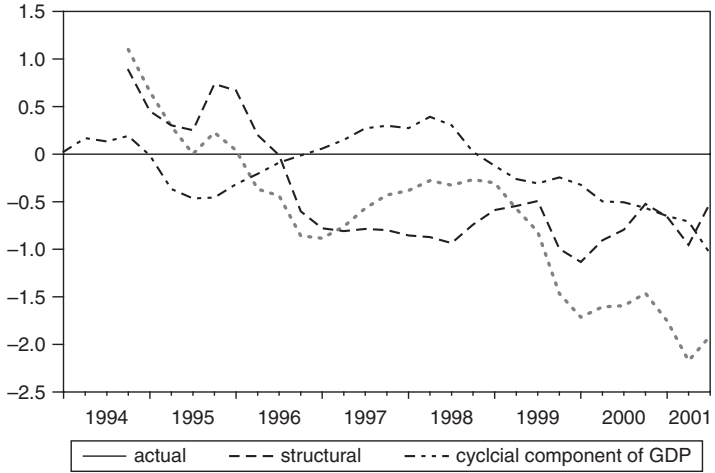
VII. Conclusions and Policy Implications

The above discussion highlights several facts. First, it is as important to reduce procyclical bias as it is to eliminate the deficit bias in Latin American fiscal policies. The procyclical bias accentuates (or at least does not mitigate) macroeconomic volatility, with harmful effects on growth. In particular, we showed that procyclical fiscal policies are common in most Latin American countries, except in those that are essentially financed by aid without recourse to private capital markets, and that procyclical fiscal policies are partially responsible for the observed anti-investment bias in Latin American fiscal expenditures. The anti-investment bias has led to costly underinvestment in infrastructure in several countries in the region, as documented in Servén (2006) and other studies. Furthermore, previous studies have shown that macroeconomic volatility hurts the poor in particular, by forcing sharp reductions in social expenditures per poor person precisely at the time when they are most needed, thus adding unnecessary policy risk to the income risk of the poor.

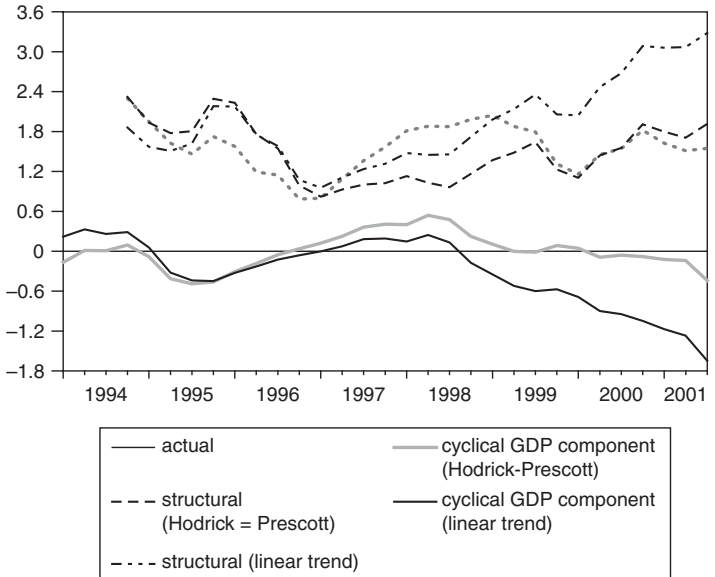
Second, fiscal policies or rules must attempt to deal with both deficit and procyclical biases at the same time. Obviously, countercyclical policies that contribute to a deficit bias will not be sustainable. But policies or rules

Figure 5.11 Structural and Actual Fiscal Balances in Argentina, 1994–2001

(a) Argentina: Structural economic balance (% of potential GDP)



(b) Argentina: Structural primary balance (% of potential GDP)



Sources: IMF country reports, International Financial Statistics database, and author's calculations.

that attempt to reduce the deficit bias and achieve fiscal solvency, while increasing procyclicality, also are likely to prove noncredible and unsustainable over the medium run, as shown dramatically by the Argentine example at the end of the 1990s.

Properly designed fiscal rules may help cope with the political economy and credibility problems that are behind the operation of procyclical fiscal policies (and deficit biases). They may help contain political pressures to spend away potential surpluses in good times by tying the hands of authorities and keeping surpluses out of reach of the political process associated with normal discretionary budgetary practices, that is, *as long as they are successful in imposing high exit costs from the rule*. They can give credibility to the sustainability of deficits in downturns, if in fact they have resulted in surpluses in upturns. Because such deficits will be entirely predictable and limited by the rule, it will be possible to overcome present asymmetric information problems about fiscal policies, thus increasing the likelihood that deficits can be financed in bad times (in addition to the fact that they would be partly or wholly financed by the savings achieved in good times). The fact that deficits will be limited by the rule may keep pressures for excessive deficits at bay during bad times.

Of the different rules examined, the most convenient seems to be a goal of structural balance, or modest structural surplus, such as the one recently adopted by Chile. Such a rule permits full operation of automatic stabilizers during the economic cycle and avoids sharp changes in public expenditures associated with changes in fiscal revenues from commodity exports receipts. The Chilean structural rule has not only permitted effective and credible countercyclical fiscal policies from 2000 onward, but also has contributed significantly to insulate Chilean economic activity from the high volatility of copper prices.

Other countries in the region would benefit from adopting a similar structural balance framework for the presentation and discussion of their fiscal policy, even if they do not adopt a structural balance rule. To do so, in addition to continuing to improve their fiscal accounting, they will need reliable estimates of potential output and revenue elasticities. They would also need to develop ways to adjust for the cyclical components in interest rates or, alternatively, to base their policy goals on adjusted primary balances. IMF assistance could be of great help, because it has developed a well-tested methodology that it regularly applies to analyze and discuss the fiscal stance of OECD countries. The IMF might consider requiring a structural balance framework as part of the Code of Good Practices on Fiscal Transparency.

Structural balance rules should form the basis of future attempts to establish fiscal responsibility laws and stabilizing transfers for subnationals. Some FRLs have relied excessively on rigid quantitative ceilings that do not consider the effects of shocks on the economic cycle. They are therefore likely to accentuate procyclicality of fiscal policies and to prove

unsustainable, as happened in Argentina and Peru in the late 1990s. Such a limitation may reduce *ex ante* their credibility, severely reducing their usefulness. The same can be said of attempts to adopt rules for stabilizing transfers to subnationals in Argentina and Colombia: by instituting minimum rigid quantitative targets, the rules can become minimum guarantees that add to federal or central government fiscal risks.

Countries that have not yet adopted credible structural balance frameworks and rules may benefit from considering more simple rules that would limit (real) expenditure growth to a moving average of past (real) revenue increases. Such a simple rule would significantly reduce the procyclicality of fiscal policies and avoid a deficit bias.

Structural goals would be set according to fiscal consolidation needs. Thus, a country that starts with a high public debt-to-GDP ratio should set goals that permit a gradual approximation to the desired long-term level of debt to GDP. Alternatively, it would limit the expansion of expenditures to an increasing percentage (with a ceiling of 100 percent) of a moving average of real revenue increases, until such long-term goals are achieved. Thus, fiscal consolidation does not need to be obtained before introducing rules that make the achievement of such goals compatible with removing the procyclicality of fiscal policies.

Most important, it would be extremely useful if the IMF (and the Multilateral Development Bank and analysts in the private sector) decides to use systematically a structural balance framework when examining and discussing the fiscal stance of all countries (as the IMF already does for OECD countries) and sets the goals of programs accordingly. After all, best practices already applied to the industrial world should be extended to the analysis and design of policies in emerging markets. It was most unfortunate that not only local authorities and analysts but also the IFIs and international markets accepted and praised highly expansionary procyclical fiscal policies in many Latin American countries (most notably in Argentina) during the good times in the early 1990s. This acceptance eventually planted the seeds of major fiscal crisis or at least significant fiscal stress during the bad times after 1998. We should not repeat these mistakes.

Notes

1. For several countries these rules, more than the currency union itself, have permitted the elimination of the deficit bias and improvement of their fiscal stance to an extent that there was a significant reduction and convergence of interest rates before the start of the currency union. But, whatever the merits of these fiscal rules in reducing the deficit bias and facilitating the convergence of interest rates, as extensively discussed in the paper by Buti and Giudice (2002), there is still a debate about the extent to which these rules permit the operation of necessary countercyclical fiscal policies. Many argue that the 3 percent deficit limit will prove to be too rigid, even though the European Commission can waive it under exceptional circumstances.

2. MERCOSUR and Andean countries recently vowed to adopt fiscal and debt convergence ceilings, following the example of the EU, although with no enforcement instruments (as mentioned in Buti and Giudice 2002). The Andean Community agreement also alludes to an escape clause during recessions.

3. With the major exception of IADB-based research; see Gavin, Hausmann, Perotti, and Talvi 1996; Gavin and Perotti 1997.

4. Calderón and Levy-Yeyati (2007) find robust evidence of statistically significant effects of volatility on inequality using multiple country panel data.

5. Data taken from the IMF's *Government Finance Statistics (GFS)* database and from the World Bank's *World Development Indicators (WDI)*.

6. There were other reasons, in particular an unfortunate public confrontation between the Central Bank and the Ministry of Finance, which led to a sharp, temporary compression of the exchange rate band to avoid a required corrective exchange rate devaluation relative to the adverse external shock.

7. Technical problems, however, are nonnegligible. Simulation exercises indicate that (by just using present output gap models and revenue elasticity estimates) the potential for countercyclical smoothing of the present rule would be fairly limited, because effects of the estimated cyclical adjustment would be just a small fraction of expected corrections related to the volatility in copper prices. In other words, as presently applied, the rule would not do much more than what was accomplished by the Copper Stabilization Fund.

8. Most analysts estimate that this achievement owes much more to the fiscal rule than to the floating exchange rate regime. See, for example, Medina and Soto (2006).

References

- Alberola, E., and J. Montero. 2006. "Debt Sustainability and Pro-cyclical Fiscal Policy in Latin America." Documentos de Trabajo No. 0611, Banco de España, Madrid.
- Alves, R., and O. Afonso. 2006. "The 'New' Stability and Growth Pact: More Flexible, Less Stupid?" FEP Working Papers No. 218, Universidade de Porto, Porto.
- Braun, M., and M. Tommasi. 2002. "Fiscal Rules for Subnational Governments. Some Organizing Principles and Some Latin American Experiences." Unpublished paper prepared for the IMF/World Bank Conference on Rules-Based Fiscal Policy in Emerging Market Economies, Oaxaca, Mexico.
- Buti, M. 2006. "Will the New Stability and Growth Pact Succeed? An Economic and Political Perspective." European Economy Economic Papers No. 241, European Commission, January.
- Buti, M., and G. Giudice. 2002. "EMU's Fiscal Rules: What Can and Cannot be Exported." *Journal of Common Market Studies* 40 (5): 823–47.
- Calderón, C., W. Easterly, and L. Servén. 2003. "Infrastructure Compression and Public Sector Solvency in Latin America." In *The Limits of Stabilization. Infrastructure, Public Deficits, and Growth in Latin America*, eds. W. Easterly and L. Servén. Washington, DC: World Bank and Stanford University Press.
- Calderón, C., and E. Levy Yeyati. 2007. "Three Degrees of Vulnerability. External Shocks in Developing Countries." Unpublished manuscript, World Bank, Washington, DC.

- Calderón, C., and L. Servén. 2004. "Trends in Infrastructure in Latin America, 1980–2001." Working Papers No. 269, Central Bank of Chile, Santiago.
- Calmfors, L. 2005. "What Remains of the Stability Pact and What Next?" SIEPS No. 2005:8, Swedish Institute for European Policy Studies, Stockholm.
- Cashin, P., H. Liang, and J. McDermott. 2000. "How Persistent are Shocks to World Commodity Prices?" *IMF Staff Papers* 47 (2): 177–217.
- Cuddington, J. 1992. "Long-run Trends in 26 Commodity Prices: A Disaggregated Look at the Prebisch-Singer Hypothesis." *Journal of Development Economics* 39 (2): 207–27.
- De Ferranti, D., G. Perry, I. Gill, and L. Servén. 2000. *Securing Our Future*. World Bank Latin American and Caribbean Studies. Washington, DC: World Bank.
- Deutsche Bundesbank. 2005. "Stability and Growth Pact Crucially Weakened." Available at <http://www.bundesbank.de>.
- Eichengreen, B., and C. Wyplosz. 1998. "Stability Pact. More than a Minor Nuisance." *Economic Policy* 13 (26): 65–113.
- Fischer, J., L. Jonung, and M. Larch. 2007. "101 Proposals to Reform the Stability and Growth Pact. Why So Many? A Survey." European Economy Economic Papers No. 267, European Commission, December.
- Gavin, M., R. Hausmann, R. Perotti, and E. Talvi. 1996. "Managing Fiscal Policy in Latin America and the Caribbean: Volatility, Procyclicality, and Limited Creditworthiness." OCE Working Paper No. 326, Inter-American Development Bank, Washington, DC.
- Gavin, M., and R. Perotti. 1997. "Fiscal Policy in Latin America." In *NBER Macroeconomics Annual*, eds. Ben S. Bernanke and Julio J. Rotemberg. Cambridge, MA: MIT Press.
- González, C., D. Rosenblatt, and S. Webb. 2002. "Stabilizing Intergovernmental Transfers in Latin America: A Complement to National/Subnational Fiscal Rules?" Policy Research Working Paper No. 2869, World Bank, Washington, DC.
- Hagemann, R. 1999. "The Structural Budget Balance. The IMF's Methodology." IMF Working Paper No. WP/99/95, International Monetary Fund, Washington, DC.
- IADB (Inter-American Development Bank). 1995. *Hacia una Economía Menos Volátil*. Apéndice técnico, Progreso Económico y Social en América Latina, Informe 1995.
- IMF (International Monetary Fund). 2004. "Evaluation Report: The IMF and Argentina, 1991–2001." Independent Evaluation Office, Washington, DC.
- _____. International Financial Statistics database. IMF, Washington, DC.
- _____. *World Economic Outlook*. Various years. Washington, DC: IMF.
- Latin Source. 2007. "Bad Start: Inflation Spikes, Growth Slows." Mexico: Latin Source Monthly Report.
- Lustig, N. 2000. "Crises and the Poor: Socially Responsible Macroeconomics." Sustainable Development Department, Poverty and Inequality Advisory Unit, Working Paper No. 108, Inter-American Development Bank, Washington, DC.
- Medina, J., and C. Soto. 2006. "Copper Price, Fiscal Policy and Business Cycle in Chile." Unpublished paper, Central Bank of Chile, Santiago.

- Mussa, M. 2002. "Argentina and the Fund: From Triumph to Tragedy." Unpublished paper, Institute for International Economics, Washington, DC.
- Perry, G. 2003. "Can Fiscal Rules Help Reduce Macroeconomic Volatility in the Latin America and the Caribbean Region?" Policy Research Paper No. 3080, World Bank, Washington, DC.
- Perry, G., O. Arias, H. López, W. Maloney, and L. Servén. 2006. *Poverty Reduction and Growth: Virtuous and Vicious Circles*. World Bank Latin American and Caribbean Studies, World Bank, Washington, DC.
- Perry, G., and L. Servén. 2003. "The Anatomy of a Multiple Crisis: Why Was Argentina Special and What Can We Learn From It?" Policy Research Working Paper No. 3081, World Bank, Washington, DC.
- Rigobón, R. 2004. "Procyclical Fiscal Policy. Dealing with Commodity Volatility: the Cases of Ecuador and Venezuela." Unpublished paper, World Bank, Washington, DC.
- Schick, A. 2002. "Budget Rules vs. Political Will." Unpublished paper, Brookings Institution, Washington, DC.
- Servén, L. 1998. "Macroeconomic Uncertainty and Private Investment in Developing Countries: An Empirical Investigation." Policy Research Working Paper No. 2035, World Bank, Washington, DC.
- . 2006. "Fiscal Discipline, Public Investment and Growth." Unpublished paper, World Bank, Washington, DC.
- Suescún, R. 2005. "Procyclical Fiscal Policy in Latin America: Where Do We Stand?" LAC Regional Study, World Bank, Washington, DC.
- Talvi, E., and C. Végh. 2000. "Tax Base Variability and Procyclical Fiscal Policy." NBER Working Paper No. 7499, National Bureau of Economic Research, Cambridge.
- Tornell, A., and P. Lane. 1999. "The Voracity Effect." *American Economic Review* 89: 22–46.
- World Bank. 2001. *Attacking Poverty: World Development Report, 2000–2001*. New York: World Bank and Oxford University Press.
- World Bank. 2005. "Bolivarian Republic of Venezuela: Country Economic Memorandum." Unpublished paper, World Bank, Washington, DC.
- . "Bolivarian Republic of Venezuela: Report on Economic Developments." Unpublished paper, World Bank, Washington, DC.
- . "Ecuador: Country Economic Memorandum. Promoting Stable and Robust Economic Growth." Report No. 36412-EC, World Bank, Washington, DC.
- . World Development Indicators database. World Bank, Washington, DC.

Part II

Fiscal Policy and Growth

Fiscal Discipline, Public Investment, and Growth

*Luis Servén**

I. Introduction

Public sector solvency has to do with the government's assets and liabilities, future income, and expenditures. It possesses, by definition, an intertemporal dimension. In practice, however, financial markets and multilateral institutions routinely assess the strength of public finances almost exclusively on the basis of the cash deficit, that is, the rate of acquisition of liabilities by the public sector. Such practice amounts to ignoring public assets or, equivalently, the future income of the public sector and the intertemporal dimension of solvency.

Following this practice, fiscal-adjustment programs, and their monitoring, typically focus on the time path of the government deficit. Because current and capital expenditure have identical effects on short-term government cash flows, and adjustment programs rarely set expenditure composition targets, the result is that the burden of fiscal adjustment tends to fall disproportionately on public investment and other productive expenditures of the public sector. The recent experience of industrial and emerging countries attests to this conclusion.¹

* The author thanks Craig Burnside, Tim Irwin, and Guillermo Perry for helpful discussions, and Patricia Macchi for excellent research assistance. An earlier version of this paper was prepared for the World Bank's Latin America and the Caribbean Regional Studies program. The views expressed in the paper are the author's only and do not necessarily reflect those of the World Bank, its executive directors, or the countries they represent.

The use of public sector cash flow as a sufficient statistic of fiscal discipline is especially problematic for those countries that face the task of building up their basic infrastructures, as is the case of most developing countries as well as newcomers to the European Union (EU). Such task demands a large investment effort that, under the action of conventional public deficit targets, would have to be financed through major increases in tax collection, entailing potentially large distortions and running counter to the objectives of tax smoothing and intergenerational equity.²

The alternative is to restrict the accumulation of productive assets to protect public sector cash flows—at a potentially major cost in terms of future growth. Moreover, such cost also has an adverse impact on the *future* cash flows of the public sector, by affecting negatively the growth of its revenue base, which implies that enhancing the government's current cash flows may not be an effective strategy to strengthen public solvency. This means that the conventional public deficit is not a good guide to the state of public finances, and it underscores the need for better fiscal targets that protect solvency without unduly distorting the composition of spending and jeopardizing growth.

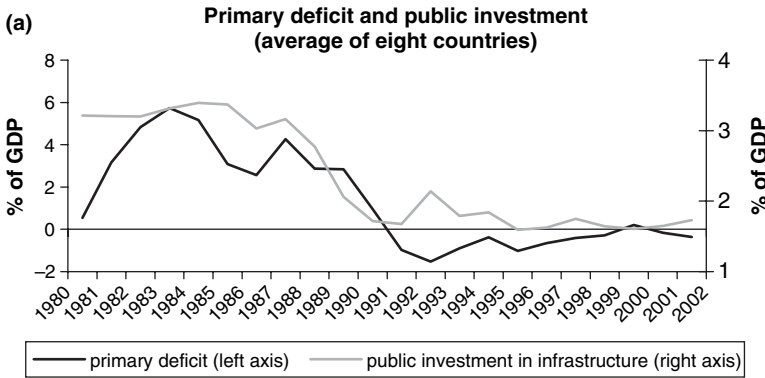
This paper offers an analytical review of the links between fiscal targets, public investment, and growth.³ The rest of the paper is organized as follows. Section II reviews the international experience with public investment in the context of fiscal adjustment. Section III examines the arithmetic of solvency and its practical application. Section IV concludes.

II. Fiscal Adjustment and Public Investment

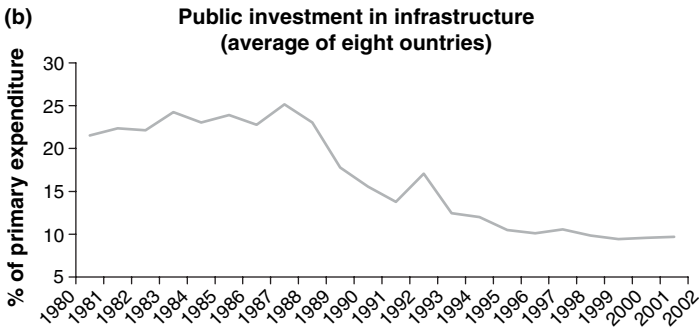
The macroeconomic literature has long acknowledged that fiscal adjustment episodes tend to include disproportionate public investment cuts. Such phenomenon has been amply documented in both developing and industrial countries.⁴ Regarding the former, a recent independent evaluation of a large set of International Monetary Fund (IMF) fiscal programs concluded that, in most cases, the restrictive fiscal measures led to a public investment contraction that proved excessive *ex post* (IMF 2003).

The experience of Latin America is particularly revealing in this sense. Over the last two decades, most of the countries in the region adopted fiscal-adjustment measures that led to significant increases in the primary surplus. In most countries, the adjustment included a drastic contraction of public infrastructure investment. This is illustrated in the top panel of figure 6.1, which depicts the trajectories of the primary fiscal deficit and public infrastructure investment,⁵ both as percentages of gross domestic product (GDP), for the average of eight Latin American countries. It is apparent from the figure that the decline in the primary deficit, from around 5 percent of GDP in the early 1980s to about zero by 2000, was accompanied by a permanent fall in infrastructure investment, from an

Figure 6.1 Latin America: Fiscal Adjustment and Public Investment



Sources: Calderón and Servén 2004a; Fitch database.



Sources: Calderón and Servén 2004a; World Bank World Development Indicators database, various years.

Note: In this figure, Latin America is Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru.

average of 3.5 percent of GDP in the early 1980s to 1.5 percent by the turn of the century. The public investment decline affected virtually all countries (Calderón and Servén 2004a).⁶

Roughly speaking, the infrastructure investment contraction amounted, on average, to some 40 percent of the observed fiscal adjustment. This is remarkable because public infrastructure investment represents a small fraction of GDP, and a relatively small part of overall public expenditure.

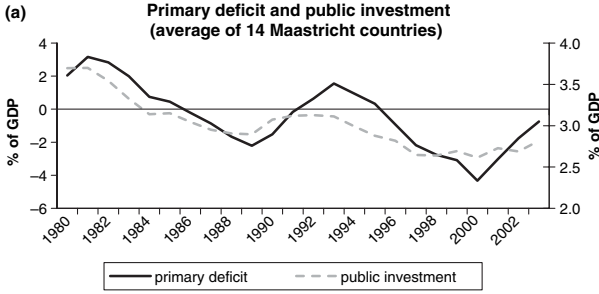
This is illustrated in the bottom panel of figure 6.1, which shows the average ratio of public infrastructure investment to the sum of public consumption plus public infrastructure investment (a rough proxy for the overall primary expenditure of the public sector, for which information is not available). The figure shows that in the early 1980s infrastructure investment accounted for less than one-fourth of this expenditure aggregate. By the late 1990s, the proportion had declined to 10 percent. In other words, in the process of fiscal adjustment, investment fell much more abruptly than consumption. Indeed, in a majority of countries public consumption rose relative to GDP, while public infrastructure investment fell, implying that the public-investment cuts partly financed expanding public consumption.

The experience of industrial countries is not much different. Among them, public investment tends to contribute a good portion of the fiscal-adjustment effort. For example, an analysis of 32 episodes of fiscal adjustment in countries of the EU during the last two decades shows that in 25 of the 32 episodes public investment fell as a percentage of GDP, and in 23 episodes investment fell more than noninvestment primary expenditure. Along the same lines, the evidence suggests that fulfillment of the Maastricht deficit targets sped up the decline of public investment in the EU countries: of the nine countries that exceeded the deficit target in 1992, eight met it in 1997; in all eight, public investment had fallen relative to GDP; and in seven, it had fallen relative to total primary expenditure. Conversely, three of the six countries that met the target in 1992 raised their public investment in the subsequent years (Balassone and Franco 2000).

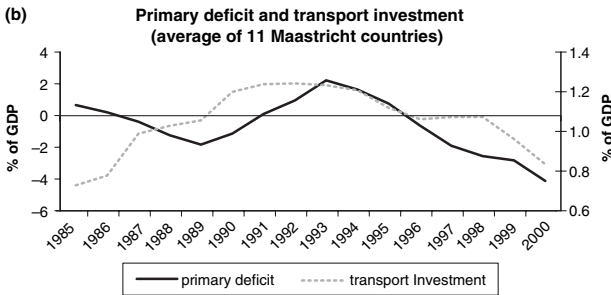
Figure 6.2 illustrates the EU experience. As in figure 6.1, the top panel shows the trajectory of public investment and the primary fiscal deficit, both as ratios to GDP. There is a clear comovement between the two series, with investment falling sharply during the fiscal adjustment of the 1980s as well as during the post-Maastricht period. Unlike in figure 6.1, investment is not limited here to infrastructure, but rather is inclusive of other categories. Nevertheless, the middle panel of figure 6.2 suggests that the situation was no different for infrastructure investment. The figure plots public investment in transport along with the primary fiscal deficit. Again, we find a clear comovement between public investment and the primary deficit, with a steady contraction in both following the Maastricht agreement of 1992.

Finally, the bottom panel of figure 6.2 shows the trajectory of public investment relative to overall primary spending of the public sector. There is an apparent downward trend, which tends to accelerate at times of fiscal adjustment, indicating that public investment falls more than proportionately during fiscal crunches. Indeed, econometric estimations confirm that the public investment-to-total primary expenditure ratio shows a significantly positive association with the primary deficit, even after accounting for a time trend (which is itself negative and significant).⁷

Figure 6.2 European Union: Primary Deficit and Public Investment

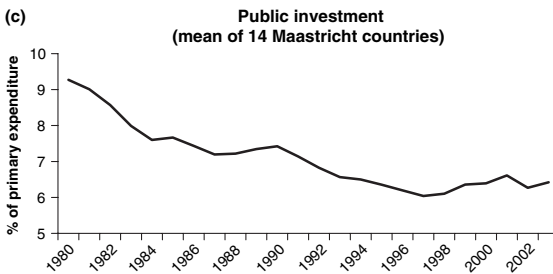


Source: Author's elaboration using IMF data.



Source: World Bank World Development Indicators database, various years; and provisional data from European Conference of Ministers of Transport.

Note: Transport investment is the sum of investment in roads, rails, and airports. In this figure, the 11 Maastricht countries are Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.



Source: Author's elaboration using IMF data.

To summarize, in recent years, the drive toward fiscal discipline has been associated with a persistent infrastructure investment crunch.⁸ This, of course, is not necessarily a cause for concern. For example, the reduction in public investment might reflect efficiency enhancements, improved public procurement, or reduced corruption, allowing the same services to be provided at a lower investment cost. Also, if private and public capital are close substitutes, the public sector retrenchment may have been fully offset by private sector entry, without any adverse impact on service provision. Finally, public investment contraction might be a perfectly sensible strategy in a context in which the stock of public capital already has reached its desired level, or following a shift in priorities toward other productive expenditures—such as education or health—not viewed as investment in the national accounts.

There is a grain of truth in all these arguments. For example, in Latin America, the decline in public infrastructure investment was accompanied by the opening of most infrastructure sectors to private initiative. But the results were uneven: total investment (public plus private) fell in all infrastructure sectors except telecommunications (see Calderón and Servén 2004a; Easterly and Servén 2003, chapter 2). In fact, the countries that managed to attract higher private investment into such sectors were those that had maintained higher levels of public investment, which suggests that private and public investment may complement rather than substitute for each other, contrary to the previous argument.

Moreover, the fall in total investment—reflecting the decline in public investment and the limited response of private investment—has been so large in many cases that it cannot be rationalized in terms of efficiency gains and reductions in investment costs. In some Latin American countries, the present levels of infrastructure investment, around 1 to 2 percent of GDP, are so low that they may not cover the depreciation of existing assets—and this in spite of the fact that in most cases infrastructure asset stocks remain wholly inadequate.⁹ In some EU countries, public investment has likewise fallen to levels that, according to some estimates, probably imply asset decumulation.¹⁰

III. The Theory and Practice of Fiscal Solvency

The seeming anti-investment bias of fiscal discipline likely reflects several factors. Among them, political economy considerations are surely key: it is politically much harder to cut pensions or public sector wages at times of fiscal stringency than to cancel infrastructure projects. However, public deficit and debt rules also play a central role. Such rules aim to protect the solvency of the public sector, but they often do so at the cost of distorting the composition of public expenditures, with potentially significant consequences for growth and even for public sector solvency itself.

The Arithmetic of Public Sector Solvency

The concept of fiscal solvency follows from the intertemporal budget constraint of the public sector, which in essence prevents the government from running a Ponzi scheme in which interest payments on outstanding debt are financed by issuing more debt. Ultimately, interest payments must be financed, at least in part, through primary surpluses. The starting point for the arithmetic of solvency is the identity defining the trajectory of the public debt stock:

$$\dot{B}(t) = r(t)B(t) - [T(t) - C(t) - I(t)] \quad (1)$$

where B is the stock of public debt, r is the short-term real interest rate, T is public revenue, and C and I , respectively, represent the current and (gross) investment expenditures of the public sector.¹¹ It can be seen that the distinction between current and investment expenditure is of little consequence for the contemporaneous rate of debt accumulation (that is, the overall deficit). From this expression, we can compute the debt stock at instant $t+u$ as follows:

$$B(t+u) = e^{\int_t^{t+u} r(v)dv} B(t) - \int_t^{t+u} e^{\int_s^{t+u} r(v)dv} [T(s) - C(s) - I(s)] ds \quad (2)$$

As noted, the intertemporal budget constraint prevents the government from forever financing interest payments on its debt through additional debt issue. This amounts to saying that debt cannot indefinitely grow at a rate in excess of the real interest rate, that is,

$$\lim_{u \rightarrow \infty} e^{-\int_t^{t+u} r(v)dv} B(t+u) \leq 0$$

Using equation (2), this amounts to the following requirement:

$$\int_t^{\infty} e^{-\int_t^s r(v)dv} [T(s) - C(s) - I(s)] ds - B(t) \geq 0 \quad (3)$$

Thus, the present value of the stream of current and future primary surpluses must be no less than the initial public debt stock. In practice, the intertemporal budget constraint in equation (3) will always be met through appropriate adjustment of some residual fiscal variable—that is, taxes or public spending. Here we shall focus on the case in which the trajectories of these variables are given arbitrarily. Then the adjustment has to take the form of a suitable change in the initial debt stock

that the government will honor. Formally, we can write analogously to (3):

$$\int_t^{\infty} e^{-\int_t^s r(v)dv} [T(s) - C(s) - I(s)] ds - DB(t) = 0$$

Here D is a “debt default discount factor,” endogenously determined so that the expression holds with strict equality. A value of D smaller than one corresponds to the case in which the present value of future primary surpluses falls short of the outstanding debt stock, and hence implies a debt write-down; conversely, a value above unity reflects a “super-solvency premium” on public debt and implies a “debt write-up” (see Buiter 2002).¹²

For concreteness, we shall refer to the left-hand side of equation (3) as the public sector net worth (denoted NW), keeping in mind that the term is shorthand for the debt write-down (or up) required for the government’s budget constraint to hold with equality when the time paths of taxes and primary expenditures are exogenously given. Hence, the government’s net worth NW is positive (negative) if and only if D is greater (smaller) than one. Equivalently, NW can be viewed, after a sign change, as the present value of the fiscal correction necessary to ensure long-run balance of the government budget (Bruce and Turnovsky 1999).

In a growing economy, it is often more convenient to restate the solvency condition in terms of the debt-to-GDP ratio b .¹³ Letting g denote the growth rate of real GDP, the trajectory of b is given by:

$$\dot{b}(t) = [r(t) - g(t)]b(t) - [\tau(t) - c(t) - i(t)]$$

where the lowercase letters in the second square brackets denote the ratios to GDP of the corresponding uppercase variables. In this notation, the solvency condition prevents debt as a percentage of GDP from indefinitely growing at a rate exceeding the difference between the real interest rate and the GDP growth rate, so that:¹⁴

$$\lim_{u \rightarrow \infty} e^{-\int_t^{t+u} [r(v) - g(v)]dv} b(t+u) \leq 0$$

Hence, the counterpart equation (3) is:

$$\int_t^{\infty} e^{-\int_t^s [r(v) - g(v)]dv} [\tau(s) - c(s) - i(s)] ds - b(t) \geq 0 \quad (3a)$$

As before, we let $nw(t)$ denote the left-hand side of equation (3a). To highlight the role of public investment and public capital (or, more broadly,

of public expenditure that generates future revenue), it is convenient to break up total revenues into two components: one that captures the direct financial return on the public capital stock, and another that includes all other income. Therefore, $T = \bar{\tau} + \theta K$, where K is the public capital stock, θ is the gross financial rate of return captured by the government on each unit of public capital—for example, public service user fees minus operating costs—and $\bar{\tau}$ includes all other public revenues. Then we can rewrite (3a) as follows:

$$nw(t) = \int_t^{\infty} e^{t-s} \int_t^s [r(v) - g(v)] dv [\bar{\tau}(s) + \theta k(s) - c(s) - i(s)] ds - b(t) \quad (4)$$

Here, k denotes the public capital-to-GDP ratio, whose time path is given by:

$$\dot{k}(s) = \frac{i(s)}{p} - [g(s) + \delta] k(s) \quad (5)$$

where δ is the depreciation rate of public capital and p denotes its replacement cost. In general, p will reflect not only the market price of investment goods, but also other factors such as the efficiency of public procurement or the effects of corruption on the actual cost of new public capital (Keefer and Knack 2006; Pritchett 2000).

It is easy to illustrate the effect of public investment on government net worth. Assume for the moment that the real interest rate and the growth rate are constant and exogenously given (with $r > g$); we shall return to this assumption later. Assume further that the current expenditure, investment, and tax revenue ratios are also constant. Solving equation (5) for $k(s)$ and replacing the result in equation (4), net worth at time 0 is given by:

$$nw = \frac{1}{r-g} \left[\bar{\tau} - c + i \left(\frac{\theta}{p(r+\delta)} - 1 \right) \right] - \left[b_0 - \frac{\theta}{r+\delta} k_0 \right] \quad (4a)$$

where the zero subscript denotes the initial values of debt and public capital. The first term of this expression captures the contribution to net worth of income and expenditure flows. Public investment appears multiplied by the ratio of the direct financial yield on public capital θ to the user cost of capital $p(r+\delta)$. In turn, the second term of the expression captures the government's initial net liabilities. Their face value is $(b_0 - pk_0)$, but the value of the capital stock pk_0 needs to be adjusted by multiplying by the return on capital relative to its user cost $\theta/p(r+\delta)$. Note that the initial capital stock drops out altogether if it yields no direct financial return

(that is, if $(\theta = 0)$). From this expression, the impact of a permanent, deficit-financed change in the public investment ratio i is as follows:¹⁵

$$\frac{d \text{nw}}{d i} \Big|_g = \frac{1}{r-g} \left[\frac{\theta}{p(r+\delta)} - 1 \right] \quad (6)$$

Thus, an increase in public investment raises or reduces the government's net worth depending on whether the financial rate of return on public capital θ is greater or smaller than the user cost of capital $(r + \delta)p$.

An equivalent way to illustrate the same point is to express the net worth of the government in terms of its net liabilities, $b - pk$. The expression equivalent to equation (4), for the case of constant r and g , is as follows:¹⁶

$$\text{nw}(t) = \int_t^{\infty} e^{-(r-g)(s-t)} \{ \tilde{\tau}(s) + [\theta - (r + \delta)p]k(s) - c(s) \} ds - [b(t) - pk(t)] \quad (4b)$$

In this formulation, solvency requires the present value of the government's primary surplus on current account, net of the user cost of public capital, to be no less than the face value of net public liabilities—that is, debt minus capital. From equation (4b), it is clear that an increase in the public capital stock matched by an equal increase in public debt at time t (so that net liabilities $b - pk$ remain unchanged) raises or lowers the net worth of the public sector depending on the sign of the return differential $\theta - (r + \delta)p$.¹⁷

Irrespective of the net worth effect of an investment increase, its impact on the primary surplus must be negative in the short run, while that on the debt-to-GDP ratio must be positive. Over time, as the extra capital is put in place and returns accrue at the rate θ , the primary surplus will rise and—provided that $\theta > (r + \delta)p$ —the debt-to-GDP ratio will decline below its initial level.¹⁸ This contrast between the short- and long-run effects on the primary surplus and debt is a reminder that cash flow can be a poor guide to solvency.

These expressions illustrate the net worth effects of a debt-financed investment change. The effects of an investment expansion financed instead by cutting public consumption are much more straightforward: short-run cash flow is unchanged, but government net worth must rise if the net financial rate of return on public capital θ is greater than zero.¹⁹ Obviously, the composition of spending matters for net worth as long as financial rates of return differ across expenditure types—as is the case in this framework, which assumes that public consumption yields zero return.

Public Investment, Growth, and Solvency

The above discussion shows that the effects on net worth of a public investment expansion depend on the direct financial return on public capital θ .

However, the value of θ is likely to vary greatly across investment types. User fees may cover the user cost of capital of government-owned utilities, but not that of untolled roads or sanitation projects, which often yield no direct financial return (that is, $\theta \leq 0$). Nevertheless, public investment projects may generate indirect financial returns to the government, to the extent that they affect aggregate income growth and hence the expansion of tax bases and public income.²⁰

The impact of public investment, and particularly infrastructure investment, on aggregate growth has attracted considerable attention in recent years.²¹ An abundant body of empirical literature, beginning with Aschauer (1989), has sought to quantify the contribution of public capital to growth; see Calderón and Servén (2007) and Romp and de Haan (2007) for recent overviews. These studies typically are based on the estimation of aggregate production functions augmented with infrastructure stocks (for example, Calderón and Servén 2003, 2007; Canning 1999; Demetriades and Mamuneas 2000; Röller and Waverman 2001), or on empirical growth equations, including measures of public infrastructure or public investment among the explanatory variables (Aschauer 2000; Calderón and Servén 2004b; Easterly and Rebelo 1993; Esfahani and Ramirez 2003). While not unanimous, the results generally point to significantly positive effects of public capital on aggregate output and its growth rate, although the findings are less robust among those studies that use public investment flows (or their cumulative value), rather than physical asset stocks, as regressors.²²

When evaluating alternative fiscal strategies, one has to consider their respective growth consequences, not just to gauge the economy's future aggregate performance, but also to assess the full effects of the different fiscal policy paths on public finances themselves.

Analytically, a simple illustration can be provided as follows. Assume that the economy's aggregate production technology is of the form:

$$Y(s) = AK(s)^\alpha [L(s)e^{\gamma s}]^{1-\alpha} \quad (7)$$

where L is labor, $1 > \alpha > 0$ and $\gamma \geq 0$ denotes the rate of exogenous labor-augmenting technical progress (annex 6.1 briefly reviews the case $\alpha = 1$ in which the marginal product of capital is constant). For simplicity, we ignore private capital and assume continuous full employment of the given labor supply \bar{L} which for convenience will be set equal to 1 and ignored in what follows;²³ we shall return to these assumptions later. Hence, $\gamma(1 - \alpha)$ captures the growth of output due to any nonpolicy factors affecting the productivity of public capital. Note that the marginal product of public capital is just $\partial Y/\partial K = \alpha/k$. In this framework, the growth impact of a given change in the public investment ratio is smaller the higher the prevailing public capital-to-output ratio k . Furthermore, investment only affects the economy's transitional dynamics; with a constant investment-to-output ratio, the growth rate of the economy converges to γ in the long run.

Assuming a constant real interest rate r (with $r > \gamma$), as well as constant public consumption, investment, and tax ratios, the annex shows that net worth is given by:

$$nw = \left[\frac{\theta}{r + \delta} k_0 - b_0 \right] + \frac{1}{r - \gamma} \left[\bar{\tau} - c + i \left(\frac{\theta}{p(r + \delta)} - 1 \right) \right] \times \\ \times {}_2F_1 \left(1, \frac{\alpha}{\alpha - 1}, 1 + \frac{r - \gamma}{(1 - \alpha)(\gamma + \delta)}, 1 - \frac{i}{pk_0(\gamma + \delta)} \right) \quad (8)$$

where b_0 is the debt-to-output ratio at time 0, and ${}_2F_1(\cdot)$ is Gauss' hypergeometric function.²⁴ While this expression may appear imposing, its interpretation is straightforward. The top line is identical to equation (4a) above, with the long-run growth rate γ replacing g . In turn, the bottom line captures the effect of net investment on output growth. It can be shown to equal one (and thus only the top line of the expression matters) if either $\alpha = 0$, so that output is unaffected by the public capital stock (that is, growth is fully exogenous, as before), or if $i = pk_0(\gamma + \delta)$, so that investment is just sufficient to keep the public capital-to-output ratio constant. In either of these cases, the growth rate is equal to γ .

Except under those special conditions, net worth reflects the growth contribution of public investment. Specifically, when $\alpha > 0$, the second line in the right-hand side of equation (8) is greater than 1 if $i > (pk_0(\gamma + \delta))$ —that is, if the capital-to-output ratio is rising—and less than 1 (but nonnegative) in the opposite case.²⁵

Using equation (8), it is straightforward to compute the change in net worth arising from a change in the public investment ratio. To simplify the algebra, it will be convenient to assume that we start from a situation with $i = pk_0(\gamma + \delta)$, so that the capital-to-output ratio is not changing (and hence the second line of equation (8) is initially equal to one, as just explained). Holding the public consumption and tax collection ratios constant, we get:

$$\left. \frac{d \, nw}{d \, i} \right|_{k=0} = \frac{1}{p(r + \delta(1 - \alpha) - \alpha \gamma)(r - \gamma)} \left\{ (\bar{\tau} - c) \left(\frac{\partial Y}{\partial K} \right) + \theta - p(r + \delta) \right\} \quad (9)$$

If $r > \gamma$, as assumed, the denominator of this expression is positive. The expression boils down to equation (6) when $\alpha = 0$, in which case the marginal product of public capital is also zero: the net worth effect of investment changes depends only on the (direct) rate of return on capital relative to its user cost. When $\alpha \neq 0$, capital accumulation generates additional output and government revenue, provided the *net* tax collection ratio ($\bar{\tau} - c$) is positive. Hence, in this case, a rise in the public investment ratio increases net worth if the *total* financial return on the additional public capital—given by the sum of user fees plus the indirect

tax revenue effect, the first two terms inside the curly brackets in equation (9)—exceeds its user cost. This is more likely to be the case the higher the marginal product of public capital and the net tax ratio, and the lower the user cost of capital. Furthermore, under the plausible assumption that the total financial return captured by the government on public capital cannot exceed its marginal product, equation (9) implies that a necessary condition for net worth to rise with an increase in the public investment ratio is that public capital be initially underprovided—that is, $(\partial Y/\partial K)_0 > p(r + \delta)$.

If the initial situation is such that net worth equals zero (so that the top line of the right-hand side of equation (8) is also zero), then equation (9) becomes:

$$\left. \frac{d\,mw}{d\,i} \right|_{k=0, mw=0} = \frac{1}{r + \delta(1-\alpha) - \alpha\gamma} \left\{ \left(\frac{1-\alpha}{r-\gamma} \right) \left[\frac{\theta}{p} - (r + \delta) \right] + \alpha \left(\frac{b_0}{p k_0} - 1 \right) \right\} \quad (9a)$$

Thus, a deficit-financed investment expansion is more likely to raise government net worth the higher the initial ratio of public debt to public capital. Indeed, if the direct financial return on public capital fails to cover its user cost (that is, when $\theta < (r + \delta)p$), a necessary condition for net worth to rise with public investment is $b_0 > p k_0$, so that the government's initial debt exceeds its capital stock.²⁶ The intuitive reason for this is that under such condition the additional growth associated with capital accumulation contributes to erode the government's net liabilities, thereby enhancing its patrimonial position; this has been stressed by Easterly (1999) and Easterly and Servén (2003). As before, in the short run the public debt-to-output ratio is likely to rise following a deficit-financed public investment expansion,²⁷ but if the right-hand side of equation (9) or equation (9a) is positive, the initial rise will be followed by a decline in the public debt ratio, which will eventually fall below its initial level.

So far we have assumed that the investment expansion is deficit financed and the net tax collection ratio ($\tilde{\tau} - c$) remains constant relative to GDP. This amounts to assuming that the tax system is sufficiently elastic so that tax revenue rises in proportion to aggregate output.²⁸ What if the investment change is financed instead by an offsetting change in net tax collection? In such scenario $d\,i = d(\tilde{\tau} - c)$, so that for given k the primary surplus ratio remains constant. In this simple framework, neither current expenditure nor taxes affect the trajectory of output, and hence it is easy to verify that net worth must unambiguously rise.²⁹

Operations and Maintenance

The preceding discussion equates public investment with productive expenditure and public consumption with unproductive expenditure. In reality, things are more complicated: not all capital expenditure is productive, and not all current expenditure is unproductive. One important case in which

current public expenditure can enhance future growth is that of operations and maintenance (O&M). While public investment in new roads or transport facilities usually attracts much more attention than O&M, the latter is essential for public capital to yield productive services. Information on these expenditures is generally hard to obtain, but anecdotal evidence suggests that they tend to be compressed even more sharply than investment at times of fiscal retrenchment. This should be a cause for concern for policy makers, because inadequate maintenance reduces the productive contribution of capital assets and shortens their useful lives. This key role of O&M has been duly recognized in recent analytical literature. For example, Rioja (2003a, 2003b) shows that if maintenance expenditures are too low, new investment in infrastructure can be growth and welfare reducing—while additional O&M spending has the opposite effect.

We can easily expand the present analytical framework to accommodate O&M spending, as follows. Let z denote O&M expenditure per unit of public capital, and let $\theta = \theta_0 - z$; hence θ_0 denotes the direct return on public capital gross of O&M charges. Likewise, let $\delta = \delta(z/p)$ with $\delta' < 0$. Thus, an increase in maintenance spending has a dual effect: on the one hand, it reduces the instantaneous rate of return on existing public capital; on the other, it extends its useful life, so that the lower return accrues over a longer horizon. Depending on the relative magnitude of these effects, raising z may raise or lower the present value of future primary surpluses.

Formally, the impact on net worth of a deficit-financed change in O&M spending per unit of public capital z can be computed replacing θ and δ into equation (8), and considering again the case of zero net worth and a constant capital-to-output ratio initially. Differentiating equation (8) we get:

$$\left. \frac{d \text{nw}}{d z} \right|_{k=0, \text{nw}=0} = \frac{-k_0}{r + \delta(z)(1-\alpha) - \alpha \gamma} \left\{ \left(\frac{1-\alpha}{r-\gamma} \right) \left[\theta \delta'(z) + (r + \delta(z)) \right] + \alpha \left(\delta'(z) \frac{b_0}{k_0} + 1 \right) \right\} \quad (10)$$

If the capital-creating effect of O&M expenditures, via reduced depreciation, exceeds the return-reducing effect of higher O&M costs, so that $\delta' + 1 < 0$, this expression is more likely to be positive than equation (9a) or, in other words, increased O&M has a more favorable effect on net worth than increased investment—and conversely if $\delta' + 1 > 0$. Thus, as long as O&M spending per unit of capital is not equal to z^* , defined by $\delta'(z^*) = -1$, a reallocation of expenditure between investment and O&M—keeping total primary spending constant—will yield higher growth and net worth. For $z < z^*$, this can be achieved by reducing investment expenditure and raising O&M, and conversely if $z > z^*$.³⁰

Reality Checks

So far we have assumed a constant real interest rate. This amounts to assuming that the government faces given borrowing terms in financial

markets. In practice, interest rates may vary reflecting changing default premiums, which are typically assumed to depend on the outstanding debt stock (as a ratio to GDP, say). In such case, the discount rate relevant for judging the solvency effects of public expenditure changes is the marginal cost of public debt, which in general will exceed its average cost, given by the prevailing interest rate. The reason is that a deficit-financed increase in investment (or in O&M spending) reduces the primary surplus and raises the debt stock in the short term—even if it may have the opposite effect in the long term—and thereby the default premium and the real interest rate.

Consider, for example, the analytically convenient real interest rate specification $r(t) = \bar{r} + \eta (1 - \bar{b} / b(t))$, where $\eta \geq 0$, are $\bar{r}, \bar{b} > 0$ given constants. In this formulation, if the interest rate rises with the public debt-to-GDP ratio. By choosing $\bar{b} = b(0) = b_0$ for simplicity (which implies that $r(0) = \bar{r}$), it can be verified that the solvency impact of a change in public investment continues to be given by expressions (9) and (9a), but with r replaced by the marginal cost of public debt $\bar{r} + \eta$ —which is higher than the interest rate prevailing at time 0. Thus, the steeper the slope of the lending supply schedule—as reflected by a larger η —the less favorable (or more adverse) the impact on net worth of a deficit-financed public investment increase.³¹

A second caveat concerns the issue of uncertainty, which has been ignored so far. Yet the net worth calculations above involve estimates of future output, tax revenues, and user fees, all of which are intrinsically uncertain. In this framework, a simple way to take uncertainty into account would be to employ risk-adjusted discount rates to bring future cash flows to present value terms. This would amount to adding a risk premium to the real interest rate, with consequences similar to those described in the previous paragraph.³²

The third caveat is the partial equilibrium setting used here, which neglects feedback effects on the productivity of public capital arising from endogenous changes in the supply of other inputs—labor or, most important, private capital—ignored in equation (7). In reality, changes in public investment would likely affect both the marginal productivity and the user cost of private capital and thus its rate of accumulation. If public and private capital are complements (as much of the empirical literature suggests), then increased public capital accumulation raises the marginal product of private capital and hence encourages private investment. In such case, the growth impact of public investment would be understated in the above analysis, as would its contribution to government net worth. If public and private capital are instead complements, the conclusion would be reversed. However, if real interest rates are endogenous, a debt-financed public investment may raise the user cost of private capital and crowd out private investment, and then the above results would overstate the growth and solvency contribution of public capital. Proper account of

these general equilibrium effects requires a fully specified macroeconomic model, which is beyond the scope of this paper.

Discussion

The main point to be stressed is the key distinction between productive and unproductive expenditures that arises from the government's intertemporal budget constraint: their respective implications for solvency are different because the former finance the acquisition of assets accruing (directly or indirectly) future financial returns, while the latter do not.

This, however, is rarely recognized in practice, because conventional fiscal targets are usually set paying scant attention to the composition of expenditure and the intertemporal budget constraint. Instead they tend to focus on the contemporaneous deficit, for which the distinction between productive and unproductive expenditures is irrelevant. As noted, this amounts to using short-term cash flow as the yardstick for solvency and tends to bias fiscal adjustment against productive expenditures. Indeed, the emphasis on public deficit limits tends to discourage the adoption of *any* projects with negative short-term cash flows. Such category includes virtually all public infrastructure projects, even if their future returns exceed the user cost of capital—in which case such projects strengthen solvency and are consistent with good public economics. Only projects whose investment costs are fully financed by taxes would be exempted from these constraints—even though raising taxes today to fund the acquisition of lasting assets may represent bad public economics, as it may run counter to the objectives of tax smoothing and intergenerational equity.

Figure 6.3 illustrates how the use of net worth and cash-flow targets affects the composition of public expenditure. Along the overall balance (solid) line in the figure, total primary expenditure $c + i$ is constant relative to output; hence, for given tax rates and debt, so is the government's overall balance. The slope of the line equals -1 . In turn, along the dashed curve, which describes the contour set of equation (8), net worth is constant. The curve must be steeper than the overall balance line if public capital yields *some* financial return, whether through user fees or taxes. Furthermore, the slope of the curve varies along with the productivity of public capital. At low levels of investment, the public capital stock remains low and its return high, and hence the curve is very steep—it may even slope upward over an initial region, if the marginal unit of investment yields a financial return in excess of the cost of borrowing. In the figure, this happens in the segment of the curve between point D and the horizontal axis. As public investment rises, so does the public capital stock, its marginal financial return declines toward zero, and the net worth curve eventually becomes parallel to the overall balance line. Toward the northeast quadrant of the graph, both the overall balance and net worth deteriorate; toward the southwest, they improve.

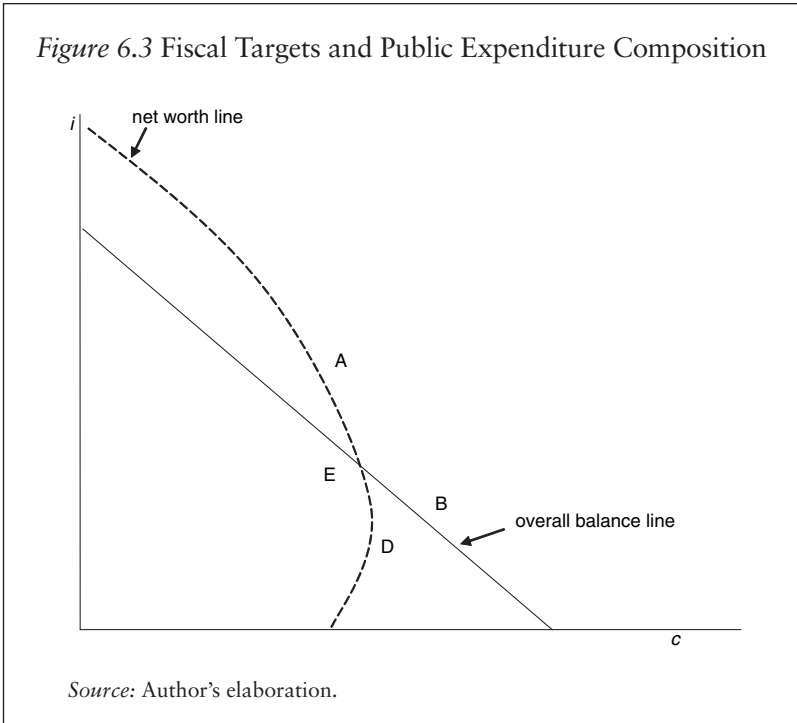


Figure 6.3 illustrates the link between expenditure composition and fiscal performance indicators. Consider point E, where the two lines intersect. Movements along the overall balance line to the southeast of E—to a point such as B, say—leave the overall balance unchanged but reduce net worth. The reason is that zero-return current expenditure is being substituted for public investment. Conversely, as we move toward the northwest of E along the net worth curve—to a point such as A, say—the overall balance deteriorates but net worth is unchanged, precisely for the opposite reason.

We can think of the government determining its spending composition in textbook fashion—at the tangency between (a) some indifference curve (not drawn) characterizing the government's preferences between public consumption and investment and (b) the relevant constraint. Because the net worth line is steeper than the overall balance line, the government spending mix will generally be more biased toward consumption under binding cash-flow constraints than under net worth constraints. Thus, other things equal, governments facing binding cash-flow targets today may devote too few resources to expenditures that yield returns tomorrow. This is a simple consequence of the different trade-off between consumption and investment posed by net worth targets and cash-flow targets.

Related to these effects on the composition of expenditure, the use of the conventional public deficit to gauge the soundness of public finances also creates incentives for governments to adopt policy measures that ostensibly aim at “fiscal adjustment” but often are little more than accounting gimmicks. In light of the intertemporal budget constraint, such measures are of no consequence for fiscal solvency, and in some cases, they may even weaken public finances. The international experience highlights a wide variety of illusory adjustment measures, ranging from changes in the time profile of public revenues or expenditures without any change in their present value, to reductions in the rate of public debt issuance achieved through matching reductions in the rate of accumulation of public assets—a strategy that by itself has no effect on public sector net worth.³³ In terms of figure 6.3, a movement from A to E, for example, improves the overall balance but has no effect on solvency.

Paradoxically, some governments have also resorted to creative tricks to shelter investment from the pressure of deficit limits. For example, many countries have made use of extrabudgetary financing of public investment, effectively hiding the latter from public view. Another popular option has been the issuance of contingent liabilities—such as credit or rate-of-return guarantees—to private investors, as part of partnership agreements between the public and private sectors. These arrangements can, and sometimes do, have efficiency-increasing effects, but they often leave the public sector bearing most or all of the investment risk, in which case they amount to little more than accounting gimmicks. Furthermore, the lack of clear standards for the budgetary accounting of such operations tends to weaken fiscal transparency, and in some countries, has allowed the accumulation of large hidden liabilities that surfaced unexpectedly—and with large fiscal consequences—when the government guarantees have been called on.³⁴

The preceding discussion illustrates the fact that cuts in the public sector’s productive expenditures undertaken in the name of fiscal discipline may represent another form of fictitious adjustment. Their direct effect is to reduce the conventional public deficit and the rate of debt accumulation, but they may do so at the cost of a slowdown in growth and future fiscal revenue, which indirectly results in reduced future primary surpluses and undermines the fiscal adjustment itself. In terms of figure 6.3, a movement from A to B, for example, improves the overall balance but weakens solvency.³⁵

How important, in practice, is this indirect effect? From the preceding discussion, there are two key ingredients. The first is the growth impact of public investment, given by the marginal productivity of public capital as well as its acquisition cost. Other things equal, the marginal productivity is likely to be higher when the government has strong project selection capabilities, so that its investment involves top-quality projects, and when the initial endowment of public capital is low. It should also depend on the

composition of public investment. Some public investment projects (for example, in areas such as environmental conservation) unquestionably enhance welfare but have little effect on future output, while others (for example, major roads) may have a significant growth impact. Finally, if the purchase of public capital involves significant waste (that is, p is high), then changes in public investment may have only a minimal impact on asset accumulation and growth.

The second ingredient is the government's ability to capture at least part of the marginal return, via user fees or taxes—which, in the latter case, depends on the tax system and its administration. If these are deficient, and thus the output elasticity of fiscal revenue is low, then even projects with high growth impact will weaken public finances.

These two ingredients reflect a multiplicity of country-specific factors, which are hard to quantify in general. But on the whole, the available evidence suggests that the indirect effect of public investment on solvency is potentially large, at least in the case of public infrastructure capital, which is the one that has received the most attention. Empirical studies, using an aggregate production function approach in a large cross-country sample, imply estimates of the marginal productivity of infrastructure capital around 50 percent. There is considerable international variation, however, with lower-income countries generally exhibiting higher marginal products because of their smaller public capital endowments.³⁶

These estimates suggest that in many countries—especially poorer ones—the productivity of infrastructure capital likely exceeds its user cost. Still, from the solvency perspective, the question is how much of the return is actually captured by the government. For example, absent user fees, equation (9) implies that if the user cost of public capital is about 0.10 (for example, $r = .06, \delta = .04, p = 1$), then the marginal (net) tax rate should be at least 0.20 if the government is to break even (in net worth terms) on a project yielding a marginal product equal to 0.50, which is in line with the above estimates. This may seem like a modest requirement, but in effect, it likely exceeds the revenue-raising abilities of many poor countries.

The self-financing ability of public investment has recently attracted some empirical attention. Perotti (2004) assesses whether public investment can “pay for itself” using data from five rich Organisation for Economic Co-operation and Development (OECD) countries—the United States, Germany, the United Kingdom, Canada, and Australia—and focusing on total public investment, very likely including projects with quite heterogeneous growth impact. He evaluates a condition similar to equation (9) with $\theta = 0$, so that public capital accrues no direct financial return. In such case, the extent to which public investment is self-financing can be measured by $1 - (\bar{\tau} - c)(\partial Y / \partial K)_0 / [p(r + \delta)]$. This expression should equal one if public investment yields no future income, and become negative if investment “pays for itself.” Using a vector autoregression (VAR) approach, Perotti finds that the empirical counterpart of this expression varies greatly across

countries, ranging from above unity in Canada and the United Kingdom (which suggests that the extra public capital has a negative growth contribution), to 20 to 30 percent in Australia and the United States, to zero or even negative values in Germany, in which case the implication is that debt-financed public investment raises net worth at the margin.

Perotti's sample is made up of countries whose public capital stocks per capita are probably among the highest in the world. What about countries with lower endowments and possibly higher marginal productivities, too? Pereira and Pinho (2006) report calculations analogous to Perotti's for 12 EU countries. In most of these countries, public investment is found to have large output growth effects. Moreover, investment is roughly self-financing in Ireland, France, and Greece, and more than self-financing in Italy and Germany. In turn, Ferreira and Araújo (2007) perform a similar exercise using Brazilian data. The main methodological difference is that they use a vector error-correction model rather than a VAR model. They find that public investment is generally self-financing in Brazil, although in most experiments it takes at least 10 years for the government to collect sufficient tax revenues to recoup the initial investment expenses.

A related exercise is reported by Calderón and Servén (2003), who offer an assessment of the fiscal effects of the public infrastructure investment cuts undergone by many Latin American countries. They make use of equation (4a), again assuming $\theta = 0$, and letting growth depend on the public investment ratio.³⁷ On the whole, their calculations suggest that the solvency-enhancing impact of infrastructure investment cuts falls quickly as the initial level of government indebtedness rises. At zero initial debt, cuts in infrastructure investment translate 100 percent into net worth increases, but the proportion declines to less than 60 percent if debt equals 40 percent of GDP, and to only 15 percent when debt reaches 80 percent of GDP. In the Latin American context of the late 1980s and 1990s, this means that infrastructure cuts in low-debt Colombia were 80 percent effective at enhancing solvency, whereas in high-debt Bolivia, their effectiveness was only around 20 percent. While these exercises are subject to a host of caveats, which make them illustrative rather than conclusive, they do suggest that, in some Latin American countries, fiscal austerity involving major infrastructure spending cuts not only entailed a substantial growth cost, but also may have been largely ineffective at strengthening public finances.

IV. Final Remarks

The conventional practice of using short-term cash flows to gauge the strength of public finances is deficient on several counts. It amounts to equating solvency, a fundamentally intertemporal issue, with liquidity, which—although undeniably important—is instead a short-term concept. Furthermore, it

makes no distinction between current and capital expenditures. Even though the latter affect the government's future cash flows, the former do not, so their respective consequences for public solvency may be quite different. This practice tends to introduce an anti-investment bias into fiscal discipline that may be, in effect, a bias against future growth, with potentially adverse consequences for public finances themselves.

These reasons justify a search for rules based on alternative fiscal targets that can protect solvency without unduly distorting the composition of expenditures. In general, rules should offer an acceptable compromise between transparency and economic sense (Buiter 2004). Conventional targeting of the public deficit scores high on the former but not on the latter.

Two alternative rules proposed in the recent debate—the golden rule and the permanent-balance rule—provide mechanisms to place the public investment program beyond the action of cash-flow targets. The golden rule redefines public deficit targets by restricting them to the current balance. In other words, it allows debt financing for capital accumulation, but not for the current account deficit.³⁸ In turn, the permanent-balance rule is directly based on the intertemporal budget constraint of the public sector (see Buiter and Grafe 2004). It amounts to an extreme form of tax smoothing: choosing a constant tax ratio that suffices to finance the government's long-run level of primary expenditure, plus the long-run level of interest payments on its debt. Therefore, the rate of debt accumulation permitted under the rule depends on the deviation of these variables from their long-run levels. For example, the rule allows increasing indebtedness when public investment is temporarily high—that is, as public assets are being built up.

Both of these rules offer conceptual and practical pros and cons (see chapter 7 by Mintz and Smart in this volume for further discussion). The permanent-balance rule comes closer to guaranteeing solvency, although its implementation and monitoring may pose greater challenges than the golden rule.

More generally, these and other fiscal rules may allow more room for public investment, but they also heighten the risks of public resource waste. Reducing these risks requires sufficient institutional capacity at project selection and evaluation, which is seriously deficient in many developing countries. Furthermore, selecting projects with high returns on paper is not enough. The government must also be able to capture those returns—be it directly through user fees on public services, or indirectly in the form of increased tax collection. This may represent a major challenge for developing countries with weak fiscal revenue systems.

Thus, institutional and capacity enhancements are essential to ensure that the degrees of freedom allowed by alternative fiscal targets are put to good use. But these enhancements may take considerable time. As they unfold, the government's intertemporal budget constraint and its net worth should start receiving increasing attention and gradually occupy

center stage in assessments of the strength of public finances, replacing the current emphasis on the cash deficit and debt alone. This does not mean that cash flow is unimportant, only that it is conceptually different from solvency. Therefore, it should be measured separately as well, so that both solvency and cash flow can be taken into account in the design of fiscal policy.

The upshot is not that more public investment is necessarily better, nor that investment is preferable to current expenditures. On the contrary, private investors can, and should, take the lead in sectors in which the government enjoys no comparative advantage. Indeed, the international experience is plagued with episodes of blatant resource waste in the name of public investment. And some recurrent expenditures may be as important as (or even more than) investment for future public revenues. But all this serves to underline the critical importance of rigorous selection and evaluation of public expenditures, along with fiscal rules that do not distort their composition.

Annex 6.1. Analytical Derivations

1. Derivation of Equation (8)

Taking the time derivative of equation (7), and using equation (5), the real growth rate can be written as follows:

$$g(s) = \alpha \left(\frac{i(s)}{pk(s)} - \delta \right) + (1 - \alpha) \gamma \quad (\text{A1})$$

Thus, other things equal, the growth impact of a given change in the public investment ratio is smaller the higher the prevailing public capital-to-output ratio k . Combining equation (A1) with equation (5), we get a differential equation describing the trajectory of k , whose solution with a constant investment ratio is as follows:

$$k(s) = k_0 e^{-s(\gamma + \delta)(1 - \alpha)} + \frac{i}{p(\gamma + \delta)} \left[1 - e^{-s(\gamma + \delta)(1 - \alpha)} \right] \quad (\text{A2})$$

where k_0 denotes the capital-to-output ratio at time 0. Replacing this expression into equation (A1), the growth rate is as follows:

$$g(s) = \frac{\gamma i + e^{-s(\gamma + \delta)(1 - \alpha)} [k_0 p(\gamma + \delta) - i] [(1 - \alpha) \gamma - \alpha \delta]}{i + [k_0 p(\gamma + \delta) - i] e^{-s(\gamma + \delta)(1 - \alpha)}} \quad (\text{A3})$$

Given the initial public capital ratio, this is an increasing function of the public investment rate i . Furthermore, the growth rate converges to γ as s goes to infinity. Replacing equations (A2) and (A3) into equation (4) (with $t = 0$ to simplify notation)—and still assuming a constant real interest rate

r (with $r > \gamma$), as well as constant public consumption, investment, and tax ratios—direct integration yields equation (8) in the text.

2. The Case of Constant Marginal Productivity

The main text assumes that the marginal product of public capital declines with the capital stock, by taking $1 > \alpha > 0$ in the production function $Y(s) = AK(s)^\alpha [L(s)e^{\gamma s}]^{1-\alpha}$. Letting $\alpha = 1$, we get an AK growth model in which the marginal product of public capital is constant. In fact, it is easy to generalize this technology to $Y(s) = \beta + AK(s)$, where returns to scale are decreasing, constant, or increasing depending on whether β is positive, zero, or negative. Now the rate of output growth can be expressed as follows:

$$g(t) = \frac{\dot{Y}(t)}{Y(t)} = A \left(\frac{i(t)}{p} - \delta k(t) \right) \quad (\text{A4})$$

Thus, the (marginal) impact of public investment on growth is constant, but as long as $\delta \neq 0$ the growth rate is inversely related to the public capital-to-output ratio. Assuming that c , i , and $\bar{\tau}$ are fixed, straightforward manipulations yield the following:³⁹

$$\begin{aligned} nw = & \left[\frac{\theta}{r+\delta} k_0 - b_0 \right] + \frac{1}{r} \left[\bar{\tau} - c + p\delta k_0 \left(\frac{\theta}{p(r+\delta)} - 1 \right) \right] \\ & + \frac{1}{r} \frac{(i - p\delta k_0)}{p(r+\delta) - Ai} \left[(\bar{\tau} - c)A + \theta - p(r+\delta) \right] \end{aligned} \quad (\text{A5})$$

The top line of this expression is analogous to that of equation (8) for the case of zero net investment (and $\gamma=0$). In turn, the second line captures the effects of a changing capital stock, which affects net worth through the already familiar return differential on new capital, and the (net) tax revenue collected on the output generated with the extra capital, $(\bar{\tau} - c)A$. In fact, the term in the small square brackets is exactly the same as that in the numerator of equation (9), with $\partial Y/\partial K = A$.

From equation (A5), the impact of a permanent change in the public investment ratio is as follows:

$$\frac{d \, nw}{d \, i} = \frac{1}{r} \frac{p(r+\delta) - A\delta k_0}{[p(r+\delta) - Ai]^2} \left[(\bar{\tau} - c)A + \theta - p(r+\delta) \right] \quad (\text{A6})$$

Furthermore, if net worth is initially zero this becomes:

$$\left. \frac{d \, nw}{d \, i} \right|_{nw=0} = \frac{1}{p(r+\delta) - A\delta k_0} \left[\frac{\theta - (r+\delta)p}{r} + \left(b_0 - \frac{\theta - p\delta}{r} k_0 \right) A \right] \quad (\text{A7})$$

Notes

1. For empirical evidence on the behavior of public investment and other government expenditure items in fiscal adjustment episodes, see Balassone and Franco (2000), Easterly and Servén (2003), Galí and Perotti (2003), and IMF (2003).

2. This view is stressed by Buiter (2004) and Buiter and Grafe (2004).

3. Key references in this literature are Blanchard and Giavazzi (chapter 8 in this volume), Buiter and Grafe (2004), and Mintz and Smart (chapter 7 in this volume). See also Easterly and Servén (2003).

4. Roubini and Sachs (1989) and de Haan, Sturn, and Sikken (1996) document the experience of industrial countries, and Hicks (1991) summarizes the facts on developing countries. Another reflection of the same empirical regularity is the fact that among all budget items public investment displays the highest volatility, a consequence of its strongly procyclical behavior. This is shown by Talvi and Végh (2000) using data from developing countries and by Lane (2003) with data from industrial countries.

5. As defined here, infrastructure includes land transportation, power, telecommunications, and water and sanitation.

6. Jonakin and Stephens (1999) also document the decrease in Latin America's public investment over this period.

7. The negative trend is emphasized by Galí and Perotti (2003). The estimations mentioned in the text, reported in Servén (2004), employ a seemingly unrelated regression (SUR) procedure with fixed effects. A significant positive association is also found between the investment-to-GDP ratio and the primary deficit.

8. Estache (2005) shows that this has been the case also in Sub-Saharan Africa.

9. See World Bank (2005) for an assessment of infrastructure investment needs in Latin America.

10. See chapter 8 by Blanchard and Giavazzi in this volume.

11. For simplicity, we have abstracted from seigniorage and inflation. Their inclusion would be straightforward but would require some additional notation.

12. Conceptually, the "write-up" provides the way for the government to dispose of any "excessive" primary surpluses it may collect.

13. The use of GDP as a scale variable is based on the implicit assumption that it is the main determinant of tax collection. If such a role corresponds instead to another macromagnitude—for example, aggregate consumption, as in the case of the value added tax—the latter would become the relevant scale variable.

14. Here we need to assume $\lim_{t \rightarrow \infty} \int_t^{t+\theta} [r(v) - g(v)] dv \geq 0$. Otherwise, the government would be able to grow its way out of any debt stock no matter how large.

15. If the change were temporary, the only difference would be the absence of the present-value term $(r-g)^{-1}$ from equation (6).

16. To derive equation (4b), we just replace equation (5) into equation (4) and integrate the resulting expression.

17. A fall in pk matched by an equal reduction in b could be interpreted as a privatization whose proceeds are used to retire public debt. Such transaction strengthens public finances only if $\theta > p(r + \delta)$. This amounts to requiring that the government sell the capital assets at a price greater than the present value of the future financial returns that would have accrued from holding them. This might occur if the government smartly manages to overbill the private purchaser or, more likely, if the returns that the purchaser can accrue (and hence the purchase price she or he is willing to pay) exceed those that the government would have obtained if it had retained the asset.

18. Specifically, the primary surplus will decline (relative to GDP) up to time

$$\hat{t} = \frac{\ln \left[1 - \frac{p(g+\delta)}{\theta} \right]}{g+\delta}$$

and the debt ratio will be rising up to a later time

$$\tilde{t} = \frac{\ln \left[1 - \frac{p(r+\delta)}{\theta} \right]}{r+\delta} > \hat{t} \text{ as } r > g.$$

19. Of course, this need not always be the case. For example, if user fees charged for public services are insufficient to cover the direct costs of providing them, we would have $\theta < 0$.

20. This is well known to budgetary authorities in many countries, who often turn to overoptimistic growth projections as a last resort to balance public finances, even if only on paper.

21. Analytically, numerous articles have explored the role of public investment in the growth process. Early on, the focus was on the flow of productive public services (Barro 1990; Turnovsky and Fisher 1995), but more recently, it has shifted to the accumulation of public infrastructure and/or human capital assets, whose services are viewed either as pure public goods (Futagami, Morita, and Shibata 1993; Ghosh and Roy 2004; Kalyvitis 2003) or public goods subject to congestion (Agénor 2005; Glomm and Ravikumar 1997; Turnovsky 1997). Zagler and Durnecker (2003) survey this literature. In these models, the impact of public investment on long-run growth is typically positive, but may change sign if public investment rises beyond a certain level. Furthermore, the growth-maximizing level of public investment may differ (most commonly, exceed) its welfare-maximizing level (for example, Turnovsky 1997).

22. The likely reason is that investment spending may be a poor proxy for the accumulation of productive assets; see Pritchett (2000) and Keefer and Knack (2006).

23. It would be straightforward to add a labor supply decision in the model, derived from consumer optimization. In contrast, allowing for endogenously determined private capital accumulation would add considerable complication to the analysis, and we shall not pursue that extension here.

24. The function can be expressed in integral form as:

$${}_2F_1(a, b, c, z) = \frac{\Gamma(c)}{\Gamma(b)\Gamma(c-b)} \int_0^1 t^{b-1} (1-t)^{c-b-1} (1-tz)^{-a} dt, \text{ with } c > b > 0.$$

For $z = 0$, this expression can be shown to equal 1.

25. For $i = 0$, the second line of equation (8) reduces to $\frac{r-\gamma}{r-\gamma+\alpha(\gamma+\delta)} < 1$. In turn, as i grows without bound, it diverges to infinity.

26. This is also the case if the government's net worth is initially positive.

27. Starting from a position of zero net worth, the debt ratio will rise initially provided $(\partial Y/\partial K)_0 \leq 1/b_0$, which is likely to hold unless indebtedness is very high or the public capital stock is very low.

28. Public capital operating costs and maintenance spending may rise along with investment, but they are already included in θ . Regarding other current spending c , as well as revenue collection $\tilde{\tau}$, rather than assuming them fixed, we could let them vary with the long-run growth rate g . Empirically, however, the evidence seems consistent with the constancy assumption; see Calderón, Easterly, and Servén (2003).

29. For example, equation (3.9a) would become:

$$\left. \frac{d \text{ } nw}{d \text{ } i} \right|_{\substack{k=0, \\ nw=0, \\ di=-dc}} = \frac{1}{r+\delta(1-\alpha)-\alpha\gamma} \left\{ \left(\frac{1-\alpha}{r-\gamma} \right) \frac{\theta}{p} + \alpha \frac{b_0}{pk_0} \right\} \geq 0.$$

30. In general, the optimal choice between new investment and O&M spending depends on other factors in addition to their net worth impact; see Kalaitzidakis and Kalyvitis (2004).

31. In other words, equation (9) and equation (9a) are more likely to be negative—except, in the case of the latter, when $(\partial Y/\partial K)_0 > 1/b_0$, so that the debt ratio falls initially instead of rising, in which case the marginal cost of debt falls as well.

32. Another alternative would be to introduce uncertainty explicitly and then examine the impact of public investment on the entire probability distribution of net worth.

33. Easterly (1999) and Easterly and Servén (2003, chapter 1) offer numerous examples.

34. These issues are discussed at length by Irwin, Klein, Perry, and Thobani (1997) and Engel, Fischer, and Galetovic (2003).

35. Buiter (1990, chapter 13) offers a rigorous illustration of the scenario in which such kind of fiscal adjustment leads to a weakening of public finances.

36. Moreover, the marginal product of infrastructure capital is found to be higher than that of other (typically private) capital in virtually all sample countries (see Calderón and Servén 2006).

37. To quantify this dependence, they rely on estimates of the parameters of an aggregate production function augmented with infrastructure, complemented with the estimation of empirical equations linking the accumulation of infrastructure assets to observed investment-to-GDP ratios.

38. The idea of separating the current and the capital budgets is hardly new. The classic reference is Musgrave (1939). See Bassetto and Sargent (2005) for a historical background.

39. In deriving equation (A5), we need to assume that $p(r + \delta) > Ai$ for the present value of future primary surpluses to remain bounded. If this holds at time 0, then the numerator of (A6) and the denominator of (A7) must also be positive.

References

- Agénor, P. 2005. "Infrastructure, Public Education and Growth with Congestion Costs." Center for Growth and Business Cycle Research Discussion Paper No. 47, University of Manchester.
- Aschauer, D. 1989. "Is Public Expenditure Productive?" *Journal of Monetary Economics* 23: 177–200.
- . 2000. "Public Capital and Economic Growth: Issues of Quantity, Finance, and Efficiency." *Economic Development and Cultural Change* 48 (2): 391–406.
- Balassone, F., and D. Franco. 2000. "Public Investment, the Stability Pact and the Golden Rule." *Fiscal Studies* 21 (2): 207–29.
- Barro, R. 1990. "Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy* 98 (5): s103–s125.
- Bassetto, M., and T. Sargent. 2005. "Politics and Efficiency of Separating Capital and Ordinary Government Budgets." NBER Working Paper No. 11030, National Bureau of Economic Research, Cambridge.
- Blanchard, O., and F. Giavazzi. 2004. "Improving the SGP Through a Proper Accounting of Public Investment." CEPR Discussion Paper No. 4220, Centre for Economic Policy Research, London.

- Bruce, N., and S. J. Turnovsky. 1999. "Budget Balance, Welfare and the Growth Rate: 'Dynamic Scoring' of the Long-run Government Budget." *Journal of Money, Credit and Banking* 31 (2): 162–86.
- Buiter, W. 2001. "Notes on 'A Code for Fiscal Stability'." *Oxford Economic Papers* 53 (1): 1–19.
- . 2002. "The Fiscal Theory of the Price Level: A Critique." *Economic Journal* 112: 459–480.
- . 2004. "How to Reform the Stability and Growth Pact." *Central Banking* 13.
- Buiter, W., and C. Grafe. 2004. "Patching up the Pact: Suggestions for Enhancing Fiscal Sustainability and Macroeconomic Stability in an Enlarged European Union." *The Economics of Transition* 12 (1): 67–102.
- Calderón, C., and L. Servén. 2003. "The Output Cost of Latin America's Infrastructure Gap." In *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*, eds. W. Easterly and L. Servén, 95–118. Palo Alto: Stanford University Press.
- . 2004a. "Trends in Infrastructure in Latin America." Policy Research Working Paper No. 3400, World Bank, Washington, DC.
- . 2004b. "The Effects of Infrastructure Development on Growth and Income Distribution." Policy Research Working Paper No. 3401, World Bank, Washington, DC.
- . 2007. "Is Infrastructure Capital Productive?" Unpublished paper, World Bank, Washington, DC.
- Canning, D. 1999. "A Database of World Stocks of Infrastructure, 1950–95." *World Bank Economic Review* 12 (3): 529–47.
- de Haan, J., J. Sturm, and B. Sikken. 1996. "Government Capital Formation: Explaining the Decline." *Weltwirtschaftliches Archiv* 132 (1): 55–74.
- Demetriades, P., and T. Mamuneas. 2000. "Intertemporal Output and Employment Effects of Public Infrastructure Capital: Evidence from 12 OECD Economies." *Economic Journal* 110 (465): 687–712.
- Easterly, W. 1999. "When Is Fiscal Adjustment an Illusion?" *Economic Policy* 28: 57–86.
- Easterly, W., and S. Rebelo. 1993. "Fiscal Policy and Economic Growth." *Journal of Monetary Economics* 32 (3): 417–58.
- Easterly, W., and L. Servén. 2003. *The Limits of Stabilization: Infrastructure, Public Deficits and Growth in Latin America*. Stanford University Press.
- Engel, E., R. Fischer, and A. Galetovic. 2003. "Privatizing Highways in Latin America: Is It Possible to Fix What Went Wrong?" *Economía* 4 (1): 129–58.
- Esfahani, H., and M. T. Ramirez. 2003. "Institutions, Infrastructure, and Economic Growth." *Journal of Development Economics* 70 (2): 443–77.
- Estache, A. 2005. "What Do We Know about Sub-Saharan Africa's Infrastructure and the Impact of Its 1990s Reforms?" Unpublished manuscript, World Bank, Washington, DC.
- Ferreira, P., and C. Araújo. 2007. "On the Economic and Fiscal Effects of Infrastructure Investment in Brazil." This volume.
- Futagami, K., Y. Morita, and A. Shibata. 1993. "Dynamic Analysis of an Endogenous Growth Model with Public Capital." In *Endogenous Growth*, eds. T. Anderson and K. Moene, 217–235. Oxford: Blackwell.

- Gali, J., and E. Perotti. 2003. "Fiscal Policy and Monetary Integration in Europe." *Economic Policy* 533–72.
- Ghosh, S., and U. Roy. 2004. "Fiscal Policy, Long-Run Growth and Welfare in a Stock-Flow Model of Public Goods." *Canadian Journal of Economics* 37: 742–56.
- Glomm, G., and B. Ravikumar. 1997. "Productive Government Expenditures and Long-Run Growth." *Journal of Economic Dynamics and Control* 21: 183–204.
- Hicks, N. 1991. "Expenditure Reductions in Developing Countries Revisited." *Journal of International Development* 3 (1): 29–37.
- IMF (International Monetary Fund). 2003. *Fiscal Adjustment in IMF-Supported Programs*. Washington, DC: IMF.
- . Various years. *World Economic Outlook*. Washington, DC: IMF.
- Irwin, T., M. Klein, G. Perry, and M. Thobani. 1997. *Dealing with Public Risk in Private Infrastructure*. Washington, DC: World Bank.
- Jonakin, J., and M. Stephens. 1999. "The Impact of Adjustment and Stabilization Policies on Infrastructure Spending in Latin America." *North American Journal of Economics and Finance* 10: 293–308.
- Kalaitzidakis, P., and S. Kalyvitis. 2004. "On the Macroeconomic Implications of Maintenance in Public Capital." *Journal of Public Economics* 88: 695–712.
- Kalyvitis, S. 2003. "Public Investment Rules and Endogenous Growth, with Empirical Evidence from Canada." *Scottish Journal of Political Economy* 50: 90–110.
- Keefer, Philip, and Stephen Knack. 2006. "Boondoggles, Rent-Seeking and Political Checks and Balances: Public Investment under Unaccountable Governments." *Review of Economics and Statistics* 89 (3): 566–72.
- Lane, P. 2003. "The Cyclical Behavior of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87 (12): 2661–675.
- Musgrave, R. 1939. "The Nature of Budgetary Balance and the Case for a Capital Budget." *American Economic Review* 29 (2): 260–71.
- Pereira, A., and M. Pinho. 2006. "Public Investment, Economic Performance and Budgetary Consolidation: VAR Evidence for the 12 Euro Countries." Working Paper 40, The College of William and Mary, Department of Economics, Williamsburg, VA.
- Perotti, R. 2004. "Public Investment: Another (Different) Look." Working Paper No. 277, Bocconi University, Innocenzo Gasparini Institute for Economic Research, Milan, Italy.
- Pritchett, L. 2000. "The Tyranny of Concepts: CUDIE (Cumulated, Depreciated, Investment Effort) Is Not Capital." *Journal of Economic Growth* 5 (4): 361–84.
- Rioja, F. 2003a. "The Penalties of Inefficient Infrastructure." *Review of Development Economics* 7: 127–37.
- . 2003b. "Filling Potholes: Macroeconomic Effects of Maintenance versus New Investments in Public Infrastructure." *Journal of Public Economics* 87: 2281–304.
- Röller, L., and L. Waverman. 2001. "Telecommunications Infrastructure and Economic Development: A Simultaneous Approach." *American Economic Review* 91 (4): 909–23.

- Romp, W., and J. de Haan. 2007. "Public Capital and Economic Growth: A Critical Survey." *Perspektiven der Wirtschaftspolitik* 8: 6–52.
- Roubini, N., and J. Sachs. 1989. "Government Spending and Budget Deficits in the Industrial Countries." *Economic Policy* 8: 99–132.
- Talvi, E., and C. Végh. 2000. "Tax Base Variability and Procyclical Fiscal Policy." NBER Working Paper No. 7499, National Bureau of Economic Research, Cambridge.
- Turnovsky, S. 1997. "Fiscal Policy in a Growing Economy with Public Capital." *Macroeconomic Dynamics* 1: 615–39.
- Turnovsky, S., and W. Fisher. 1995. "The Composition of Government Expenditure and Its Consequences for Macroeconomic Performance." *Journal of Economic Dynamics and Control* 19 (4): 747–86.
- World Bank. World Development Indicators database. World Bank, Washington, DC.
- Zagler, M., and G. Durnecker. 2003. "Fiscal Policy and Economic Growth." *Journal of Economic Surveys* 17 (3): 397–418.

Incentives for Public Investment Under Fiscal Rules

*Jack M. Mintz and Michael Smart**

I. Introduction

In recent years, governments have been employing in greater degrees various fiscal rules to limit deficits or debt accumulation. The intent of such fiscal rules is to discourage “bad” politicians from pursuing spending programs and deficit financing to garner current political support while pushing the cost of raising taxes to future voters. A significant concern has been raised with the incentive to undertake public investments in the presence of such fiscal rules. A relaxation of these rules could, in fact, improve economic performance if the bias against capital investments is lessened.

In particular, under cash accounting, governments expense investments that are fully charged to the current budget, even though capital provides services to the owner over its service life. Such capital expenditures therefore add to the current deficit, which requires greater debt financing. Thus, if fiscal rules constrain deficits to a certain portion of the gross domestic product (GDP), as under the Maastricht Treaty in Europe, to be zero as in a balanced budget, or to be positive under a required surplus, public capital expenditures may push deficits or debt levels beyond the fiscal limits. Therefore, governments are arguably reluctant to invest in capital that yields social benefits for future voters compared with the immediate political benefits derived from spending on current programs and transfers. Cash accounting

* This paper was prepared as part of the World Bank’s Latin American Regional Studies Program. The views expressed here are the authors’, and do not necessarily represent those of the World Bank.

under fiscal rules that limit deficits is suggested to bias governments against capital spending, thereby running down public infrastructure.

To overcome any bias against public investment decisions under fiscal rules, some governments have adopted accrual accounting. While accrual accounting can be limited to a modified approach whereby capital is still expensed, the full accrual approach would result in public capital being depreciated over its service life. Deficits could appear smaller, because new capital expenditures would be depreciated rather than fully charged to the current budget. Governments could avoid the bounds imposed by fiscal rules by taking capital off the public operational accounts, except for depreciation, and by financing capital with debt that would not be included in the deficit under the fiscal rule.

Over time, however, the depreciation of current and past capital investments could be larger than current capital expenditures, therefore worsening the deficit (and facing constraints imposed by the fiscal rules). In practice, however, governments have often initiated capital accounts to provide an opportunity to escape the impact of the fiscal rule in the short term. Alternatively, they may push debt finance off their own books to quasi-public agencies not consolidated in the budget or to the private sector under public-private partnership arrangements. Under these scenarios, “bad” governments might rely on too much capital investment and debt finance.

The primary task of this chapter is to consider how fiscal rules should be applied in the presence of capital budgeting under accrual accounting. Several issues are to be examined. How should a government determine the level of capital expenditure? How should such expenditures be accounted for on the government’s books and to what extent should *per se* fiscal rules apply to capital costs? Which governance institutions are available to determine investment strategies in a politically imperfect world, and how do such institutions interact with accounting standards adopted by governments?

The conventional wisdom in public finance is that capital budgeting is apt to do more harm to public decision making than good. It involves accounting distinctions that have little economic meaning, it is prone to abuse by opportunistic governments, and it may often reduce rather than enhance transparency in government. For all these reasons, a focus on the cash budget as a unitary indicator of the state of public finances has much to recommend. But, when fiscal rules are imposed (or self-imposed) on governments, a more subtle approach to capital may be called for as a matter of second-best policy making. In this paper, we outline how such distinctions can and should be made, and we outline specific proposals for how a capital budget may be operated.

The plan of this paper is as follows. In section II, we lay out the main issues regarding fiscal rules and accounting practices, including an analysis of different fiscal rules in terms of their implications for debt financing and revenue requirements as well as a framework for long-run fiscal decision making. Section III follows with a review of capital budgeting, its relation

to debt policy and fiscal rules, and incentives for governments to undertake capital projects. Section IV surveys current practice with respect to fiscal and accounting rules, especially with respect to capital decision making. Section V provides a critical assessment of various proposals for reform when fiscal rules are applied. Section VI outlines an alternative approach to fiscal rules.

II. Fiscal Rules and Public Investment

To begin, we provide some basic analysis to develop a framework for understanding the relationship between debt and various fiscal rules that have been recently discussed in the literature. We outline principles related to long-run fiscal policy by which fiscal balance criteria and associated borrowing rules may be judged.

The Basic Analytics

We consider an accounting model of the government budget, cast in continuous time. Let B denote the stock of government debt, K the stock of public capital, and Y the level of GDP. Let t denote government current revenues less current spending and i denote government investment in capital, both as a fraction of GDP Y . Furthermore, let r denote the real rate of interest on government debt and p the financial rate of return on government capital (the financial return are fees, other revenues, and capital gains specifically earned from government capital investments). The government's budget constraint implies a level of current borrowing of $B' = rB - pK + (i - t) Y$ (B' denoting net new bond issues). More usefully for our purposes, the budget constraint can be used to express current net revenues as follows:

$$t = i - pk + rb - B'/Y \quad (1)$$

where $k = K/Y$ is the public capital-to-GDP ratio and $b = B/Y$ the debt-to-GDP ratio.

Let n be the growth rate of GDP and δ the depreciation rate for public capital. Public net investment, K' , is equal to the gross investment rate less depreciation on existing capital stock and can be expressed as a proportion of GDP as follows:

$$K'/Y = i - \delta k \quad (2)$$

Our objective is to use equation (1) to examine fiscal rules and their implications for the level of taxes and public investment.

Cash-balance rule. First, let us consider a restriction on the *cash deficit*, or public sector borrowing requirement B' . A *cash-balance rule*¹ requires

$B'=0$ so that, using equations (1) and (2), net current revenues under a cash-balance rule must satisfy the following:

$$t^c = (r + \delta - p)k + r(b - k) + K'/Y \quad (3)$$

That is, under the cash-balance rule, current net revenues must finance net additions to the capital stock K'/Y and the financial cost of debt that is not backed by capital $r(b - k)$, as well as the user cost of public capital $(r + \delta - p)k$.²

Operating-balance rule. An alternative fiscal rule focuses on the *operating deficit* of the government, defined as minus the change in net worth $K-B$.³ An *operating-balance rule* permits borrowing to finance net investment in public capital, a principle known as the *golden rule of public finance* since the work of Pigou (1928) and Musgrave (1939). Under the golden rule, we have $(B' - K')/Y = 0$ and thus a level of current revenues satisfying:

$$t^o = (r + \delta - p)k + r(b - k) \quad (4)$$

Evidently, the level of net revenues needed to achieve the deficit target is higher under a cash-balance rule than under an operating-balance rule whenever net investment is positive.

Permanent-balance rule. Alternatively, a fiscal rule may specify that the debt-to-GDP ratio remain constant over time: $b' = 0$, implying a cash deficit-to-GDP ratio of $B'/Y = nb > 0$, and current net revenues equal to:

$$t^p = (r + \delta - p)k + r(b - k) + K'/Y - nb \quad (5)$$

which Buiters and Grafe (2003) term the *permanent-balance rule*.

Implications for public debt financing and net revenue requirements. To understand the long-run evolution of taxes under these various fiscal rules, we must consider their implications for the behavior of the debt-to-GDP ratio. A cash-balance rule implies $b' = B'/Y - nb = -nb$, that is, a vanishing debt-to-GDP ratio in the limit of a growing economy. If the capital-to-GDP ratio is constant, so that $K'/Y = nk$, then equation (3) in turn implies that required net revenues decline over time, reaching $(n + \delta - p)k$ in the limit as the debt is retired. Indeed, if $r > n$, the limit of net revenue lies below the user cost.

Likewise, an operating-balance rule implies the debt-to-GDP ratio grows at rate $b' = k' - n(b - k)$. As stressed by Blanchard and Giavazzi (2007), this implies that b approaches k : government debt is in the limit issued to finance the full public capital stock, and only the public capital stock. Thus, under an operating-balance approach, equation (4) implies that net revenues as a fraction of GDP approach a level that is just sufficient to cover the user cost

of public capital $(r + \delta - p)k$. Even in the long run of a growing economy, a cash-balance rule implies permanently higher taxes (and lower debt) than an operating-balance rule, if $r > n$.

Evidently, in permitting positive current deficits in a growing economy, a permanent-balance rule allows lower current net revenues than a cash-balance rule. Furthermore, comparing equations (4) and (5), a permanent-balance rule implies lower current revenues than an operating-balance rule if and only if:

$$K'/Y = k' + nk < nb \quad (6)$$

If the capital-to-GDP ratio is held constant, then, the permanent-balance rule implies limiting tax revenues equal to that of the operating-balance rule, because $b \rightarrow k$ under the operating-balance rule. Along a transition path, taxes are lower under the permanent-balance rule if the government initially has negative net worth, $k - b < 0$.

In summary, each of the fiscal rules considered here has particular implications for the evolution of government debt and the level of current revenues required to finance public investment plans. Each of these rules is consistent with some notion of fiscal sustainability; however, each has different implications for the pattern of taxation required in the short run and the long run. To evaluate the desirability of these rules, therefore, we turn to a discussion of some principles of optimal fiscal policy.

Principles of Long-Run Fiscal Policy

Recently, as governments have become more concerned with debt reduction and fiscal sustainability in general, the cash balance has become the metric by which sustainability is generally judged. The Excessive Deficits Procedure of the Maastricht Treaty is defined as a limit on the general government cash deficit as a percentage of GDP, and many countries define self-imposed fiscal rules with respect to the cash balance as well. (Section IV surveys fiscal rules and accounting standards in a number of countries.) Multilateral lending organizations likewise tend to look at the cash balance to measure fiscal sustainability.

We may distinguish a number of perspectives on these issues, each with its own implications for the way fiscal balance should be calculated.

Fiscal sustainability. A primary role of any balance measure will be in judging the sustainability of the current fiscal stance and ultimately the solvency of the government sector as a whole. The preoccupation with sustainability leads some commentators to argue for the cash-balance approach—only debt matters—and others for the operating-balance approach—only net worth matters—and debt is unimportant per se if it is backed by assets. Both views are in their own ways erroneous. The latter view, in particular,

is based on a false analogy between private sector and government finance.⁴ Unlike the private sector, government solvency depends less on the value of assets held than on the taxable capacity of the economy (Musgrave 1963). The argument for incurring debt, therefore, is not that assets are to be held on the balance sheet, but that public investment will, directly or indirectly, lead to future increases in government revenues.

When the assets in question are associated with projects that are or may be commercialized, the analogy to business finance is more apt. Some types of public capital investments, such as in the utility sector (power, transport, and communications), could be sold to private investors, thereby providing funds to governments to pay back debt. Thus, debt is sustainable to the extent that asset disposals can assure lenders that their principal and interest will be covered.

Tax smoothing. Because the static marginal cost of public finance is an increasing function of the government tax take, there is a prima facie case for borrowing to finance public investment, thereby smoothing the associated tax burden over future years and future generations. Optimally, tax burdens should be set to minimize dynamic efficiency costs.

That tax smoothing may be consistent with an operating-balance rule for financing public investment can be seen by examining the associated path for taxes given by equation (4). For a government with initial public debt fully backed by initial capital, equation (4) implies that current net revenues are everywhere equal to the user cost of capital $(r + \delta - p)k$. Musgrave (1939) argues that the tax-smoothing argument in favor of borrowing makes the most sense for investments in public infrastructure, which may be expected to increase future government revenues. It makes particular sense for “self-liquidating” projects that are financed entirely through user fees, benefit taxes, and capital gains (from asset disposals), for which therefore $p = r + \delta$. Benefit taxes and user fees place no excess burden on future generations, and in such cases equation (4) implies that current revenues can be held constant at each date, regardless of the path of accumulation of public capital.

Similar arguments, however, may be applied in the case of projects that are financed from general tax revenues, but for which there is a reasonable presumption that the project will sufficiently enhance future revenues to cover its costs. For example, an investment in public highways might generate sufficient gasoline tax and licensing revenues to cover capital costs. Likewise, other projects may increase revenue indirectly through their effects on private incomes—tending to decrease the excess burden of taxation in future. The argument for borrowing is, however, much weaker for other forms of public capital, such as environmental, military, and cultural assets, with no direct link to future private incomes. Furthermore, public projects might create not just more revenues but also additional

spending requirements for governments, such as a new urban development increasing the need for social housing, schools, and hospitals.

Intergenerational equity. A more general argument for debt finance is that long-term capital investments benefit not only existing but also future generations. Given that debt finance provides an opportunity to postpone taxes in the future, it provides a means for future generations to contribute to the cost of public investment. The intergenerational equity perspective is related to the tax-smoothing argument, but it is more comprehensive. It may be applied not only to infrastructure assets that are closely linked to future tax revenues, but also to other public capital.

At the same time, it is much more problematic than the tax-smoothing perspective. First, the intergenerational distribution of debt finance costs is difficult to determine in general, depending on whether debt is held domestically or externally and on the extent to which current generations regard government debt as net wealth. Second, the valuation of such assets and the attribution of costs and benefits to future generations are difficult. Third, because future generations do not have an opportunity to express support for public decisions, current governments face a potential moral hazard problem, as discussed further below, whereby existing generations make decisions without considering net costs imposed in the future.

The contrast between the tax-smoothing and equity perspectives emerges most clearly by considering the case for debt finance of *recurrent* government expenditures that enhance private sector assets—such as expenditures on teachers and health professionals that will increase private sector human capital. It is often argued that such expenditures should be treated on the same basis as investments in tangible assets, because they provide benefits to the economy beyond the current accounting year. However, the tax-smoothing argument appears to offer no basis at all for borrowing in such cases. Labor costs are ongoing expenditures that must be financed annually, and such investments are as likely to increase as decrease the future marginal excess burden of taxation. Consequently, a policy of debt finance for recurrent expenditures must imply increasing tax rates over time, violating the tax-smoothing principle. From the perspective of intergenerational equity, debt finance might still be warranted. It permits the tax burden for recurrent expenditures to be levied on future generations who will benefit from earlier investments in human capital, which enhances productivity growth in the economy.

In summary, tax-smoothing and equity considerations imply a *prima facie* case for borrowing to finance (some) public capital expenditures, but the arguments are conceptually distinct. Because of the practical and normative difficulties with intergenerational equity principles, the tax-smoothing perspective seems like a practical guide to policy, and it forms the basis for our approach below.

III. Capital Budgeting, Accounting, and Debt Finance

To understand how public investment decisions interact with fiscal rules that limit deficits or debt, it is useful to outline how public capital decision making and budgeting operate in the absence of such rules. Public investment decision making is a complex subject, depending on the governance process, accounting practices, types of capital being considered, sources of finance, and fiscal limitations in place.

Public capital can be defined along similar lines to the notion of capital used in the private sector. Public capital is an outlay of expenditures on assets that provide longer-run benefits that extend beyond the current period. The yield to public capital could include financial benefits (user fees and related taxes) or social benefits (for which no charge can be assessed), such as in the cases of investments in security, defense, and social services. Public investments that provide a long-run benefit may be commercial in that fees and benefit taxes charged would fully recover economic costs and be self-liquidating in the sense the assets may be disposed of at a later time by being sold to private operators. Examples of commercial-type public investments common in many less developed economies include state-owned investments in resources, manufacturing, utilities, communications, and other services. Alternatively, public assets may have no commercial value (since the market cannot provide the service on its own) and cannot be sold to private operators as in the case of defense outlays and residential roads (except for contracting-out arrangements). Some public investments are at best only partly recoverable through charges—museums and parks—with a significant public subsidy involved even if they were commercialized to the extent possible.

Capital expenditures tend to be lumpy so that public investment would not be expected to be constant relative to GDP at each point of time. Furthermore, it cannot be presumed that public investment should grow with GDP at a constant rate, which would be typically assumed if public services are produced under constant returns to scale (more output requires a similar proportionate increase in factors of production). It is sometimes argued that, with economies of scale, public investment could decline over time relative to GDP as people become more urbanized (thereby making more efficient use of roads, water treatment facilities, and waste management facilities). Furthermore, investment expenditures provide opportunities to adopt new technologies that make more efficient use of capital and labor inputs. Alternatively, with congestion costs, public investment might need to grow faster than output to maintain the same services. In some of our discussion (as in section II), we implicitly assume that the optimal level of public investment would grow with the economy.

A budget is indicative of the revenues and costs incurred by governments to provide goods, services, and transfer payments. These costs are

associated with labor, capital, materials, interest expenses, and other costs used in the public production process. In defining capital costs, one need not express them solely in terms of the investment expenditure incurred in purchasing or constructing an asset. Instead, the capital asset could be leased, for which the annual lease price is equal to the economic depreciation and financing costs incurred to maintain a capital asset. Thus, to make clear what is meant by a capital budget, we define two notions of government budgets: operations and capital. In principle, one could imagine the capital budget being administered by an agency that would charge a fee for the leasing of public capital to the operational side of government, although this is not a common practice.

- **The operational budget** would be the accrued revenues (taxes and non-tax revenues) and current expenses associated with programs. In principle, current expenses could include a charge for “leasing” capital from the capital budget agency. The lease costs would be the annualized value of depreciation and financing costs associated with maintaining capital. Often, operational budgets may only be assessed the depreciation charge, which would be less than the true cost of leasing capital.
- **The capital budget** is associated with the assets and liabilities held by the government. Assets would be tangible (buildings, machinery, inventory, and land, for example) and intangible (such as goodwill and nonrenewable resource reserves). Liabilities would include debt and other contingency claims on the government. In principle, the capital budget, on an accrual basis, would be equal to lease income (payments made to it from the operational budget), financial returns on assets, and any taxes dedicated to capital budgets net of interest expenses on debt.

The sum of operational and capital budgets under accrual accounting is simply accrued revenues net of program expenditures, depreciation, and interest on debt. The transfers made from the operational to capital budgets for leased capital are netted out. When considering fiscal rules, these distinctions are important, because the fiscal rule may only apply to the operational side of government.

Determining Debt-Financed Public Investment

The normative economics literature (see Atkinson and Stiglitz 1980) stresses the use of a cost-benefit analysis to guide the decision whether a public investment project should be undertaken. Governments seeking to maximize net social benefits should invest in capital so long as the present value or annualized value of social benefits, net of operating and other

social costs, is more than the social cost of funds used to finance capital expenditures. For debt finance, the social cost of funds is determined as the weighted average of the cost of displacing private sector investment projects and private consumption (derived from domestic or foreign savings). The crowding out of private investment projects would be valued at the pre-tax rate of return on capital, while the crowding out of domestic savings would be valued at the after-tax rate of return on capital. The opportunity cost to society of borrowing from international sources is the world rate of return earned by international investors. For a small open economy, the opportunity cost of financing capital investment is simply the world financial cost of funds since public investment projects would be financed solely from international markets.

In principle, the normative approach to public investment decision making has well-defined economic criteria for project valuation, but it is not easy to apply in noncommercial situations. Clearly, a commercial project is simple to value since the net benefits would be the same as the profitability earned by the project. However, many public investment projects, including dams, public transport, airports, education, and research and development, might earn some financial income but have significant external impacts on the economy. To conduct a cost-benefit analysis, one would need to value the gains derived from the project that households and businesses might be willing to pay for (but are not asked to do so to cover costs). This value might be estimated by examining economy prices, land rents, and other variables to measure such benefits and costs, for example, those associated with improved productivity and pollution. None of these are easy to estimate; however, the cost-benefit approach does provide an appropriate benchmark to measure the acceptability of a public investment project.

Accounting Principles

Government budget and accounting statements serve the dual purposes of governing the revenue-expenditure process and facilitating oversight and accountability of government finances. From either perspective, general accounting principles must be determined, and some measures of the overall balance of government finances must be reported. Traditionally, most governments have adopted the *cash balance* as the main “headline” measure of fiscal stance for the government sector. The cash balance is defined simply as the excess of receipts over outlays for the general government sector. Under full-cash accounting, public program expenses and debt interest charges are subtracted from revenue receipts, all defined on a cash basis. Cash accounting, therefore, treats public investment expenditures similarly to other programs expensed and charged fully to the current year.

The cash balance is perhaps natural given most governments’ historical preoccupations with cash accounting and budgeting systems. It is also

the most appropriate measure of balance if one is concerned with the fiscal stance of a short-run stabilization policy, the public sector's overall demands on capital markets, or the aggregate level of tax revenues that are being postponed to future dates (Boadway 1993).

In recent years, many governments have adopted accrual accounting principles in place of traditional cash accounting. Under accrual accounting, expenditures and revenues are charged to the year in which they are incurred, not when they actually are paid. Thus, any accounts receivable but not yet paid are treated as revenue received during the year and any accounts payable are treated as expenses, even though the payment may take place in a different year. Unfunded pension liabilities owed in the future to civil servants under defined benefit programs are treated as a liability, and new pension liabilities would be an accrued expense to the current budget, although the payment would be made many years hence.

Greater use of accrual information in government has led naturally to a greater focus on the operating balance as a measure of fiscal stance, in place of cash balance. The *operating balance*, which can be defined as (minus) the change in net worth of government, differs formally from the cash balance by the addition of net investment in capital—that is, the change in the value of government financial assets less nondebt liabilities, including “implicit debt” associated with public pensions, government business enterprises, and the like.

When accrual accounting is adopted for the capital budget, capital expenditures are no longer expensed to the current year's operations. Instead, they are depreciated over time, reflecting an estimate of the capital good's service life (the years over which the capital good provides benefits in the future). Thus, capital depreciation on current and past investment expenditures is charged as a current expense to the operating budget.

Naturally, a measure of fiscal balance that includes net investment in capital may be calculated whether the government has adopted accrual accounting principles or not; however, accrual accounting is most suited to the operating-balance approach. Several governments, including Canada and Italy, have adopted accrual accounting on a modified basis, in that accrual methods are not used for the capital budget. Table 7.1 provides a survey of public sector accounting practices in a number of countries.

When governments are constrained by fiscal rules, the operating balance may be preferred over the cash-balance approach to limit “creative accounting” (Milesi-Feretti 2003). Under cash accounting, governments may, for example, substitute unfunded liabilities (such as those related to contingent liabilities) for market debt to satisfy constraints on borrowing. The operating-balance approach, taking a broader perspective of fiscal sustainability, restricts the use of this and many other such practices. Conversely, by shifting focus from cash to less verifiable accrual measures, the operating-balance approach creates potential for new accounting games.⁵

Table 7.1 Survey of Accounting Practices^a

	<i>Accruals applied in financial reporting</i>	<i>Accruals applied in budgeting</i>
Australia	Yes	Yes
Austria	No	No
Canada	Yes ^c	Yes ^c
Denmark ^b	No ^c	No ^c
Finland	Yes	Yes ^c
France	No ^c	No
Germany	No	No
Greece	Yes	No
Ireland	No	No
Italy	Yes ^c	Yes ^c
Japan	No	No
Korea, Rep. of ^b	No	No
Mexico	No	No
New Zealand	Yes	Yes
Norway	No	No
Poland	No ^c	No
Portugal	No	No
Sweden ^b	Yes	No
Switzerland	No	No
United Kingdom	Yes	Yes

Source: Joumard, Mathis, Nam, and Price 2004.

a. Countries are classified as “full accrual basis” irrespective of whether certain heritage assets and military systems are recognized. Countries are classified as “full cash basis” irrespective of whether a system of commitments or obligations is in place.

b. Plans to introduce accruals in financial reporting or budgeting.

c. Modified.

Moral Hazard in Government

Government decision making—more easily applied to understand the reasons for adopting fiscal rules to limit government deficits—can best be characterized using a political economy analysis. Government politicians are interested in reelection or maintaining power. They derive monetary or nonpecuniary benefits from being in power and therefore undertake actions to maximize political support. Nevertheless, the nature of the distortion created by the existence of such “bad” governments is unclear.

In one perspective, bad governments are those with short-term horizons, which value the political and social benefits from current spending while discounting the associated costs, to the extent they may be deferred to the future. Such governments may receive political support from voters who either misperceive future costs or who discount the future more highly than is deemed ethically acceptable. Evidently, such myopic behavior in government creates a *prima facie* case for restrictions on government borrowing. Notice, however, that myopic governments will discount too heavily the future *benefits* derived from public investment, as well as the future tax costs of debt finance. In such cases, myopic decision making would result in too few public investment projects, with net long-run benefits, being undertaken. A fiscal rule that imposed tighter restrictions on borrowing for the operational budget, while treating capital projects more leniently, would therefore constitute an appropriate “screening mechanism.” Because good governments are more patient than bad governments, the behavior of bad governments is restricted and good governments have more leeway to pursue appropriate spending policies.⁶

Given the difficulties in defining and measuring capital and its net benefits, fiscal rules that accord preferential treatment to investment may be prone to abuse by bad governments. This can especially arise when long-run benefits are negative, imposing a cost on future taxpayers, even though the expenditures are perceived to be beneficial to supporters of the current government. Evidently, fiscal rules are less likely to be effective when transparency in government accounting is limited (Milesi-Feretti 2003) and when institutions for public decision making are prone to manipulation (Alt and Dreyer Lassen 2003; Von Hagen and Harden 1995). For these reasons, Eichengreen (2004) has suggested, in the context of Europe’s Stability and Growth Pact (SGP), that fiscal rules should be applied differentially to countries, depending on the quality of the political institutions and the extent of structural reforms to public finances.

The Scope of Capital Budgets

Capital budgeting for public accounting purposes is a theoretically well-understood concept, as described above. However, the notion of “public capital” is less well defined and raises a number of tricky issues. As discussed, public capital can have a commercial nature. If disposed to private hands, it would earn a yield sufficient to cover the cost of depreciation and financing. Therefore, in principle, it can be valued. In general, however, public capital may yield, at least partly, social benefits that go beyond what would be earned in the private market and, therefore, have no commercial value.

It would be useful at this juncture to make a further observation that public investments can be decomposed into two components: (a) capital used in the process of producing public goods and services and (b) capital as a form of output produced by governments. Much confusion in the

literature arises by not making these differences clear. A parallel example typical in the private sector is used initially to clarify the concepts.

Suppose a developer is constructing a building for rental purposes. Two stages of production are involved: the construction of a building followed by leasing to tenants. The inputs used in producing the building are current (labor and materials) as well as capital (such as heavy construction material). The output being produced is "capital," which is a structure that will be available for use at a later time. Two forms of capital budgeting are required in this context. First, the capital used in constructing the building should be amortized. The annual depreciation and financing costs are added to current inputs (such as labor) to account for the annual cost of producing the building. Second, once the building is constructed, the total construction costs incurred to create the asset (or the observable market value of the asset when construction is completed) is amortized to determine the lease costs. Typically, accounting practices would require amortization of capital goods by the company building a project (which could then be disposed of or put to use) as well as amortization of capitalized costs by the building's owner.

In the public sector, a similar distinction should be made between capital inputs used to produce public goods and services directly and capital being constructed by the public sector that provides longer-term benefits to society over time.

For example, take health care. To produce health services, governments employ doctors and nurses and construct hospital buildings. The hospital buildings are clearly capital inputs used to provide health services and should be amortized under capital budgets, and doctor and nurse salaries should be expensed. The health services, however, are arguably consumption goods to reduce pain and suffering, although an element of public capital might be entailed if current health services improve the long-run productivity of workers (who later remit taxes to the government). Some judgment is needed to determine whether any health service expenditures should be amortized under public accounts, because a majority of health expenditures tend to be focused at the end of a person's life.

Other examples of public capital expenditures that lead to tricky valuation issues can be given in this context:

- Education services use labor (teachers) and school buildings to produce the services. Although education is in part consumption, such services are largely human capital investments that yield returns in the future through higher incomes paid to those who become educated. Although education could be self-financed through tuition fees with students obtaining student loans, the financing is more expensive compared with collateralized lending, as in the case of housing. Lenders may not be able to fully collect repayment of interest and principal if the student fails to become employed at expected wage levels. Would the same apply to the public sector? Kelly (1993) argues that

education expenditures should not be treated as a capital expenditure since they are not made to acquire property. This is an accounting distinction rather than an economic one. School buildings should be accounted for on a capital basis, but what about spending on current inputs like teaching salaries? A justification might be given to treat education spending on teachers as capital, but instead these current inputs are being used to produce capital and should be deducted as an expense to build capital. The whole cost of the education system could be treated as capital, but it is unlikely to be valued precisely since the returns are difficult to estimate. Thus, it is far from clear that education expenses should be capitalized and, even if an attempt is made to do so, it would be a challenge to measure the true value.

- Infrastructure expenditures on roads, highways, bridges, airports, ports, water treatment facilities, electricity, heating, and communications result in the creation of public capital that should be amortized. However, some infrastructure expenditures such as heritage assets, defense capital goods, and parks or museum assets are difficult to value and amortize (Blöndal 2003; Kelly 1993). Accountants have taken a view that if amounts cannot be measured, then they should not be included in capital budgets.
- Pay-as-you-go (defined benefit) social security programs create future liabilities for governments (Blöndal 2003). In principle, current resources are needed to cover these liabilities. Both intergenerational equity and tax-smoothing arguments would buttress the argument that funds should be set aside by current populations to cover benefits received in the future.
- Some revenue sources are of a nonrecurring and capital nature (asset disposals, auctioning of licenses, resource royalties, and death duties). One could argue that receipts should be included in a capital budget and be used to reduce the need for debt finance (Boothe 1993).

The application of “capital” to government budgets is therefore not a simple matter and judgment is needed to classify expenditures as public capital. Given that this exercise could involve value judgments, a concern could arise that far too many public expenditures might be classified by governments as capital to justify debt financing. In part, this is related to motives for debt financing of capital as discussed above.

IV. Survey of Current Practice

Fiscal Rules

Fiscal rules and capital budgeting have affected a number of practices, including European fiscal targeting, golden rules for debt accumulation,

public infrastructure agencies, and public-private partnerships (see table 7.2). Below, a brief review of the issues related to these practices is provided.

Europe and the SGP. The Maastricht Treaty contains a provision requiring member states to avoid running “excessive” deficits, regardless of whether they have adopted the euro. A protocol to the treaty specifies in turn that members’ fiscal stances are to be judged by two criteria: whether the budget deficit is less than 3 percent of GDP, and whether total government debt exceeds 60 percent of GDP. If the European Council determines a deficit is excessive, there is a procedure to encourage its elimination. The Council may issue warnings and impose deposit requirements and, eventually, fines.

The SGP corresponds to the provisions of the Maastricht excessive deficits procedure, but it clarifies the terms, introduces monitoring procedures, and gives the Council greater teeth in the event of violations. Under the SGP, deficits may exceed the 3 percent level if the excess is “exceptional, temporary, and limited in size.” Some discretion is accorded to the Council in determining whether this provision should apply.

Table 7.2 Survey of Fiscal Rules in the OECD

<i>Country</i>	<i>Year of implementation</i>	<i>Summary</i>
Australia	1998	Charter of Budget Honesty <ul style="list-style-type: none"> • No legislated numerical rules. The charter requires the government to spell out objectives and targets but places no constraints on their nature.
Austria	2000	Domestic Stability Pact Law <ul style="list-style-type: none"> • Negotiated floors on the budget balance for each government level (a surplus of 0.75 percent of GDP for the länder and zero for municipalities, and the federal government balance should be such that the Stability Programme target is met). Outcomes are assessed by an independent auditor. The law embodies financial sanctions in case of noncompliance.
Belgium	1999	Cooperation Agreement <ul style="list-style-type: none"> • Permissible deficits are established for the federal government plus social security on the one hand, and for the regions and the local governments on the other.

(continued)

Table 7.2 Survey of Fiscal Rules in the OECD (*continued*)

<i>Country</i>	<i>Year of implementation</i>	<i>Summary</i>
Canada	1998	Debt Repayment Plan <ul style="list-style-type: none"> • There are no legislated rules at the federal level, but the government has a “balanced budget or better” policy. Most provinces have some form of balanced budget legislation.
Denmark	2001	A Medium-Term Fiscal Strategy (until 2010) <ul style="list-style-type: none"> • Structural general government surpluses of around 2 percent of GDP. • A “tax freeze” covering both central and subnational governments (introduced in 2002).
European Union	1992	Maastricht Treaty (extended in 1997 under the Stability and Growth Pact) <ul style="list-style-type: none"> • 3 percent of GDP ceiling on general government net borrowing. • “Close to balance or surplus” target applying in cyclically adjusted term each year. • 60 percent of gross government debt-to-GDP ratio norm.
Finland	2004	Medium-Term Objectives <ul style="list-style-type: none"> • Balanced central government finances in structural terms by 2007. • Central government expenditure (excluding interest payments, unemployment benefits, and a few other items) is subject to a cap over the period 2004 to 2007.
Germany	2002	Domestic Stability Pact <ul style="list-style-type: none"> • Golden rule: the budgeted deficit of the federal government must not exceed federal investment spending. Most länder constitutions have a similar law. • Both the central government and subnational governments should aim at balanced budgets.

(continued)

Table 7.2 Survey of Fiscal Rules in the OECD (*continued*)

<i>Country</i>	<i>Year of implementation</i>	<i>Summary</i>
Japan	2002	A Reform and Perspective Programme (revised in 2003) <ul style="list-style-type: none"> • Maintain general government expenditures at or below the 2002 level of 38 percent of GDP. • Achieve primary budget surplus by early 2010s.
Netherlands	1994	Multiyear Expenditure Agreements <ul style="list-style-type: none"> • Separate expenditure ceilings on central government, social security, and labor market and health spending. • Automatic stabilizers are allowed to work fully on the revenue side, except if the deficit came close to the Maastricht Treaty's 3 percent ceiling.
New Zealand	1994	Fiscal Responsibility Act <ul style="list-style-type: none"> • Maintain debt and net worth at "prudent" levels and run operating surpluses on average over a "reasonable" period of time. The government sets its own numerical targets consistent with these principles.
Norway	2001	Fiscal Stability Guidelines <ul style="list-style-type: none"> • Structural nonoil central-government budget deficit should not exceed 4 percent of the Government Petroleum Fund over the cycle. • In the event of major revaluations of the fund's capital or statistical revisions of the structural deficit, corrective action should be spread over several years.
Poland	1999	Act on Public Finance <ul style="list-style-type: none"> • The Constitution sets a limit of 60 percent of GDP for total public debt.
Spain	2003	Fiscal Stability Law <ul style="list-style-type: none"> • Accounts should balance or show a surplus at all levels of government

(continued)

Table 7.2 Survey of Fiscal Rules in the OECD (*continued*)

Country	Year of implementation	Summary
		(central, social, territorial, and local) as well as for public enterprises and corporations.
		<ul style="list-style-type: none"> • A cap is put on central government expenditure and a contingency fund (2 percent of expenditure) is set up to cover unscheduled nondiscretionary expenditure.
Sweden	1997	Fiscal Budget Act <ul style="list-style-type: none"> • Set nominal expenditure limits for the subsequent three years on 27 expenditure areas (including social security). • Maintain a general government surplus of 2 percent of GDP on average over the business cycle.
Switzerland	2003	Debt Containment Rule <ul style="list-style-type: none"> • Sets a ceiling for expenditures, which is equal to total revenues adjusted for the cycle and for ex post deviations of outturns from the norm laid out in the rule.
United Kingdom	1997	Code for Fiscal Stability <ul style="list-style-type: none"> • Golden rule: over the business cycle, the government will borrow only to invest and not to fund current spending. • Sustainable investment rule: net debt as a proportion of GDP must be held stable over the business cycle at a prudent level (defined so far as net debt below 40 percent of GDP).
United States	1990 to 2002	Budget Enforcement Act <ul style="list-style-type: none"> • Medium-term nominal caps for discretionary spending. • Legislated changes to revenues or mandatory spending programs should be budget-neutral over a five-year horizon.

Source: Joumard, Mathis, Nam, and Price 2004.

The pact requires members to have medium-term budgets that are “close to balance or in surplus.” Again, the definition of fiscal balance treats government investment expenditures on a cash basis. Importantly, the ECOFIN (Economic and Financial) Council adopted a revised Code of Conduct in 2001, requiring that member states use common assumptions in their forecasts of the main variables and encouraging countries to use cyclically adjusted budget balances in their medium-term forecasts.

Recent events, however, have put the operation and effectiveness of the SGP in doubt. In 2003, the ECOFIN Council declared three members, France, Germany, and Portugal, to be in an excessive deficit position (Portugal for the second consecutive year). Because the first tests of the procedure have occurred at a time of economic slowdown, considerable debate about the appropriateness of the rules has been engendered and several major reforms to the procedures have been proposed.

In March 2005, the European Union (EU) governments agreed to a relaxation of the fiscal rules, leading some to suggest that the budget limitations are far less effective. New country-specific limits would be instituted to reflect growth and debt levels (higher debt and low growth would have less stringent targets) and be cyclically adjusted to meet the normal deficit and debt limitations. Those failing to achieve the budget fiscal targets would need to undertake fiscal actions to reduce deficits by at least 0.5 percent of GDP per year until their targets are reached. The 3 percent limit on fiscal deficits and 60 percent debt-to-GDP ratio can be breached if a country is undertaking significant structural reforms, including pension reform. Other changes, including a relaxation of the definition of a severe recession (that allows for temporarily missing the target) and the consideration of other relevant factors such as research spending, public investment, and foreign aid, are to be used only in assessing short-term compliance with the Maastricht Treaty. The EU is examining the incorporation of unfunded liabilities (such as those related to pensions and health care) in the measure of fiscal deficits.

Golden rules. A number of countries in Europe and elsewhere have adopted alternative procedures as “self-imposed fiscal rules.” These tend to differ in important ways from the rules promulgated under the SGP. Here we offer a selective survey of some alternative rules governing public investment decisions.

Since 1997, the United Kingdom’s government has been subject to two self-imposed fiscal rules:

- The golden rule: over the cycle, the government is to borrow only to finance capital and not current expenditures.
- The sustainable investment rule: over the cycle,⁷ the net-debt-to-GDP ratio is not to exceed 40 percent. Net debt is defined as gross government debt less liquid assets.

The United Kingdom has moved to accrual accounting for financial reporting. For budgetary purposes, the U.K. government focuses on two main “flow” measures of the fiscal stance: (a) adherence to the golden rule is measured by the current budget surplus, defined as the difference between tax revenues and current public spending (including depreciation); and (b) the government reports public sector net borrowing (PSNB). Both measures are accrual-based concepts: the PSNB can be contrasted with the previous use of the public sector net cash requirement (PSNCR), which was essentially the cash deficit. In particular, proceeds from privatization and other asset sales are excluded from the PSNB, but not the PSNCR.⁸ Both the current budget surplus and the PSNB are cyclically adjusted before the fiscal rules are applied.

These rules have an impact on public investment spending. The United Kingdom, for example, is well within the 60 percent gross debt limit specified in the Maastricht Treaty (its own 40 percent net debt limit is surely more binding). Net borrowing in the United Kingdom is currently about 1.8 percent of GDP, and substantially less on a cyclically adjusted basis. While an increase in investment is planned, it may be that the U.K. government’s reliance on largely off-budget public finance initiatives means that the Maastricht deficit limit is unlikely ever to be more binding than the golden rule policy.⁹ The U.K. chancellor has argued that it would not be more binding, apparently based on statements from the European Commission.

Likewise, Germany has a constitutional restriction that the budgeted deficit of the federal government cannot exceed *gross* investment spending; most *länder* face similar constitutional restraints. Evidently, this rule places less restraint on spending and borrowing compared with the Maastricht rules. On a national accounts basis, the general government deficit has often exceeded gross public investment since reunification (see Joumard, Mathis, Nam, and Price 2004).¹⁰ Norway’s approach is relevant to its recent increase in energy revenues: the structural nonoil central-government budget deficit is constrained not to exceed 4 percent of the Government Petroleum Fund over the cycle. The Norwegian approach follows a principle in which nonrecurrent royalties from nonrenewable resources would be placed in an investment fund held in perpetuity. A distribution of the fund’s income would be used to finance current public services so long as the real value of the fund’s assets is maintained.

Australia, a country that has pioneered the use of accrual accounting and capital charges in budgeting, continues to rely largely on cash measures to assess its fiscal policy stance. When accrual accounting was introduced in 1999, the Australian government introduced a new “headline” measure of fiscal balance, defined as the operating balance (the accrual accounting concept) minus net investment. Hence, while Australia (like New Zealand) reports operating-balance information, it continues to target a measure that replicates the earlier focus on the cash-balance position (Robinson 2002). The government is committed to pursue a policy of

fiscal balance over the economic cycle, and net government debt has been reduced markedly in recent years.

In 2001, the government of Chile committed itself to maintain a structural surplus equal to 1 percent of GDP. The structural balance indicator is computed on a modified accrual basis, with adjustments made to align the measure with the change in net financial assets of the central government; the fiscal balances of public enterprises, the military, and lower-level governments are excluded (Fiess 2004). This renews the government's commitment to a fiscal retrenchment program that has brought substantial reductions in the debt-to-GDP ratio since 1990 and has gone some distance toward increasing social expenditures and public investment. Recent reforms are designed to strengthen the use of accrual information in budgeting, while maintaining the strong role of central agencies, including MIDEPLAN (Ministerio de Planificación y Cooperación), in expenditure review and control (Marcel and Tokman 2002).

In Canada, the federal government has balanced its budget since 1997 and has begun to reduce its debt substantially from roughly two-thirds of GDP in 1994 to about two-fifths of GDP today. Although many provinces have balanced budget legislation, provincial debt loads have only decreased somewhat in aggregate. The largest province, Ontario, is operating with a large deficit after suspending its balanced budget rules used for several years since 1999. One province, oil-rich Alberta, has just eliminated all of its gross debt after a period of surplus budgets, strong growth in resource prices since 1998, and a program to cut expenditures in the mid-1990s (Alberta had the highest debt per capita of all provinces in 1994). Recently, the federal government has announced that it would move toward a 25 percent debt-to-GDP ratio, which will be primarily achieved by economic growth while maintaining balanced budgets.

Public infrastructure agencies. Another phenomenon has been the development of separate agencies for infrastructure spending. The use of a separate agency arguably improves management of large-scale public investment projects that need to be administered and financed with considerable specialized expertise, especially since contracting-out is quite common. However, centralization can result in a potential cost of inhibiting line department managers from choosing the best combination of capital and operating inputs to produce program services, because the capital decisions become divorced from operating ones without full coordination.¹¹

Another reason to create infrastructure agencies may be simply to avoid debt limitations associated with the SGP and similar fiscal constraints on debt, especially if these agencies are off-budget.

Within the EU, public investment in Italy appears to have been among the most affected by fiscal restraints. The 1999 Internal Stability Pact imposes deficit restraints on subnational governments. The regulated deficit is defined on a cash basis, but it excludes capital spending and interest

payments. Global cuts in public spending in the early 1990s had the greatest impact on the capital budget. As a result, Italy's share of the public sector in total fixed capital formation is now well below the Organisation for Economic Co-operation and Development (OECD) average.

Recent initiatives in Italy are designed to address the perceived shortfall in public investment, while respecting the strictures of the SGP. To this end, the government has formed an off-budget agency responsible for new infrastructure, Infrastrutture SpA (ISpA). ISpA seeks private sector partners for investment and raises capital by issuing revenue bonds, which are in turn guaranteed by the state. The government's Tremonti Plan for reforming the SGP essentially calls for infrastructure spending throughout the EU to be financed through off-budget agencies modeled on ISpA.

Public-private partnerships. In recent years, governments have embraced public-private partnerships that are expected to achieve efficiencies in the delivery of public services. Since governments rarely have the management capability of handling large-scale investment projects, the use of private sector participants in the design, operation, and management of projects is expected to reduce costs.

Significant issues are involved with public-private partnerships. Contract design requiring the appropriate share of returns and risk is critical to provide incentives to achieve objectives such as quality and accessibility to program services, and to simultaneously reduce costs. Bad contract design can result in excessive costs and poor implementation (Poschmann 2003).

However, the fiscal restraints provide another motive for these partnerships—namely, to have the private sector finance commercial capital projects rather than rely on debt that would be constrained by fiscal rules. If the motive of governments is to form public-private partnerships, not to improve the management of capital projects, but rather to escape debt limitations, governments may not properly design contracts to ensure that appropriate incentives are in place. Certainly, any contingent claims on governments (such as environmental liabilities or payments if the project does not earn sufficient profitability) should be valued and included in government debt.

Impacts on Public Investment

A number of observers have suggested that the application of fiscal constraints to the government budget on a cash basis have contributed to the decline in public investment ratios in many countries in the past two decades. The above accounting model shows that a deficit limit defined on the basis of the cash balance is more stringent than one based on the operating balance if net investment is positive. (The opposite is true when net investment is negative, which arises when public gross investment is less than capital depreciation.)

Related, but conceptually different, there is reason to believe that fiscal restraints in general tend to result in disproportionate reductions in government capital expenditures, compared with current expenditures. A number of factors have been adduced to explain this:

- *Short-run adjustment factors.* Many critics of the SGP in particular have suggested that, when governments undertake fiscal adjustment programs in the face of adverse shocks, cuts in spending tend to fall disproportionately on investment rather than current expenditures. While it may be possible for governments to defer some capital projects without much cost during economic downturns, interrupting ongoing projects may raise their completion cost substantially.
- *Transitional factors.* These issues are likely of greater concern, however, in emerging economies, where the public capital-to-GDP ratio is considered to be below desirable levels. In such cases, high levels of lumpy net investment may be called for in the medium term, and borrowing may therefore be appropriate.
- *Long-run factors.* The above model suggests that, in a growing economy, positive net investment is required if the economy is to maintain a constant public capital-to-GDP ratio, which is likely appropriate. In such cases, both considerations of tax smoothing and intergenerational equity suggest that application of a golden rule may be more appropriate.

Evidence on the actual effect of fiscal rules on public investment is mixed. Over short-run horizons, there is considerable evidence that fiscal adjustments result in a decline in public investment. Roubini and Sachs (1989) observe that public investment typically responds sharply to restrictive fiscal policies in OECD countries—and much more than current expenditure. Similarly, the *World Development Report* of 1988 reported that cuts in public investment were, on average, three times greater than cuts in current expenditures during fiscal adjustment exercises during the 1980s. Lane (2002) finds that government investment is the most cyclical component of government spending.

Likewise, fiscal adjustments have had discernable negative impacts on public investment in Latin American countries. Calderón, Easterly, and Servén (2003) argue that about half of the fiscal adjustment in Latin America and the Caribbean during the 1990s was achieved through cuts to infrastructure investment.

Galí and Perotti (2003) offer a detailed examination of the effects of the SGP on investment in the Euro Area. They find that government investment as a share of potential GDP fell in the Euro Area by 0.47 percentage points on average following implementation of the Maastricht Treaty. But investment also fell by comparable amounts in a comparison group of other EU and OECD countries. Thus, while there is a clear downward trend in

public investment in industrial countries, it is not unique to the SGP. They further argue that the downward trend substantially predates the Maastricht Treaty: the investment decline from 1978 to 1992 was of a similar magnitude to that of the later period in both the Euro Area countries and the OECD comparison group.

As argued above, fiscal rules often have stronger cyclical effects compared with trend effects on public investment. Galí and Perotti (2003) argue, however, that while public investment expenditures are procyclical in the Euro Area, there is no evidence that cyclical behavior has changed since implementation of the Maastricht rules.

Additionally, trends in public investment in Europe and elsewhere may reflect accounting and institutional changes, in addition to fundamental changes in policy. In particular, changes in the treatment of public utilities, the effects of privatization, and the development of public-private partnerships for infrastructure may be reflected in the public accounts. For the United Kingdom, Balassone and Franco (2000) suggest that up to one-third of the decline in public investment may be attributed to changes in project financing regimes.

V. Recent Proposals for Reform

As outlined in section II, two approaches have been suggested to provide greater incentives for public investment in the presence of fiscal rules related to debt constraints: the golden rule and the permanent-balance rule.

The *golden rule* (Blanchard and Giavazzi 2007) would exclude net public investment (managed by an agency) from the fiscal deficit target and place it in a separate category as expenses to be financed by debt. The fiscal budget would be balanced for operational purposes. The golden rule in the long run would imply that public debt is fully backed by capital, which would certainly be the case when capital has worth equal to the present value of taxes and other revenues generated by projects and revaluations to reflect their disposal value. If capital provides only social benefits (not commercial benefits), it would not be included in the capital account. Instead, it would be subject to deficit and debt aggregate limitations because of the lack of valuation.

The rule would imply that if public net investment and debt optimally grows with the economy, debt will be constant to GDP. As mentioned above, capital expenditures need not optimally grow with the economy if there are economies to the use of capital. In practice, however, there is no reason to believe this would be the case if services are increasingly turned over to the private sector to operate (in other words, the public-private-capital-to-GDP ratio might be constant depending on how capital investments are organized).

The golden rule for public investments—budget balance for operational accounts, including depreciation and interest expense, and debt finance for public investment—potentially imposes several distortions in public decision making. Specifically, they include the following points of criticism:

- *Remaining distortions in the choice of capital projects:* Under the golden rule, debt finance could be used for capital expenditures that can be commercially valued so that asset disposals can sustain debt levels. Those investments that cannot be valued would be subject to the balance-budget constraint. Compared with the cash-balance rule that discriminates against public investment spending, several distortions in public decision making remain, in some cases potentially leading to too much public investment expenditure.
- The sustainable debt view for deficit financing would limit capital budgeting to assets sold in markets (buildings and perhaps roads and bridges that can be tolled and privately run) or operated as a public-private partnership. When debt finance is limited to commercial capital assets, other types of public capital expenditures would be included in the operational budget. If fiscal constraints such as balanced budgets apply to only the operational budget, then public sector investment decisions are distorted to the extent that only commercial activities are left off the operational budget and can be debt financed.
- If capital expenditures are taken off the budget (school buildings) but other inputs used in production are subject to fiscal limits (teacher salaries), production techniques could be distorted in favor of capital intensity (teaching by computer rather than by people).
- Capital expenditures that have unknown depreciation rates are typically expensed (such as employee training and perhaps research and development in the private sector unless a patent is provided). If public intangible expenditures such as employee training are expensed and subject to the fiscal limitation, then investments in other assets such as tangible capital (like military equipment) are more favored, if financing is not subject to fiscal rules for the operational budget.

Yet, debt-financed capital expenditures that would be subject to fiscal constraints may be important for intergenerational equity and tax-smoothing objectives as discussed above. Clearly, a trade-off arises from the need to ensure the financing of public investments with the desire to limit the bad government behavior that might result in excessive spending and debt. The type of fiscal rule used becomes important in this context.

- *Moral hazard problems:* Governments facing limitations on debt financing for operational accounts would hope to shift expenditures

to capital accounts with no limitation on debt finance. This raises moral hazard problems. Seeing that it would be easier to take on public investments that escape the fiscal rules, some governments will favor such expenditures over other program expenditures. With debt-financed capital expenditures, governments can shift the cost of financing public investments to future generations that would have to pay additional taxes. Although future generations benefit from such expenditures, it is also the case that they do not have the opportunity to express support for capital decisions made in earlier years. Thus, there is an incentive for governments to take on public investments that are not subject to fiscal limits to shift tax burdens to the future. Furthermore, a concern is raised that a liberal definition of "capital" would result in excessive debt levels taken on by bad governments to finance investments that may not truly be capital, but labeled such, so the application of fiscal rules is relaxed.

- *Valuation distortions*: Even if public capital can be measured using typical valuation techniques used in the private sector, the valuation may still be distorted. First, governments might try to book some assets that are unlikely to be collected, such as unpaid taxes. Second, the use of historic prices (such as equipment, land, and buildings) would imply that depreciation of capital goods is underestimated. With debt finance limited to the estimated value of capital, historic valuations would put some additional constraint on investments, especially in countries with high rates of inflation. Finally, in principle, contingencies such as those related to public-private partnerships would be valued as debt (as in the case of financial derivatives such as swaps and options¹²) and would be hard to estimate, leading to incorrect valuation of a government's asset and liability position.

Given these difficulties, it is not surprising that some other potential fiscal rules should be considered to provide an opportunity to limit bad government behavior but provide better incentive for public investment decision making.

The second alternative is the *permanent-balance rule* (Buiter and Grafe 2003) which would allow public investment to be debt financed so long as government solvency is respected. In particular, any expenditure financed in the current period with debt would need to be offset by surpluses generated in later years. Under the permanent-balance rule, the tax-to-GDP ratio on a cyclically adjusted basis would be held constant over time. Taxes would need to increase over time to hold debt-to-GDP ratios constant. No specific capital account is needed.

The advantage of the permanent-balance rule over the golden rule is that it could be less distorting with respect to different types of public sector decisions, because any type of capital investment could in principle qualify

for the approach. The adjustment on a cyclical average has worked well so far in the United Kingdom. However, the moral hazard and valuation issues could remain in predicting future surpluses and, to the extent that care is not taken to address them, could be more problematic under the permanent-balance rule than under the golden rule. Unlike the golden rule, the permanent-balance rule would put little sanction on a government that does not back up debt finance with capital. If the expected fiscal surpluses from public investments are not generated, resulting in large future fiscal deficits, future governments, those not responsible for the poor decisions of the previous governments, will look to relax the rule to avoid its application (this would be a problem of time inconsistency).

VI. An Alternative Approach to Fiscal Rules

The effect of fiscal rules that limit debt finance is meant to curtail the bad behavior of governments that push costs to future generations who have little option but to pay them (or renounce some or all of the debt owed to foreign lenders, as in the case of Argentina in recent years). However, the effect of such rules is to reduce the role of debt finance to redistribute tax burdens across generations and to smooth tax burdens. Clearly, trade-offs are encountered in determining a fiscal rule that provides incentives for public investment while it discourages excessive debt finance by bad governments. Any rule must balance these considerations.

Our proposal is to incorporate two covenants on debt-financed public investments that would otherwise apply to the golden rule. Similar to the golden rule, commercial or self-liquidating assets could be placed in a capital account but, unlike the normal golden rule, only a portion of them would be debt financed. Other capital assets would remain expensed and would be included in operational accounts, but an overall debt limitation (to GDP) would then apply to restrict debt financing of other forms of capital.

Based on sustainability and tax-smoothing considerations, a strong case can be made for debt financing of capital projects that generate commercial or self-liquidating assets, or that generate revenues from user fees or other taxes that ultimately will recoup initial outlays. While capital budgeting is therefore appropriate for such self-liquidating assets, other types of public capital expenditures should be included in the operational budget.

By implication, this does not mean that commercial capital investments should be financed fully by debt. On the contrary, some portion of capital expenditures should remain tax financed for financial reasons. With economic uncertainty, asset values change according to circumstances. Typically, lenders are willing to provide debt financing for only a portion of investment costs to ensure that their principal and interest will be repaid over time. This suggests that a limitation may be imposed on the portion of commercial

capital assets that can be debt financed—such as those rules of thumb for financing and liquidity ratios that reflect risk considerations.

The advantage of a limitation for the debt-asset ratio is to reduce distortions inherent with a golden rule that allows only commercial or self-liquidating investments to be backed by debt finance. By requiring some capital expenditures to be tax financed, the government has a choice of placing the capital expenditure into the general basket (subject to a maximum debt-to-GDP ratio) or into a special capital account that allows for debt finance up to a margin of asset values. Compared with the golden rule, the modified approach would reduce some of the incentives discussed above to invest in public capital that could be fully debt financed.

If fiscal constraints such as balanced budgets apply to only the operational budget, then public sector investment decisions are distorted to the extent that only self-liquidating or commercial activities are left off the operational budget and can be debt financed. Such an outcome may be undesirable in light of the intergenerational equity and tax-smoothing objectives discussed above, although less pressing than for self-liquidating assets. Clearly, a trade-off arises from the need to ensure the appropriate financing of public investments with the desire to limit “bad” government behavior that might result in excessive spending and debt. The type of fiscal rule used becomes important in this context.

In practice, the debt-to-GDP limitation would be conditioned on what is included in capital accounts. The more those investments are placed in the capital account, the stricter the overall limitation. For example, government ownership of natural resources (oil and gas deposits, for example) could be included in the capital account, therefore requiring the overall debt-to-GDP limitation to be similar to that in those countries without natural resources.

Several other implementation issues would need to be considered, such as the procedure used to determine when assets are eligible for inclusion on the capital account and at what level they can be debt financed (typically businesses are only 40 percent financed by debt). These technical issues should be resolved using an objective approach for capital budgeting, such as relying on independent valuations made by accountancy firms in some countries.

VII. Conclusion

Fiscal rules are commonly followed to limit deficit financing. While such rules are intended to protect future taxpayers from governments carrying favor with existing populations, the effect of such rules is to reduce the incentive for public investment, since such expenditures tend to provide benefits in the future. To correct the bias against public expenditures, governments have looked to create capital budgets that would require capital expenditures to be depreciated rather than expensed.

For governments looking to avoid binding fiscal rules on debt financing, the capital budget provides an opportunity to take new capital expenditures off the books and therefore increase debt financing. This is especially problematic, given that many assets in the public sector are not easily amenable to commercial valuation. Therefore, recent proposals to allow governments to borrow against their net worth under a golden rule are prone to abuse, if some governments take advantage of a liberal definition of net worth to rely excessively on debt-financed capital. Conversely, a too-restrictive ambit for the capital account, while limiting government borrowing, could lead to undesirable distortions in governments' choice of capital projects and organizational forms.

We propose a modified golden rule to balance the incentives for efficient public capital spending with the limitations on the bad behavior of governments. We suggest that two limitations could be employed. First, those commercial capital assets placed in the capital account would be subject to financial covenants that imply that the capital would be only partly debt financed, according to appropriate financial criteria. Second, an overall debt-to-GDP limitation would be placed on other debt; when the limit is reached, tax financing of those residual public capital expenditures would be required.

Notes

1. For simplicity, we consider only rules requiring zero deficit on a cash or operating basis. The extension to nonzero balance rules is straightforward.

2. The user cost for public capital is adjusted for the financial return that is subtracted from the cost of financing to derive a net cost to the government (the financial return does include capital gains that typically would be included in a user cost of capital estimate).

3. To focus on debt and public capital, we ignore for the time being changes in government nondebt liabilities and government financial assets.

4. It is also a too-narrow view of corporate finance.

5. In this respect, the tendency of some governments to adopt the capital budgeting principle only for *new* investments provides incentives to escape fiscal rules imposed on operational budgets, since old capital is not depreciated at time of transition. Under this approach, a government only charges to the current budget depreciation on new capital purchases, which is far smaller than the actual capital outlay that must be financed. For example, the government of Saskatchewan in Canada introduced capital budgets to shift investment expenditures off-budget. The government could then borrow against the investments and only depreciation of current capital expenditures would be charged to the operational accounts, which would be subject to a balanced budget fiscal rule (see Boothe 2004).

6. A different but related view is that the potential for corruption is greater in public investment projects than for current spending (see Tanzi and Davoodi 2002). If so, then bad governments may prefer investment to operational spending, and the case for debt-financed investment is weaker.

7. In practice, this means that the current balance (that is, before deducting net investment) is constrained to be nonnegative either on average over an estimated full

economic cycle, or at each point in time in cyclically adjusted terms, using government estimates of output gap and of the output elasticity of government revenues and expenditures.

8. More precisely, the two measures are similar in the coverage of the whole public sector of both current and capital spending, but PSNB differs from PSNCR in the following ways: (a) its adoption of internationally accepted national accounting standards (the System of National Accounts of 1993 and the European System of Accounts of 1995); (b) its measurement of revenues and expenditures on an accrual rather than cash basis; and (c) its exclusion of transactions in financial (though not physical) assets, such as sales of shares in public corporations. In particular, the last point means that, under the PSNB, the sale of equity securities is treated in the same way as the sale of government debt securities for the purposes of computing fiscal balance.

9. However, Robinson (2001) notes that net investment through public finance initiatives has been a relatively small fraction of total net public investment in the United Kingdom, so that the controversy over accounting treatment of such projects is of little importance for the operation of the fiscal rules. It seems likely that the government's stated commitment to these initiatives reflects a belief in their efficacy as a means to deliver public services, rather than as a device to evade fiscal rules.

10. The basic law permits deficits in times under extraordinary circumstances. On several occasions, the Constitutional Court has permitted borrowing in excess of investment to preserve the stabilization function of fiscal policy.

11. The province of Ontario in Canada created two agencies to manage assets (the agency Superbuild, which is now the Ministry of Public Infrastructure and Renewal—nicknamed EMPIRE) and debt (Ontario Financing Authority, OFA). All capital projects are approved centrally rather than by departments under EMPIRE. OFA is responsible to manage debt to achieve the lowest cost of funds for the Ontario government as well as to provide advice on public-private partnerships and some other specific financing policies of the government. The capital budget is generally consolidated with the overall Ontario budget, except for significant debt that was related to investments in the government-owned power companies. Recently, however, such debt, which is managed by OFA, is now consolidated with the provincial budget. The province is consolidating other investments and debt with the Ontario budget, including hospitals and schools.

12. Financial derivatives are treated on a mark-to-market basis resulting in some potentially large swings in valuations that would affect the size of fiscal deficits.

References

- Alt, James, and David Dreyer Lassen. 2003. "Fiscal Transparency, Political Parties, and Debt in OECD Countries." Unpublished paper, Harvard University, Cambridge, MA.
- Atkinson, A. B., and J. Stiglitz. 1980. *Lectures in Public Economics*. New York: McGraw-Hill.
- Balassone, Fabrizio, and Daniele Franco. 2000. "Public Investment, the Stability Pact, and the 'Golden Rule'." *Fiscal Studies* 21 (June 2000): 207–29.
- Blanchard, Olivier J., and Francesco Giavazzi. 2007. "Improving the Stability and Growth Pact Through a Proper Accounting of Public Investment." Chapter 8 in this volume.
- Blöndal, J. R. 2003. "Accrual Accounting and Budgeting: Key Issues and Recent Developments." *OECD Journal on Budgeting* 3 (1): 43–59.

- Boadway, Robin W. 1993. "Wrap-up." In *Capital Budgeting in the Public Sector*, eds. J. M. Mintz and R. S. Preston, 115–26. Kingston, Canada: John Deutsch Institute.
- Boothe, P. 1993. "Capital Budgeting in the Public Sector: Lessons from Alberta's History." In *Capital Budgeting in the Public Sector*, eds. J. M. Mintz and R. S. Preston, 98–111. Kingston, Canada: John Deutsch Institute.
- . 2004. "Accounting Regimes and Fiscal Rules." Unpublished paper, University of Alberta, Edmonton, Canada.
- Buiter, W., and C. Grafe. 2003. "Patching up the Pact: Some Suggestions for Enhancing Fiscal Sustainability and Macroeconomic Stability in an Enlarged Union." In *Monetary and Fiscal Policies in EMU*, ed. M. Buti, 92–156. Cambridge: Cambridge University Press.
- Calderón, César, William Easterly, and Luis Servén. 2003. "Latin America's Infrastructure in the Era of Macroeconomic Crises." In *The Limits of Stabilization—Infrastructure, Public Deficits, and Growth in Latin America*, eds. W. Easterly and L. Servén, 21–94. Palo Alto: Stanford University Press.
- Eichengreen, Barry. 2004. "Institutions for Fiscal Stability." *CESifo Economic Studies* 50 (2004): 1–25.
- Fiess, Norbert. 2004. "Chile's Fiscal Rule." In *Fiscal Sustainability in Theory and Practice. A Handbook*, ed. C. Burnside, 175–204. Washington, DC: World Bank.
- Gali, Jordi, and Roberto Perotti. 2003. "Fiscal Policy and Monetary Integration in Europe." *Economic Policy* 18 (October): 533–72.
- Joumard, I., P. Mathis, Y. Nam, and R. Price. 2004. "Enhancing the Effectiveness of Public Investment: Experience in OECD Countries." Economics Department Working Paper No. 380. Organisation for Economic Co-operation and Development, Paris.
- Kelly, J. J. 1993. "Accounting for Capital Expenditures and Assets." In *Capital Budgeting in the Public Sector*, eds. J. M. Mintz and R. S. Preston, 63–73. Kingston, Canada: John Deutsch Institute.
- Lane, P. 2002. "The Cyclical Behaviour of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87 (12): 2661–675.
- Marcel, Mario, and Marcelo Tokman. 2002. "Building a Consensus for Fiscal Reform: The Chilean Case." *OECD Journal on Budgeting* 2: 35–56.
- Milesi-Ferretti, Gian Maria. 2003. "Good, Bad or Ugly? On the Effects of Fiscal Rules with Creative Accounting." *Journal of Public Economics* 88: 377–94.
- Musgrave, Richard A. 1939. "The Nature of Budgetary Balance and the Case for the Capital Budget." *American Economic Review* 29 (2): 260–71.
- . 1963. "Should We Have a Capital Budget?" *Review of Economics and Statistics* 45 (2): 134–37.
- Pigou, A. C. 1928. *A Study in Public Finance*. London: Macmillan.
- Poschmann, F. 2003. "Private Means to Public Ends: The Future of Public-Private Partnerships." *C.D. Howe Institute Commentary*, No. 183, C. D. Howe Institute, Toronto, Canada.
- Robinson, Marc. 2002. "Accrual Accounting and Australian Fiscal Policy." *Fiscal Studies* 23: 287–300.
- Robinson, Peter. 2001. "PFI and the Public Finances." In *The Private Finance Initiative: Saviour, Villain or Irrelevance*, eds. P. Robinson, J. Hawksworth, J. Broadbent, R. Laughlin, and C. Haslam, 5–13. Commission on Public Private Partnerships. London, Institute for Public Policy Research.

- Roubini, Nouriel, and Jeffrey Sachs. 1989. "Government Spending and Budget Deficits in the Industrial Countries." *Economic Policy* 4 (April): 99–132.
- Tanzi, Vito, and Hamid R. Davoodi. 2002. "Corruption, Public Investment, and Growth." In *Governance, Corruption, & Economic Performance*, eds. G. Abed and S. Gupta, 280–99. Washington, DC: International Monetary Fund.
- Von Hagen, J., and I. Harden. 1995. "Budget Processes and Commitment to Fiscal Discipline." *European Economic Review* 39 (3–4): 771–79.
- World Bank. 1998. *World Development Report 1998*. Washington, DC: World Bank.

Improving the Stability and Growth Pact Through Proper Accounting of Public Investment

Olivier Blanchard and Francesco Giavazzi

I. The Pact: Flaws and Reform Options

The Stability and Growth Pact (SGP) is increasingly held responsible for the inability of the European economy to sustain demand and maintain growth—a concern that extends beyond Europe now that the United States is no longer able to provide growth for the world economy. The current slowdown in economic activity is widening budget deficits throughout the European Union (EU): Portugal exceeded the 3 percent limit in 2001; Germany exceeded this limit in 2002 and remained above the ceiling in 2003; the situation in France is similar to that of Germany—a deficit in excess of 3 percent of gross domestic product (GDP) in both years; and Italy, too, came close to the upper limit. The “excessive deficit” procedure—the process initiated by the European Commission and that may result in sanctions if countries are unwilling or unable to reduce the deficit promptly—has been opened for Portugal and Germany. Dealing with a country’s inability to reduce the deficit during a recession by simply applying sanctions defies intelligence.

* The authors thank Franco Modigliani for an inspiring discussion, and Stanley Fischer, Charles Wyplosz, Marco Buti, Ludger Schuknecht, and participants at seminars on the Stability and Growth Pact organized by the Bundesbank and DIW-Berlin for useful comments. A draft of this chapter appeared as Centre for Economic Policy Research Discussion Paper No. 4220 in February 2004. The text has not been updated to reflect developments since that date.

There is no doubt that if the Stability and Growth Pact could be rewritten it would look quite different. Of the various reasons why a monetary union may wish to impose fiscal rules upon its members, the Pact deals with but one: the possibility that governments might be tempted to run larger budget deficits once the exchange rate and interest rates no longer respond to the fiscal actions of a single country. But there are important issues the Pact does not address. In particular, the Pact puts no pressure on Economic and Monetary Union (EMU) members to reduce current government spending to lower tax rates and make room for higher public investment. The Pact is indifferent as to whether a country meets its requirements by raising spending and taxes, or by lowering both.¹

By requiring that the budget deficit, including interest, be balanced on average over the cycle, the Pact eventually drives the ratio of debt-to-GDP to zero. There are good arguments for preventing the public debt from disappearing: for instance, public debt can be an instrument for carrying out transfers between generations, or it may be issued to finance public investment projects with a large enough social rate of return. A deficit of x percent on average over the cycle would drive the debt-to-GDP ratio to x/g , where g is the nominal growth rate of potential output. So for $g = 5$ percent (3 percent real growth and 2 percent inflation) and $x = 3$ percent, the debt-to-GDP ratio would converge to three-fifths, the level indicated in the treaty (60 percent).

Proposals on how an “ideal” Pact should be written abound.² The International Monetary Fund (IMF 2001) favors fiscal rules designed to control current government spending. Pisani-Ferry (2002) suggests that rules on the budget should be replaced by rules on the level of the debt-to-GDP ratio. Wyplosz (2002) suggests that rules should be removed and authority over fiscal policy delegated to independent committees, following what has become standard practice with monetary policy. Goodhart (2002) would allow bond markets to monitor fiscal policy. Today, spreads on euro bonds issued by different EMU members are small, probably because government bonds are mostly held domestically, and the home bias in financial portfolios is significant. Goodhart would induce the diversification of bond portfolios and impose limits on the exposure of financial institutions to the bonds issued by a single country. Most likely this would open up spreads.

Writing a new Pact is, however, difficult. Many of these ideas would require a change in the European treaties and ratification of a new treaty by the member countries. Although possible in principle, a new Pact and a new treaty require time. But some improvements do not require changing the treaty.

For example the European Commission proposes that the Pact should no longer consider the actual budget deficit, but rather the structural deficit—increases in the deficit that result from a slowdown in economic activity should be disregarded. Moreover, in assessing a country’s compliance with the rules of the Pact, the Commission would, from now on, recognize that

some structural reforms (such as a tax reform) raise a country's growth potential and thus improve public finances in the long run, but these reforms are costly in the medium term and thus justify temporary deviations from the rules of the Pact. None of this, according to the Commission, would require a change in the treaty.

We can do better. The Pact contains a serious error—that is, the way governments are expected to account for public investment. Correcting this error and applying, as article 104.3 of the treaty allows, the current rules of the Pact to a measure of the budget for which the treatment of investment expenditures is done properly—which means applying the rules of the Pact to the budget inclusive of nominal interest payments and capital depreciation but exclusive of net investment—would have several desirable characteristics:

- *It would remedy an obvious mistake in the way the Pact was written.* A private company does not attribute the entire cost of an investment project to a single year's accounts. Investment implies future returns: its cost should thus be distributed over time as those returns accrue. Amortization of investment expenditures by governments is not allowed by the Pact, although the treaty does not prevent it. Removing financial constraints on public investment is important in the EU. First, gross public investment in the 12 EMU countries has been on a downward path since the mid-1970s, falling, as a share of GDP, from 4 percent in the early 1970s to less than 2.5 percent in 1998. In particular, public investment fell by 0.8 percentage points during the run-up to the euro (1993–97). Today, average gross investment is 2.4 percent of GDP, but net investment is probably close to zero in Germany, Italy, Belgium, and Austria.
- *Over time, the debt-to-GDP ratio would tend to become equal to the ratio of public capital to GDP.* Although there are different arguments for why the optimal stock of public debt may not be zero (intergenerational transfers is one), financing investment projects with a sufficiently high social rate of return is certainly one.
- *It would introduce more transparency in the budget.* The inability to treat public investment differently from current expenditure has created, in some countries, the incentive to shift borrowing off-budget. Italy, for instance, has recently set up an agency fully owned by the government but not consolidated in the government accounts, whose purpose is to finance and run public investment projects, borrowing on the market. There is nothing wrong with investment agencies as such: the separation of the “current” budget from the “capital” budget has a time-honored tradition in public finance. What is inappropriate is the lack of transparency. The accounts of these agencies, for instance, make no distinction between gross and net investment, and thus they fail to recognize that depreciation of public capital is equivalent to

current expenditure and should be treated as such in the consolidated government accounts. The agencies have no clear limits on the amount they can borrow. The bonds they issue are guaranteed by the government, but such guarantees are not recorded in the government books. Thus, the debt they issue is not considered as part of the public debt. The European Commission has questioned these guarantees, arguing that they are equivalent to state aid. There certainly are instances—and the recent capital injection by the KfW Bankengruppe into a German private communications company is one example—in which these agencies engage in state aid. But this is not the case in general: subsidizing public projects whose social return exceeds their financial return is one of the reasons governments exist.

- *Excluding net public investment from the definition of the budget that is relevant for the Pact would also help in the short run.* Consider Germany, for instance, one of the countries where a change in the rules would apparently not matter, because net public investment today is essentially zero. With the current interpretation of the Pact, and assuming that German output is below potential by an amount large enough to justify the entire use of the 3 percent band—which is probably the case—Germany would need to cut the deficit by at least 0.8 percent of GDP. The modified rule also requires fiscal action, but of a very different type: instead of a cut in demand, it allows for a substitution of current expenditure with an equivalent amount of public investment.

II. The Arithmetic of Public Investment

Let r be the real rate of interest, n the growth rate of GDP, δ the rate of depreciation and the cost of maintaining public capital, and ϑ the gross financial rate of return on public capital. In general, $\vartheta < r + \delta$. Public investment is worthwhile from a social point of view, although its net financial rate of return, $\vartheta - \delta$, may be lower than the financing cost, which we expect to be smaller than the social rate of return on government projects. Let k be the stock of public capital, i public investment, so $i = \dot{k} + (n + \delta)k$, and b the stock of public debt, each as a fraction of GDP. Also assume that there is no inflation.

The government's budget constraint is as follows:³

$$\dot{b} = g - t + i - \vartheta k + (r - n)b \quad (1)$$

where t and $(g+i)$ denote taxes and government spending.

Let's assume that the SGP, as currently applied, requires countries to run a zero budget deficit when output is close to potential (it is straightforward

to extend our argument to the case in which the SGP is taken to allow a deficit of x percent of GDP):

$$g - t + i - \vartheta k + rb = 0 \quad (2)$$

so that

$$\dot{b} = -nb$$

the debt ratio will eventually go to zero.

Suppose now, as is usual for firms, that only capital depreciation and maintenance costs are included in current spending, and impose the rule that current spending be balanced. This leads to the following:

$$g - t + (\delta - \vartheta)k + rb = 0 \quad (3)$$

so that

$$\dot{b} - \dot{k} = -n(b-k)$$

which indicates that eventually $b-k = 0$, no matter what the initial level of b . Eventually the entire stock of public debt is backed by public capital. If the stock of public capital, as a fraction of GDP, is constant, this rule allows the government to run a deficit that is equal to nk .

Suppose an agency is set up, with the goal of financing and running new public investment projects. Let k^A be the amount of capital it manages at any point in time. The agency receives an income ϑk^A from its projects and needs to spend δk^A on maintenance and depreciation. It receives from the budget a subsidy equal to $(r+\delta-\vartheta)k^A$, reflecting the fact that the projects have a net financial return that may be less than the market return. It is allowed to issue bonds for the difference. Then:

$$\dot{b}^A = \dot{k}^A + (\delta - \vartheta)k^A - (r + \delta - \vartheta)k^A + rb^A \quad (4)$$

so

$$\dot{b}^A - \dot{k}^A = -r(b^A - k^A)$$

If k^A is initially equal to zero, the agency's debt will always remain equal to the stock of public capital it has financed.

How does the presence of an agency affect the budget of the central government? Assume that the agency only runs new projects: the stock of public capital that exists when the new institution is set up, k_0 , continues to be run by the central government. There is no need to transfer existing buildings and so on to the agency. Let b^P be the stock of public debt

outstanding, as a fraction of GDP. Once the agency is set up, the central government's budget constraint is as follows:

$$\dot{b}^P = g - t + (r - \vartheta + \delta)k^A + (\delta - \vartheta)k_0 + (r - n)b^P \quad (5)$$

where g is government spending net of the transfer to the agency. Now impose the rule that current spending, inclusive of the transfer to the agency, be balanced,⁴ that is:

$$g - t + (r - \vartheta + \delta)k^A + (\delta - \vartheta)k_0 + rb^P = 0 \quad (6)$$

then

$$\dot{b}^P = -nb^P$$

the central government debt ratio eventually goes to zero, and the only public debt is that issued by the agency. When this happens, taxes pay for current spending, plus the subsidy given to the projects run by the agency, plus the depreciation and maintenance cost of the old capital stock, net of its financial return:

$$t = g + (r - \vartheta + \delta)k^A + (\delta - \vartheta)k_0 \quad (7)$$

To summarize, the main difference between these rules and the way the SGP is currently applied lies in the financing of public investment. The rules we have discussed allow net investment to be financed by borrowing. The current SGP implies that all additions to the capital stock, including those needed to keep its ratio to GDP constant over time, must be financed out of current taxes.

III. Should Balanced Budget Rules Exclude Net Investment?

Governments could in principle avoid financial constraints on public investment by renting the capital goods rather than investing in these goods themselves. Leasing an airplane to be used by the military is straightforward, especially if the government needs it for a temporary purpose. Leasing other military equipment is more tricky. In the case of infrastructure, such as roads, government investment can be replaced by private investment through contracts that give the private sector the right to collect tolls for a number of years. The problem with these contracts, however, is that they are often difficult to monitor and enforce.⁵ This adds to the case for investment agencies: an institution focused on the task of running public capital might be better equipped at writing and monitoring such contracts. We return to this point in the next paragraph.

The idea of separating capital spending from the current budget runs up against three common objections (see, for example, Buti, Eijffinger, and Franco 2002).

- What matters is overall capital accumulation, not its distribution between private and public capital. Lower public capital will be compensated by a higher stock of private capital. What matters is the general equilibrium effect: there are no grounds for giving privileged status to a specific spending item. The simple answer here is that all public investment projects with a sufficiently high social rate of return should be implemented. This is what the modified rule allows, because it eliminates cash constraints. So should all private investment, with a sufficiently high private rate of return.
- Capital budgets distort expenditure in favor of physical assets and away, for instance, from investment in human capital. It is true that capital budgeting removes constraints differentially across projects. Only those under the agency benefit, the others do not. This is not crowding out these other projects, but it does provide help to some. Capital budgets do not provide a way to avoid difficult decisions concerning the choice among alternative forms of current expenditure: the choice to invest in school teachers or in office clerks exists regardless of whether the government runs a capital budget. Under the current Pact, the choice is even more difficult, because it treats investment like current expenditures. Capital budgets cannot protect investment in school teachers, but they make it a bit less likely that useful infrastructure investment is sacrificed to raise wages in the public sector—not an uncommon experience in the European fiscal consolidation of the 1990s.
- Capital budgets remove the pressure to lower the stock of public debt, a problem that is particularly relevant in those countries where debt-to-GDP ratios remain high. The answer here is that a rule that forces the stock of public debt to zero and introduces a financing constraint on investment expenditure is simply stupid—to repeat the expression correctly used by the president of the European Commission. The modified rule also puts downward pressure on the stock of debt, but it does not drive it to zero. Eventually the debt ratio approaches the stock of public capital—typically a smaller number than the current debt ratios in most countries.

Rules that allow net public investment to be financed by borrowing need to be complemented by rules that define what can be counted as public investment—something like International Standards on Auditing accounting rules. This is a task for the statistical office of the EU. Such rules will have to deal with the incentive to redefine current spending as public investment, and this may not be easy. But this difficulty should not

be an argument for justifying rules that may result in worthwhile projects being ignored because of cash constraints.

IV. Do Governments Need to Set Up an Investment Agency?

The logical answer is no. The consolidated budget constraint of the government is the same regardless of whether it delegates an agency to finance and run new public projects. Both rules discussed above result in a stock of public debt that is, on average, equal to that of public capital. The similarity, however, ends there.

Delegating the running of public projects to an agency may result in more transparency and in better management.

- *Transparency.* In consolidated budgets, it is often difficult to figure out the return on individual projects. Maintenance costs and depreciation are also hidden in the government books. The agency will have to document the financial return on its projects, and this by itself introduces transparency. Depreciation rates and the cost of maintenance will be revealed because they will be the object of tough bargaining between the government and the manager of the agency.
- *Management.* The agency is an institution focused on a single, well-specified task. This may result in better management.

There are also risks. The manager of the agency could be relaxed about knowing that the government will come to the rescue. As with all contracts between a principal and an agent, institutional design and monitoring are essential to avoid potential misbehavior.

On balance, in situations in which agencies do not exist, it is not worthwhile to set them up—although, as mentioned above, the United Kingdom's experience might suggest otherwise. Where agencies do exist, they need to be made transparent. Good institutional design could result in delegation to an agency delivering more transparency and thus better management.⁶ We address the incentive issue in section VIII.

V. Trying Some Numbers

How would the modified rule discussed above affect budget deficits in Europe today? And what would be the effect in the steady state? In the steady state, the government is allowed to borrow an amount equal to nk . In the short run, countries may be moving at different speeds toward their steady state: public investment as a share of GDP differs a lot across the EU. Computing these numbers requires estimates of the current

capital-output ratio in the public sector, estimates of the rate of depreciation, and estimates of the long-run capital output ratio in the public sector. None of this is available.

Official numbers on public investment refer to gross fixed capital formation. No EU data are available on capital depreciation that would allow us to compute net investment. Information on rates of depreciation is available for few countries. For Germany, Wendorff (2001) estimates that in 1991–99, a decade during which average gross investment amounted to 2.3 percent of GDP, net investment averaged 0.5 percent. Assuming a value of $\delta = 0.05$ percent, depreciation is around 1.8 percent of GDP, which implies a capital-output ratio of 36 percent. For Italy, Modigliani and Padoa Schioppa Kistoris (1998, table 2.2.B) estimate that net investment in the early 1990s amounted to 1.5 percent of GDP, half of gross investment. Based on the information for Germany and Italy, we assume $\delta = 0.05$ and $k = 30$ for all countries.

The first column of table 8.1 shows the actual deficit estimated for 2002. Column 2 shows public investment, as a share of GDP, also in 2002. Column 3 computes the deficit that would have been allowed in 2002 under the modified rule, that is $i - \delta k$, assuming $\delta k = 1.5$.⁷ The last column shows the deficit that would be allowed in steady state, assuming that the long-run value of k remains 30 percent. For the steady-state growth rate of output, n^* , we use the numbers shown in column 4, which are estimates of potential output growth produced by the European Commission (European Commission 2002, table A1).

Table 8.1 Admissible Deficit Under the Modified Stability and Growth Pact Rule

	\dot{B}/Y_{2002}	i_{2002}	$\dot{B}/Y_{Admiss.} = i - \delta k$	n^*	$(\dot{B}/Y)_{St. St.}^* = n^* k^*$
Belgium	0.1	1.6	0.1	021	0.6
Germany	3.8	1.6	0.1	016	0.5
Greece	1.3	3.7	2.2	031	0.9
France	2.7	3.4	1.9	026	0.8
Ireland	1.0	4.5	3.0	074	2.2
Italy	2.4	2.0	0.5	023	0.7
Holland	0.8	3.4	1.9	029	0.9
Austria	1.8	1.2	-0.3	018	0.5
Portugal	3.4	3.8	2.3	031	0.9
Finland	-3.6	2.6	1.1	029	0.9
Spain	0.0	3.4	1.9	031	0.9

Source: European Commission, autumn 2002 forecasts; and European Commission 2002 for n^* .

If our assumptions about the stock of public capital and the rate of depreciation are about right, in four EU countries, net public investment is currently close to zero—it is actually negative in Austria. Obviously, to gain from the modified rule, these countries would need to increase public investment. Consider Germany, for instance. At the 2002 level of public investment, the modified rule would allow a deficit of just 0.1 percent of GDP. With the current interpretation of the Pact, and assuming that German output is below potential by an amount large enough to justify the entire use of the 3 percent band—which is probably the case—Germany would need to cut the deficit by at least 0.8 percent of GDP. The modified rule requires fiscal action, but of a very different type. To satisfy the rule, the German government would have to replace at least 0.8 percent of GDP of current expenditure with an equivalent amount of public investment.

In seven countries, net investment is positive and relatively large. The modified rule would allow these countries to run deficits ranging from 1.9 percent of GDP for France and Holland, to 3 percent for Ireland. Portugal's 2002 deficit, for instance, which exceeds the 3 percent rule, would fall well within the limits, if the modified rule were applied. Moreover, the modified rule allows all countries to raise public investment without running into a financing constraint.

VI. Capital Budgets: The Experience of the United States

The idea of separating investment expenditure from the current budget, while considering capital depreciation as current government expenditure, has a long tradition in economics, dating back at least to Musgrave (1939). Proponents of capital budgets contend that unified budgets are biased against capital expenditure. Opponents argue that separate budgets raise the incentive to lobby for capital spending and result in inefficiently high expenditure on physical assets, at the expense of intangibles such as health or education. An extreme view states that accounting rules by themselves do not affect the level or composition of spending. What is the evidence?

U.S. states provide a good testing ground, because budgetary procedures differ from one state to the other. Poterba (1995) has studied this experience, asking whether the level and composition of government spending is affected by the use of separate budgets for capital and current expenditures, and by the use of pay-as-you-go (PAYG) constraints in financing capital projects. The study has the drawback of using rather old data: the information on state budgets is for 1962, a year for which a detailed survey exists of budgetary procedures in individual states. The data distinguish among states that make no budgetary distinction between capital and operating expenditures (at the time of the study, there were 20 such states out of 50) and those that have separate budgets. Among the states that use separate

budgets, the data identify those using multiyear capital budgets, that is, physical and financial plans for capital expenditures extending beyond the operating budget cycle. Twelve states in this group had delegated the administration of capital projects to specialized agencies.

The results suggest that state capital budgets are associated with higher levels of capital spending; about one-third higher. The data refer to capital expenditures, excluding highways, that is, primarily, institutions of higher education, health and hospital facilities, natural resource projects, such as parks, and state prisons. PAYG constraints on the financing of public projects are associated with lower levels of capital spending, some 20 percent lower. There is no evidence that capital budgets affect the level of noncapital spending—a finding that suggests that (a) the states with capital budgets are not those that spend more on all public goods, not only on investment, nor (b) are these states simply redefining noncapital spending as capital outlays.

Poterba's results run against the view that public accounting practices are simply a veil, with no impact on budget outcomes. They support a number of recent studies (see, for example, Poterba and von Hagen 1999), which suggest that fiscal institutions exert real effects on public policy outcomes.

VII. Doing This Within the Treaty: Article 104.3

Article 104.3 of the European treaties reads:

If a member state does not fulfill the requirements under one or both of these criteria [deficit below 3 percent and debt ratio approaching 60 percent at a satisfactory pace], the Commission shall prepare a report. [Such report is the starting point of the procedure possibly ending in sanctions.] ... The report of the Commission shall also take into account whether the government deficit exceeds government investment expenditure ...

Rules that allow proper accounting of government investment, separating it from current expenditure, appear to be consistent with article 104.3. Note that the article is actually too lax because it makes no distinction between gross and net investment, thus allowing for the (incorrect) possibility of treating gross investment differently from other expenditure, rather than only net investment.

Article 104.3 is currently interpreted by two regulations, issued by the European Council, which specify how it should be interpreted. Regulation 14676/97 establishes the rules. It should be amended specifying that the current rules, including the excessive deficit procedure, apply to the budget excluding net capital formation. It should assign to the statistical office of the EU the task of issuing rules for computing the amortization

of public capital. These amendments require a unanimous vote of the European Council.

For those countries that decide to set up investment agencies, the Council should issue a specific regulation laying out the principles member states should follow in the institutional design of such agencies. We address this in the next section.

VIII. Principles for the Institutional Design of Investment Agencies

The institutional design of an agency delegated to finance and run public investment projects should address the following issues:

- *Transparency.* The liabilities of the agency are public debt. The agency should not be an instrument to shift debt off balance sheets, allowing the government to issue liabilities that are not properly recorded in the books of the state.
- *Incentives.* The managers of the agency have an incentive to understate ϑ , and overstate δ , because the central government will make up the difference. The government, to the extent that it wants to be able to run a larger deficit, will want to understate δ .
- *Qualification.* What qualifies as public investment, and who decides?
- *Management.* One of the arguments for delegating the running of public projects to an agency is focus. The agency will run the projects more efficiently if it has an unambiguous task.

These problems could be addressed by an institutional design with the following characteristics:

- The agency is set up as a joint stock company, with the government as its shareholder. The status of a company operating under the civil code guarantees that the accounts are subject to the same rules and scrutiny as those of a public company—which in most countries are quite different from those of a government department. Rules for the depreciation of capital should be identical to those used by private companies. The board of the agency includes independent directors: under the civil code, they are personally responsible and liable for the transparency of the accounts.
- Compensation of the agency's managers is linked to two parameters: (a) ϑ , the financial return on public projects—for those projects that are expected to produce a positive ϑ ; and (b) the share of projects cofinanced by the private sector in “project financing” arrangements. Both parameters provide an incentive for the managers to put effort into raising ϑ . For the project financing rule to be useful, private sector

investors should receive only a fraction of v , which would prevent the agency from becoming an instrument for the disbursement of taxpayer money. Like many incentive schemes, these rules do not prevent misbehavior caused by managers' power-seeking. The presence on the board of independent directors is helpful. Incentives and transparency will reduce the risk that the agency is pressured by the government to accept insufficient transfers, which would have to be made up by higher agency borrowing. Although good institutional design can go a long way, it should be complemented by rules issued by the statistical office of the EU, specifying what qualifies as public investment.

Notes

1. Since the Pact was agreed upon, taxes, as a percent of GDP, have remained almost unchanged in the EU, and so has current public expenditure net of interest, while government investment has contracted. Current spending net of interest was 40.8 percent of GDP in 1995 and 40.2 in 2002; total revenues were 46.5 and 46.3 percent, respectively; and public investment was 2.7 and 2.5 percent, respectively.

2. For a review of the various proposals, see Coeuré and Pisani-Ferry (2003).

3. We ignore inflation and its role on the budget constraint.

4. This rule is different from one that simply excludes investment expenditure from the current budget.

5. The United Kingdom's experience with public-private partnerships may be relevant here. The problems such partnerships have run into provide an example of the difficulty of writing and enforcing contracts in this area.

6. The Italian state-owned company Infrastrutture SpA is an example of such agencies. The company issues government-guaranteed bonds to finance investment projects or participate in investment partnerships with the private sector. This is different from the German KfW Bankengruppe, which is only a financial intermediary: it issues bonds and transfers the receipts to the federal or local governments.

7. The reference value for the deficit under the current Pact is 0 percent of GDP over the cycle.

References

- Artis, M., and M. Buti. 2001. "Setting Medium-Term Fiscal Targets in EMU." In *The Stability and Growth Pact: The Architecture of Fiscal Policy in EMU*, eds. A. Brunila, M. Buti, and D. Franco, 185–203. Basingstoke, U.K. Palgrave.
- Buti, M., S. Eijffinger, and D. Franco. 2002. "Revisiting the Stability and Growth Pact: Grand Design or Internal Adjustment?" Unpublished paper, European Commission, Brussels.
- Coeuré, Benoit, and J. Pisani-Ferry. 2003. "A Sustainability Pact for the Eurozone." Unpublished paper, Université Paris Dauphine and Ecole Polytechnique, Paris.
- European Commission. 2000. "Public Finances in EMU-2000." European Economy Reports and Studies No.3, Brussels.

- . 2002. "Production Function Approach to Calculating Potential Output Growth and Output Gaps." European Economy Economic Papers No. 176, Brussels.
- IMF (International Monetary Fund). 2001. "Selected Euro-Area Countries: Rules-Based Fiscal Policy and Job-Rich Growth in France, Germany, Italy and Spain." IMF Country Report 01/203, October, International Monetary Fund, Washington, DC.
- Goodhart, Charles A. E. 2002. "The Stability and Growth Pact." Unpublished paper, London School of Economics, Financial Markets Group, London.
- Modigliani, F., and F. Padoa Schioppa Kostoris. 1998. "Sostenibilità e solvibilità del debito pubblico in Italia." Bologna: Il Mulino.
- Musgrave, R. A. 1939. "The Nature of Budgetary Balance and the Case for the Capital Budget." *American Economic Review* 29: 260–71.
- Pisani-Ferry, J. 2002. "Fiscal Discipline and Policy Coordination in the Eurozone: Assessment and Proposals." Unpublished paper, Université Paris Dauphine, Paris.
- Poterba, J. M. 1995. "Capital Budgets, Borrowing Rules, and State Capital Spending." *Journal of Public Economics* 56: 165–87.
- Poterba, J. M., and J. von Hagen. 1999. "Fiscal Institutions and Fiscal Performance." Chicago: The University of Chicago Press.
- Wendorff, K. 2001. "The Discussion of a National Stability Pact in Germany." In *Fiscal Rules*, ed. Banca d'Italia, 677–712. Roma: Banca d'Italia.
- Wyplosz, C. 2002. "The Stability Pact Meets Its Fate." Paper prepared for the Euro50 Group Meeting, Paris, November.

Accrual Accounting, Long-Term Fiscal Projections, and Infrastructure Investment

*Timothy Irwin**

I. Overview

Well-chosen infrastructure investments can generate user fees that pay for some or all of their investment costs, and even when there are no user fees, the investments may increase economic output and hence tax revenue. Yet many governments have debt and deficit targets that take little account of the long-term effects of different forms of spending. Thus, a dollar of infrastructure investment competes on equal terms with a dollar spent on current consumption, even if the net fiscal cost of the infrastructure investment is lower. Decisions based on conventional debt and deficit targets may therefore lead to insufficient investment and a disappointing improvement in the government's long-term fiscal position (see Easterly and Servén 2003a; IMF 2004a).

Such concerns have led to proposals for fiscal targets that distinguish between public investment and other spending. Notably, the U.K. government has committed itself to follow a cyclically adjusted golden rule according to which “over the economic cycle” it will “borrow only to invest and not to fund current spending,” as well as to a “sustainable investment rule” that limits public sector net debt to 40 percent of gross domestic

* This chapter has benefited from comments by Santiago Herrera, Luis Servén, Jonathan Walters, Michael Warlters, and two anonymous referees.

product (GDP) (H.M. Treasury 2004, p. 4). An alternative to the U.K. government's rule is the permanent-balance rule, which says that taxes must be set at a constant share of GDP that is sufficient to pay for all the government's future spending (see, for example, Buiter and Grafe 2004). Like the golden rule, the permanent-balance rule treats investment with future fiscal benefits differently from current spending with no future fiscal benefits.

This chapter proceeds from the assumption that governments, creditors, and fiscal analysts have focused on debt and near-term cash deficits partly because other information has been lacking. In particular, governments have traditionally prepared only cash accounts, which generate little information about the long-term effects of present fiscal decisions. This raises the following question: What information should be produced by governments that want to draw attention to the long-term fiscal effects of their decisions and to discourage others from focusing only on their debt and near-term cash deficits?

The chapter argues that governments should supplement information on debt and near-term cash flows with information on the value of their physical assets, their net worth, and the change in their net worth from year to year. Specifically, it suggests that at least middle- and high-income governments should prepare fiscal statistics according to the *Government Finance Statistics Manual 2001* of the International Monetary Fund (IMF) and financial reports according to the standards set by the International Public Sector Accounting Standards Board. It argues, however, that these accrual standards have some shortcomings for the purposes of fiscal analysis, and that governments should also prepare and publish long-term projections of cash revenues and cash spending, including, at an appropriate level of aggregation, those associated with infrastructure projects.

II. The Need for a Long-Term View

Each government faces a short-term financing constraint: spending plus debt service cannot exceed revenue plus new borrowing. But each government also faces a long-term solvency constraint: the present value of future outlays cannot exceed the present value of future receipts. Put differently, the government cannot have negative net worth. (Annex 9.1 sets this out algebraically.) Though both the financing constraint and the solvency constraint matter, the solvency constraint is fundamental in the sense that a government is likely to be able to meet the financing constraint if and only if it is solvent: the government is likely to be able to borrow to cover a temporary cash shortfall if and only if its long-term cash flows are sufficient to repay the new debt.

Thus, fiscal decisions must take account of the long term as well as the short term. If the government and the electorate were fully informed and fully rational, this would not be a problem. But imperfect information and imperfect rationality lead to myopia. Voters see a policy's short-term benefits more clearly than its long-term costs. So governments are tempted to make fiscal decisions with short-term benefits even if the costs ultimately exceed the benefits. The most obvious temptation is to fund too much current consumption by borrowing.

Avoiding this temptation is difficult even if the same people bear the costs and enjoy the benefits. An additional problem of intergenerational fairness can arise when the beneficiaries are not the benefactors. People may disagree about what exactly is fair, but most would agree that sound judgments require good information about the long-term fiscal consequences of spending.

The benefits of tax smoothing create a third reason for taking a long-term view. Taxation is usually thought to have a deadweight cost because it inadvertently encourages untaxed activities (such as leisure) at the expense of taxed activities (such as work). Given simple assumptions, it can be shown that the deadweight cost of taxation rises with the square of the tax rate, so that high tax rates have a much bigger deadweight cost than low tax rates. A constant tax rate therefore imposes a lower deadweight cost than a fluctuating tax rate that on average brings in the same revenue. Other things equal, this implies that if investment opportunities are greater now than they will be in the future—perhaps because economic growth will decline—the government should borrow to finance some present investment. More generally, it implies that governments need to understand future as well as present fiscal outcomes.¹

Like other fiscal decisions, decisions about infrastructure investments should be made in light of their long-term effects. In particular, some public infrastructure investments generate user fees that may eventually pay for some or all of the costs of the investments. For example, public telecommunications providers have usually charged more than enough to cover the cost of their investment. (By contrast, water utilities seldom have.)² As long as revenue exceeds operating costs, however, the net fiscal cost of investment is less than the initial expenditure. Moreover, public infrastructure investments can have indirect fiscal benefits. Roads that generate no user fees, for example, may nonetheless boost economic output and hence taxes.³

Although maintenance is not treated as investment in accounts, it is economically similar because it, too, has long-term benefits. Maintenance can increase future user fees and taxes by allowing a better service to be provided. It can also obviate the need to rehabilitate an asset later at great cost. Concerns that governments may spend too little on worthwhile public investments are thus mirrored by concerns that they may spend too

little on maintenance. Indeed, the problem may be greater for maintenance because investment may offer greater opportunities for bribes and ribbon cuttings, and because donors give subsidized loans for investment but not for maintenance (see Tanzi and Davoodi 1997).

The need to consider the long term means that fiscal analysis must deal with uncertainty. Future revenues and future costs are both unknown and must be estimated. So whether an investment will pay for itself is also unknown. It may do so according to current forecasts of revenues and costs, but perhaps that is only because the forecasts are wrong.⁴

This uncertainty has several implications for fiscal analysis. First, the calculation of the present values of future cash flows generated by an investment should take account of the risks of the cash flows. Either expected cash flows should be adjusted for risk to arrive at certainty equivalents before being discounted at a riskless rate, or expected cash flows should be discounted at a risk-adjusted rate. Because each stream of cash flows is subject to a different degree of risk, each stream, in principle, should be adjusted separately. For example, revenues may be riskier than costs, because the former may be more highly correlated with the state of the economy.

Second, uncertainty means that solvency today does not imply solvency tomorrow. A deficit-financed investment program, for example, may be consistent with continued solvency according to the best estimates available at the time. But if demand turns out to be lower than expected, the investment program may push the government into insolvency. This is true even if the investment's forecast cash flows were fully adjusted for risk: actual cash flows may be less than their originally estimated certainty equivalents. Every government faces some risk of insolvency, and there is no sense in aiming to eliminate it. But analysts can reasonably ask what the probability of insolvency is and how it will be affected by infrastructure investments.

Third, uncertainty means that fiscal analysis needs to take some account of the government's flexibility to change policy as new information arrives.⁵ Governments can raise taxes or cut expenditure if they become insolvent under current policies. Governments can also modify infrastructure investments as new information arises. Roads, electricity plants, and other infrastructure can often be expanded if demand turns out to be higher than expected. If exercised rationally, these options mean the government's net worth is higher than it would be under forecasts that assume a course of action unaffected by future outcomes. (Although managerial flexibility always makes infrastructure projects more valuable, it does not imply that more investment should be undertaken now. The option to delay investment until more is known about demand means that waiting is sometimes best.)

Last, but probably most important, uncertainty creates the possibility of opportunism. Uncertainty means estimates of future cash flows rely on

judgments, about which people may reasonably agree. So a government that wants to make its fiscal position look better has many opportunities to do so. Its forecasts may be not just wrong, but biased. This is true both of its estimates of its overall fiscal position and of its estimates of the fiscal effects of infrastructure investments.

III. Traditional Fiscal Indicators

Measures of debt and near-term cash deficits have several advantages as fiscal indicators. First, the cash deficit relates directly to the government's financing constraint, so forecasts of the cash deficit in the next year or two give an idea of how hard it will be to meet the financing constraint in the near future. Second, attention to debt and near-term cash deficits counteracts the temptation to borrow too much. Third, measures of debt are crucial to judgments about whether the government is solvent today and whether it is likely to be so tomorrow. For any given net worth, the higher the government's debt the more vulnerable the government is to shocks and the more likely it is to become insolvent. Fourth, data on debt and near-term cash deficits are less uncertain than other fiscal indicators and thus less subject to bias. True, there are problems determining exactly which government agencies' cash flows should be counted in the cash deficit. But the problems of bias and uncertainty are smaller than those of forecasting distant future cash flows and of valuing assets and liabilities.

Yet traditional fiscal indicators are insufficient. They provide little information on long-term cash flows or on the present values of those cash flows.⁶ Thus, among other things, they provide little information on the long-term effects of present spending decisions. They do not distinguish decisions that affect only this year's fiscal performance from those that also affect fiscal performance in future years. Medium-term fiscal forecasts, which extend the government's forecasting horizon out another three years or so, help a little, but they do not solve the problem. Cost-benefit analysis of investment, which is long term, can also help. But it is not always done, and when it is, it does not always link well with the government's fiscal planning.

As a consequence, traditional fiscal indicators create problems for the analysis of infrastructure investments. They do not help governments avoid the temptation to substitute current consumption for investment. They make the privatization of profitable state-owned infrastructure firms look better from a fiscal perspective than it really is (and likewise may understate the fiscal benefits of selling loss-making state-owned infrastructure firms). And they encourage governments to take on liabilities that don't count as debt, for example, by granting guarantees to privately financed infrastructure projects or by entering into long-term contracts to purchase services provided by a private infrastructure provider.

IV. The Benefits of Accrual Accounting

The weakness of traditional fiscal indicators suggests that governments should produce supplementary indicators. Because the traditional indicators are derived from cash accounting, it is worth considering in particular whether the adoption of accrual accounting would provide the missing information.

Under the accrual basis of accounting, transactions and other events are recorded when the transactions or events occur—not necessarily when cash changes hands. Revenue is typically recognized when a sale takes place, not when the customer pays. Expenses are typically recognized when costs are incurred, not when bills are paid. Expenditure on an asset is typically recognized as the asset is consumed—that is, in installments over the useful life of the asset—not when the asset is paid for.

Accrual financial statements include an income statement that shows the surplus of recognized revenues over recognized expenses. They also include a balance sheet that presents assets and liabilities, including conventionally measured debt. The difference between the value of assets and the value of liabilities is equity or, in the case of governments, net worth.⁷ In clean-surplus accounting, the change in net worth from one year to another is equal to the surplus in the income statement. Typical accounting standards do not exactly follow the clean-surplus principle; some changes in net worth are not shown in the income statement. Thus, another statement shows how the income-statement surplus and other factors combine to produce the change in net worth over the period.

Modern accrual financial statements also include a cash-flow statement, so information on cash flows is not lost in the move from cash to accrual accounting. Cash flows are divided into three categories: operating, investing, and financing. The traditionally measured cash deficit is roughly the sum of operating and investing net cash outflows. Assuming the stock of cash does not change, this sum equals cash inflows from financing.

To see the implications of a government's adopting accrual accounting, consider a government investing \$200 million in a power plant, financed entirely by borrowing. Assume that in the first year no revenue is received, no operating costs are incurred, and no depreciation occurs. The incremental effect of the transaction on the government's cash accounts is shown in table 9.1, panel A. The accounts show \$200 million in spending that increases the cash deficit and debt by the same amount. Under modern accrual accounting, additional information is provided (panel B). The consequences of the investment on the government's cash flows and debt are revealed, but so, too, are the consequences for the government's assets. The accounts report that the investment has no effect on the government's net worth or income-statement surplus. Table 9.2 shows how road and electricity assets, expenses, and cash flows enter into the New Zealand government's accrual-based financial statements.

Table 9.1 Debt-Financed Investment in Cash and Accrual Accounting

	<i>\$ millions</i>
<i>A. Cash accounting</i>	
Revenue	0
Expenditure	200
Surplus	-200
Debt	200
<i>B. Modern accrual accounting</i>	
<i>Income statement</i>	
Revenue	0
Expenses	0
Income-statement surplus	0
<i>Balance sheet</i>	
Assets	200
Liabilities	200
Net worth	0
<i>Cash-flow statement</i>	
Cash disbursed to investment	200
Cash surplus	-200
Cash from financing	200

Source: Author's example.

Note: "Cash surplus" is the sum of cash disbursed to operations and cash disbursed to investment.

Moving from cash to accrual accounting is a substantial task. One report talks of short reform periods of one to three years and long reform periods of more than six years (IFAC 2003, p. 25). Whether all governments should incur the costs of adopting accrual accounting is unclear. Some of the costs are probably fixed, and are likely to be relatively burdensome for small governments. In low-income countries, the costs may outweigh the benefits. In middle- and high-income countries, the costs are more likely to be worth incurring.

The governments of many high-income countries, including Australia, Canada, Iceland, New Zealand, the United Kingdom, and the United States already report using accrual standards. Many other governments, in Latin America and elsewhere, are moving to adopt these standards. Some have

Table 9.2 Infrastructure Items in the Accrual-Based Financial Statements of the New Zealand Government

<i>Elements of the financial statements</i>	<i>\$NZ billions</i>
<i>Income statement (year ending June 30, 2004)</i>	
Revenues	60.4
Sale of services (including electricity)	10.2
Expenses	53.1
Operating expenses	22.7
Depreciation	2.3
Electricity assets	0.2
State highways	0.2
Income-statement surplus	7.4
<i>Balance sheet (June 30, 2004)</i>	
Assets	110.7
Property, plant, and equipment	57.9
Electricity assets	6.5
State highways	13.1
Liabilities	75.2
Net worth	35.5
<i>Cash-flow statement (year ending June 30, 2004)</i>	
Cash flows from operations	9.0
Cash flows from investing	-7.1
Purchase of physical assets (including any investments in state highways and electricity assets)	-3.8
Cash surplus	1.9
Cash flows from financing	-1.1
Net increase in cash	0.8

Source: New Zealand Government 2004.

Note: Several headings have been changed to make them consistent with the terms used elsewhere in this paper.

adopted a partial form of accrual accounting in which revenues and current expenditures are recognized on an accrual basis, but capital expenditures are still expensed as the investment occurs. This partial form of accrual accounting does not address the problem discussed here.

Governments wanting to adopt accrual standards can follow local generally accepted accounting principles, modified as necessary for governments. This is the approach taken, for example, by U.S. governments. But they can also adopt the International Public Sector Accounting Standards Board's International Public Sector Accounting Standards (IPSAS).⁹ These standards are derived from the International Accounting Standards Board's International Financial Reporting Standards (IFRS), the standards according to which firms in many countries now report.¹⁰ Individual IPSAS are based on individual IFRS and are similar to them in most respects, but include modifications to deal with the special features of governments.

When IFRS were developed, very few firms followed them; almost all reported according to national standards that were, at the time, different. And, at the time of writing, only one government—that of the Cayman Islands—and some nongovernmental public entities, including the European Commission and the Organisation for Economic Co-operation and Development, reported according to IPSAS.¹¹ In time, however, the list may well grow quickly. Australian and New Zealand governments now report according to versions of IFRS that are modified locally to accommodate the special features of governments.

The IMF's GFSM 2001 also provides standards for accrual accounting. These standards are for preparing fiscal statistics, not financial statements, so governments do not have to choose between GFSM and IPSAS. Indeed, reporting according to one of the standards is easier if the government already reports according to the other. GFSM 2001 follows accrual accounting principles similar to IPSAS, but it is designed with fiscal analysis in mind. One major difference between IPSAS and GFSM 2001 is that GFSM 2001 requires all assets and liabilities to be recorded at market value whereas IPSAS often allow the use of depreciated acquisition cost.

GFSM 2001 presents information in a somewhat different format from IPSAS. Table 9.3 gives an example, using information reported by New Zealand. It shows how changes in a government's net worth are made up of changes caused by transactions the government has entered into, shown in a statement of "government operations," and other changes, such as appreciation in the value of assets held during the period, shown in a statement of "other economic flows." GFSM 2001 describes the change in net worth as the "preferred" measure for assessing fiscal sustainability (IMF 2001, paragraph 4.52). Although both causes change in net worth are important, the statement of government operations is more directly under the government's control, so it may form a more useful basis for fiscal targets.

Probably no country fully meets the accrual reporting requirements of GFSM 2001. New Zealand, for example, does not report all assets and liabilities at market value. But many countries report at least some of the required accrual information. Countries that report a balance sheet showing physical assets such as infrastructure include Australia, Hong Kong (China), Iceland (for local governments), Mongolia, New Zealand, San Marino, the

Table 9.3 Excerpts from GFSM 2001 Accounts for the Central New Zealand Government

<i>Item</i>	<i>\$NZ billions</i>
Balance sheet at end of 2002	
Net worth (a)	15.4
Statement of government operations (2003)	
Revenue (b)	50.5
Expenses (c)	45.6
Net operating balance (d = b - c)	4.9
Statement of other economic flows	
Holding gains (e)	-2.4
Volume changes (f)	3.7
Other changes in net worth (g = e + f)	1.3
Balance sheet at the end of 2003	
Net worth (= a + d + g)	21.6

Source: IMF 2004a (p. 196) and, to correct an error, the New Zealand Treasury.

Note: Because GFSM 2001 excludes public enterprises, the coverage, as well as the period, of this table differs from that of table 9.2.

Slovak Republic, the Russian Federation, and, in Latin America, El Salvador (see table 9.4). The information is often incomplete. El Salvador, for example, does not appear to measure the depreciation of assets. But it is clear that many countries are moving, at various speeds, toward reporting according to GFSM 2001 accrual standards. Some report their intentions. Thailand plans to report full accrual-accounting information, albeit without valuing all assets at market value, to the IMF by 2007 (IMF 2004b, p. 544).

One test of whether modern accrual accounting is useful for fiscal analysis is to see what use fiscal analysts make of it. Casual observation suggests that analysts tend to cite accrual measures when governments produce them. But the analysts retain an interest in the traditional debt and cash measures. The fiscal section of a recent Standard & Poor's report on New Zealand begins by mentioning the cash surplus, but then mentions the accrual surplus excluding revaluations and accounting changes (Standard & Poor's 2006a, p. 10). Moody's takes a similar approach and also mentions the surplus including revaluations and accounting changes (Moody's 2006, p. 2). In its most recent Article IV report on New Zealand, the IMF refers to the accrual measure of the surplus (again excluding revaluations and accounting changes) in its summary of the government's fiscal performance, but also includes the cash balance in tables at the end of the report (IMF 2007). Analysts cannot always use accrual

Table 9.4 Excerpts from the Central Government of El Salvador's 2003 Balance Sheet, According to GFSM

<i>Item</i>	<i>US\$ millions</i>
Net worth	-3,463
Nonfinancial assets	1,815
Fixed assets	1,207
Buildings and structures	376
Machinery and equipment	385
Other fixed assets	447
Inventories	160
Valuables	5
Nonproduced assets (land, etc.)	444
Financial assets	2,392
Liabilities	7,670

Source: IMF 2004b.

Note: The numbers have been rounded to the nearest whole number.

figures when making international comparisons. But when comparative data are available, analysts sometimes use them. The Standard & Poor's credit report on the State of Victoria in Australia, for example, compares Victoria's "accrual operating performance" with that of the State of New South Wales (Standard & Poor's 2006b, p. 2).

V. The Limits of Accrual Accounting

Although modern accrual accounting provides more information than cash accounting, it does not fully meet the needs of fiscal analysis. The extent of the shortcoming depends on the particular accrual standards that are used, but no existing standards solve all the problems.

Recall the government's fundamental fiscal constraint: the present value of future government spending on transfers, consumption, and investment plus the service of existing debt cannot exceed the present value of future taxes and other receipts. The extent to which modern accrual accounting provides relevant fiscal information therefore depends on the extent to which (a) accounting values of assets and liabilities approximate the relevant present values and (b) the income-statement surplus approximates changes in the relevant present values.

In the area of infrastructure, four questions arise:

- Do the reported values of infrastructure assets approximate the present value of the cash flows they are expected to generate?
- Are the present values of guarantees and long-term purchase commitments reported?
- Are the infrastructure assets and liabilities of public enterprises included in reported assets and liabilities?
- How well do modern standards deal with the problems of uncertainty and bias?

Valuation of Infrastructure Assets

Ideally, fiscal reporting would reveal the net present value of the cash flows associated with the government's infrastructure assets. Modern accrual standards generally do not prescribe the valuation of assets at the net present value of the associated cash flows. But different standards come more or less close to this ideal.

IPSAS require assets to be valued initially at acquisition cost and thereafter allow them to be valued at depreciated acquisition cost or at fair value, if that can be reliably measured.¹² Assets valued at depreciated acquisition cost must also be reduced in value if they are impaired. Fair value is the amount for which the assets could be exchanged between knowledgeable, willing parties in an arm's-length transaction. It can be estimated by observing the value at which comparable assets have recently been traded. If such transactions are rare, as may be the case for infrastructure assets, it can be estimated by depreciated replacement cost.

GFSM requires assets to be valued at their current market value, which is defined much like fair value. For many physical assets, including infrastructure, GFSM suggests approximating current market value by depreciated replacement cost.

Fair value and market value tend to approximate the present value of user fees less cash operating costs. On the one hand, the price at which an asset would change hands in an arm's-length transaction should roughly equal the expected net present value of the future operating cash flows. On the other hand, replacement cost equals the present value of future operating cash flows if user fees are set to cover costs. And, if user fees are set below replacement cost, the accounting value of the assets may be written down because of the asset's impairment. (Among other things, measures of fair value should reveal problems caused by poor maintenance.) Thus, governments that follow GFSM or follow IPSAS and choose the fair-value option are required to report asset values that approximate the present value of future revenues from user fees less cash operating costs.

Estimates of depreciated replacement cost will exclude, however, the value of any supernormal profits the government expects to receive from user fees set higher than full costs. In addition, measures of fair value won't incorporate any effect of the asset on the government's tax revenues. On the one hand, such benefits probably could not be measured with sufficient accuracy to warrant counting them in financial statements. On the other, increases in future tax revenues do not affect the value of the asset to owners other than the government. Thus, they do not affect fair value.

This is part of a broader limitation of accrual accounting for fiscal analysis. The largest economic asset of most governments is the power to tax. Yet the present value of future tax payments is not recognized as an asset according to IPSAS or GFSM 2001. Similarly, the present value of social security payments is unlikely to be recognized as a liability according to IPSAS or GFSM 2001, despite their fiscal importance (IFAC 2004b).

Interestingly, assets such as untolled roads that do not generate, or directly contribute to the generation of, future revenues from user fees are still treated as accounting assets by IPSAS and GFSM 2001.¹³ IPSAS 17 states:

An item of property, plant and equipment should be recognized as an asset when: (a) It is probable that future economic benefits or service potential associated with the asset will flow to the entity and (b) The cost or fair value of the asset to the entity can be measured reliably. (IFAC 2004a, paragraph 13).

IPSAS 17 also clarifies that "infrastructure assets," including roads, "meet the definition of property, plant and equipment and should be accounted for in accordance with the Standard" (IFAC 2004a, paragraph 21). Under the fair-value option, such assets can be valued at their depreciated replacement cost.

Is this appropriate for the purpose of fiscal analysis? Expenditures that generate no future user fees for the government are different from those that do. Untolled roads, for example, are certainly valuable to governments, because they enable the provision of valuable services to citizens. But possible tax effects aside, they do not generate any future revenues that would offset their fiscal cost. One might argue that if the services must be provided the investment does have future fiscal benefits because it allows the government to *avoid* future expenditure on the service. But even when the services are valuable they are not usually obligatory, and (still ignoring possible tax effects) the decision to incur the expenditure reduces the government's net worth.¹⁴

It seems, then, that modern accrual accounting for infrastructure assets has two weaknesses. First, it ignores tax effects. Second, it treats assets that create future user fees no differently from assets that do not. The two

effects work in opposite directions, but there is no reason to think that they will cancel each other out.

IPSAS have another, relatively minor, weakness. Even if the use of the fair-value option leads to reasonable approximations of the present values of infrastructure assets in the government's balance sheet, changes in present values are not necessarily revealed in the income-statement surplus. The first downward revaluation of an asset must be reflected in the surplus, but the first upward revaluation may show up only in successive balance sheets, but not in the income-statement surplus (IFAC 2004a, IPSAS 17, paragraphs 49 and 50). By contrast, GFSM requires all changes in values to show up in either the statement of government operations or the statement of other economic flows.

Guarantees and Long-Term Purchase Contracts

Modern accrual accounts report some nontraditional liabilities, but they do not report all fiscally important liabilities. In the area of infrastructure, the present value of future payments associated with guarantees and long-term purchase commitments for privately financed infrastructure projects may go unrecognized.

IPSAS, for example, do not require recognition of "contingent liabilities," which guarantees are often thought to create. IPSAS do, however, require recognition of derivatives, and guarantees written on financial variables such as exchange and interest rates appear to be derivatives. (IPSAS do not yet incorporate standards on derivatives or insurance, so the IFRS provide guidance.) Other guarantees might count as insurance contracts, which must also be recognized according to IFRS. GFSM states that "contingencies, such as loan guarantees ... do not result in transactions or other economic flows recorded in the GFS system until the event or condition referred to actually occurs" (IMF 2001, paragraph 1.20). Yet GFSM also refers to the appropriate accounting treatment of derivatives, and some guarantees might count as derivatives for the purposes of GFSM and therefore require recognition.

Likewise, the treatment of long-term purchase contracts is not clear-cut. Sometimes, the contracts are considered "executory" and therefore create no accounting assets and liabilities. At other times, they are considered to put the government in the position of an owner that has borrowed to finance its purchase, and accounting standards require the government to recognize the assets and liabilities. The U.K. government, for example, puts some of its privately financed projects on its balance sheet, but not others. In the Philippines, the major state-owned power utility's accounts include the assets and liabilities associated with power plants procured with long-term power-purchase agreements; but in other countries, similar assets and liabilities remain off-balance-sheet.

The Consolidation of Public Enterprises

A third issue is whether the assets and liabilities of public enterprises are consolidated in the accounts produced by government—an issue that is related to the debate about whether fiscal targets should apply to commercially run public enterprises (see IMF 2004a).

If public enterprises are consolidated, their assets and liabilities are shown as assets and liabilities of the government. Thus, for accounting purposes, borrowing by the public enterprise from parties outside the consolidated government entity is counted as borrowing by the government. The public enterprise's profit or loss is included in the government's income-statement surplus and its cash flows are recorded in the government's cash-flow statement.

If public enterprises are not consolidated, the government reports the value of its ownership interest in the public enterprises, but not the (gross) values of the assets and liabilities. Thus, borrowing by the public enterprise does not increase the government's reported indebtedness. The government would include dividends it received from the public enterprise in its income statement, but not necessarily the full profit or loss of the enterprise. The cash-flow statement would include only the cash flows the government paid to or received from the public enterprise.

Accountants generally prefer consolidated information. Accordingly, IPSAS generally require publication of consolidated information, including all public enterprises (see IFAC 2004a). They would require information of the sort shown in table 9.2, which reports electricity assets belonging to New Zealand public enterprises alongside roads owned directly by the government.

Reports according to GFSM could in principle cover the whole public sector and therefore consolidate public enterprises. In practice, their focus is on the "general government," which excludes public enterprises engaged in commercial activities. The *Government Finance Statistics Yearbooks* presenting GFSM data, for example, include only the general government (IMF 2004b). Outside the *Yearbooks*, the IMF's treatment of public enterprises in fiscal analysis varies from region to region. In Latin America, its fiscal analysis usually incorporates the consolidated public sector, whereas in other regions it usually focuses on general government and therefore does not consolidate the public enterprises (IMF 2004a).

For the purposes of fiscal monitoring, consolidation has some advantages. For example, the debts of public enterprises are often guaranteed by the government, and when they are not, experience suggests that they may be tacitly guaranteed: the government would find it difficult not to honor the enterprise's debts. An unconsolidated set of accounts would at most report the explicit guarantees as liabilities. A consolidated set of accounts would report the public sector's total liabilities (the guarantees

being eliminated in the consolidation), which is probably just as clear for the purposes of external financial reporting.¹⁵

Although fiscal monitoring seems more useful when it provides consolidated information about public enterprises, a government or creditor might sometimes set a fiscal target that excluded them. In particular, a government or creditor that set a fiscal target regarding the sum of operating and investing cash flows (the cash deficit) might not want to constrain public enterprises in this way.

Uncertainty and Bias

IPSAS and GFSM deal reasonably well with some aspects of uncertainty. Because they employ measures of fair or market value, they can implicitly incorporate adjustments for the cost of bearing risk. For the same reason, they can account for the value of important real options tied to physical assets. When market value or fair value cannot be estimated by reference to actual transactions in similar assets, however, and must be approximated by depreciated replacement cost, values generally will not incorporate adjustments for risk or the value of real options. In addition, accounting estimates do not provide much information about the risks of outcomes being better or worse than estimated. Even when they value an electricity plant at the present value of its expected cash flows adjusted for risk, they are not intended to offer information on how this value might change.

Accounting standard setters have also been concerned to counter problems created by self-serving estimates. Other things equal, they prefer estimates that are based on simple, verifiable procedures, such as valuing an asset at its acquisition cost and then depreciating it according to a simple formula. Their approach to guarantees probably reflects a concern that some guarantees can be valued only with great uncertainty. Yet standard setters sometimes require accountants to make difficult judgments when the judgments are believed to generate important information. New requirements to value derivatives, including some guarantees and employee stock options, are examples.

When estimates rely on considerable judgment, accounting standards can reduce the likelihood of self-serving estimates in various ways:

- The standards may contain a “conservative” bias designed to counteract the “liberal” bias of those preparing accounts.
- Companies may be required to disclose how they arrived at their estimates, which helps others make their own judgments.
- Responsible individuals may have to certify that the accounts are accurate to the best of their knowledge.
- Accounts must be audited by an independent auditor.
- Companies may be required to have certain valuations done by independent valuers (separate from the auditors).

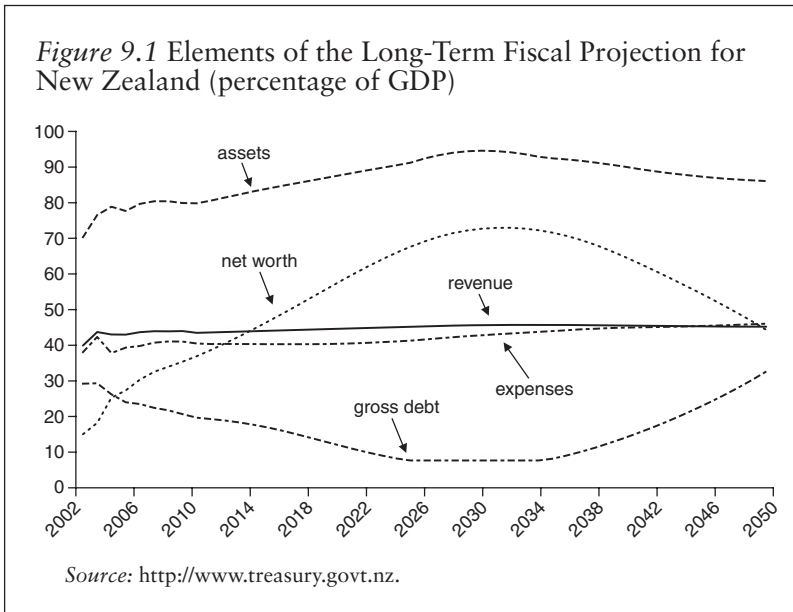
IPSAS make use of these techniques, and thus address the problem of self-serving estimates. (Of course, self-serving estimates are still possible, as accounting scandals show.) GFSM 2001 reports are probably more vulnerable to self-serving biases. For example, GFSM 2001 requires little disclosure and no auditing. If GFSM's accrual measures were to be used as the basis of fiscal targets, and the failure to meet the targets had financial or political implications, governments might at first find it easy to generate the results they wanted. Though this problem would not be eliminated, it would be lessened if the government also produced accounts according to IPSAS and reconciled the IPSAS and GFSM reports by explaining the differences.

All things considered, the adoption of IPSAS and GFSM 2001 would provide governments, their creditors, and others with information more valuable than that provided by cash accounting alone. Exactly how much more valuable would depend on the choices the government made (for example, whether it chose the fair-value option under IPSAS); how diligently it prepared financial statements; and how effective auditors, creditors, and others were at persuading the government to produce timely, reliable, and helpful statements. But even the best reporting according to accounting standards will not always generate the information most useful for fiscal analysis.

VI. Long-Term Fiscal Projections

To address the shortcomings of accrual accounting, governments can prepare and publish long-term projections of their cash flows, including tax revenues, social security payments, and expenditures and revenues associated with infrastructure.

How long should the period of projection be? In principle, the relevant period is the entire future. In practice, a finite period needs to be chosen. Britain publishes a 30-year projection, New Zealand a 45-year projection (figure 9.1), and the United States a 75-year projection. Projections beyond a few years are subject to great uncertainty. But shortening the horizon does not necessarily help. For the purposes of testing whether the solvency constraint is met, stopping a projection at some point is equivalent to assuming that net operating and investing cash flows beyond that point are worth nothing—which is probably not the best guess. The time value of money means cash flows become less important as they recede into the future. Yet, at a discount rate of 5 percent, not unreasonable in an inflation-adjusted projection, the value of \$1 received in 30 years is still \$0.22. Only after 75 years is it an easily ignored \$0.02. Moreover, extending a projection from, say, 30 to 75 years need not entail much new work: beyond the first few years, projections are likely to be based on simple assumptions about the growth rates of economic and demographic variables.



As in the case of accrual accounting, fiscal analysts seem to make use of long-term fiscal projections when they are available. In a recent rating of New Zealand, Standard & Poor's refers to the government's long-term fiscal projection: "Over the very long term, as described in the government report published in June 2006 entitled *New Zealand's Long-Term Fiscal Outlook*, health and superannuation costs could bring about a return to rising debt ratios." In its Article IV report, the IMF states that it "welcomes the release of the first report on the long-term fiscal position, which clearly articulates the significant long-term challenges that rising health care costs and population aging will pose for fiscal policy."

Long-term projections typically assume the continuation of current policies as the base case. They therefore tell governments whether the solvency constraint is satisfied under current policies. Put differently, they answer questions such as, Will debt grow in a sustainable manner, or will spending cuts or tax hikes be needed? Or, what economic growth rate would be required to maintain solvency? Long-term projections also allow the government to estimate the permanent tax rate of the permanent-balance rule.

Long-term cash projections provide the basis for estimating a fiscal balance sheet that is more comprehensive than an accounting balance sheet—that is, one that incorporates a tax asset that summarizes the value of expected future tax revenues and a social security liability that summarizes the value of expected future social security payments, as well as assets and liabilities related to infrastructure.

Infrastructure might enter the projections in two ways. First, projected user fees and expenditures on maintenance and investment might be recorded (at some high level of aggregation—perhaps as the operating profits of public enterprises). So, too, could expenditure that resulted from long-term contracts to pay for the outputs of privately financed infrastructure projects. If spending on guarantees was expected to be large enough, it might also be included. Governments would need to judge which items were large enough to warrant a line of their own in the projection.

Second, infrastructure investment and maintenance might be allowed to affect estimates of economic output, tax revenues, and growth-driven spending. If the model included a projection of GDP, tax revenues might be modeled as a function of GDP, which might in turn depend on prior public investment.¹⁶

Clearly, there is room for much reasonable disagreement about the outputs of such models. Among other things, governments, their creditors, and others may differ over the long-term fiscal effects of infrastructure investment. Will governments permit public enterprises to charge the user fees implicit in projections of future cash flows? Will they undertake necessary maintenance on time? Will the government's planned infrastructure investment really increase output and therefore tax revenue? Will it really affect the long-run rate of growth? In short, analysts will reasonably ask whether the projection is fair, or whether the government has made whatever assumptions were needed to report a healthy fiscal position.

Such concerns cannot be avoided, but they can be reduced. First, cash flows can be adjusted for risk when present values are calculated. Uncertain tax revenues can, for example, be discounted at a higher rate than required payments for the servicing of debt and the satisfaction of long-term purchase contracts. Second, the government can acknowledge the possibility that actual values will differ from estimated values, and it can show the sensitivity of outcomes to assumptions such as the link between public investment and tax revenue. It might also incorporate random variation in the modeling of certain variables, such as the rate of growth of GDP. By doing so, it could present estimates not only of whether it was solvent now but also of the probability of its being solvent at various times in the future.

To reduce concerns about bias, governments can make their models and their underlying assumptions public, allowing others to see how the results change with different assumptions. The long-term projection presented by the New Zealand government does not seem ideal for the purposes presented here, because it focuses on projecting the government's income statement and balance sheet, rather than the underlying cash flows. Yet the model has the merit of being available in an Excel spreadsheet that allows an observer to see how results change with changes in various assumptions. In addition, governments can use estimates of critical variables (such as GDP growth rates) provided by independent experts—something that

Chile does when estimating its cyclically adjusted surplus. Governments could also publish standards for projections. Last, they might require an auditor to state whether the projections reflected the stated assumptions.

Annex 9.1. Solvency, Accounting, and Cash-Flow Projections

This annex sets out a simplified version of the analysis of solvency of Servén (2007), some of which is in turn based on earlier work, such as Buitier (1990), and relates it to some of the issues discussed in this chapter. It uses discrete rather than continuous time to facilitate comparisons with conventional accounting and forecasts.

The long-term fiscal constraint in year $t = 0$ can be written as:

$$B_0 + \sum_{t=1}^{\infty} \frac{c_t + i_t}{(1+r)^t} \leq A_0 + \sum_{t=1}^{\infty} \frac{x_t + \pi_t}{(1+r)^t} \quad (\text{A1})$$

where B_0 is the present value of the government's financial liabilities; A_0 is the present value of its financial assets; c is spending on consumption and transfers; i is infrastructure investment; π is user-fee revenue from infrastructure less operating costs; x is tax revenue; and r is the discount rate, which is assumed the same for all items and constant over time. If we let net worth NW be defined as:

$$NW_0 \equiv A_0 - B_0 + \sum_{t=1}^{\infty} \frac{\pi_t - i_t + x_t - c_t}{(1+r)^t} \quad (\text{A2})$$

we can also write the solvency constraint as $NW_0 \geq 0$.

An ideal fiscal projection would include all the π_t , i_t , x_t , and c_t up to some large value of t , such as 50. The information in the fiscal projection could be summarized in a comprehensive fiscal balance sheet that showed the present value of each category of cash flow. If we let capital letters denote the present values of streams of cash flows denoted by the corresponding lowercase letter, so that C_0 is the present value of future spending on consumption and transfers, and so on, we can write the constraint as:

$$A_0 - B_0 + X_0 - C_0 + \Pi_0 - I_0 \geq 0 \quad (\text{A3})$$

The ideal fiscal balance sheet based on these projections would present all these values (perhaps grouping some) and hence reveal whether current policy satisfied the fiscal constraint. The ideal fiscal income statement would, among other things, reveal what had happened to net worth ($NW_1 - NW_0$). Table A9.1 compares the information provided by traditional cash accounts, modern accrual accounts, and a 50-year projection of cash flows.

Table A9.1 Fiscal Information Provided by Three Kinds of Fiscal Reports

	<i>Traditional cash accounts</i>	<i>Modern accrual accounts</i>	<i>50-year fiscal projection plus associated balance sheet</i>
Cash flows (c_t , i_t , x_t π_t),	Only c_1 , etc.	Only c_1 , etc.	$c_1 - c_{50}$, etc.
Present value of financial assets and liabilities (A_0 , B_0)	Yes	Yes	Yes
Present values of infrastructure net revenues and investment costs (Π_0 and I_0)	No	Partially	Yes
Net worth (NW)	No	Partially	Yes
Change in net worth (ΔNW)	No	Partially	Yes

Source: Author's creation.

To show how investment affects net worth in this simple model, we make several simplifying assumptions. First, we assume that operating profit derived from user fees in each year is a constant fraction θ of the stock k of infrastructure in that year:

$$\pi_t = \theta k_t \quad (\text{A4})$$

Next, we assume that the stock of capital at t is the sum of past investment (we thus ignore depreciation):

$$k_t = \sum_{\tau=1}^t i_\tau \quad (\text{A5})$$

We assume that tax revenue is a constant proportion s of economic output y :

$$x_t = sy_t \quad (\text{A6})$$

and that output is a function g of capital,

$$y_t = g(k_t) \quad (\text{A7})$$

The effect of a one-off debt-financed investment on net worth in year 0 is then given by:

$$\frac{\partial NW_0}{\partial i_0} = \sum_{t=1}^{\infty} \frac{\theta + sg'}{(1+r)^t} - 1 \quad (\text{A8})$$

The first term on the right-hand side is a perpetuity discounted at r , so we can rewrite the equation as:

$$\frac{\partial NW_0}{\partial i_0} = \frac{\theta + sg'}{r} - 1 \quad (\text{A9})$$

That is, infrastructure investment increases net worth if and only if the direct return on infrastructure investment from user fees plus the indirect return from taxes is greater than the cost of capital.

Notes

1. For more on the arguments from tax smoothing and intergenerational equity, see Mintz and Smart (2007). For an early reference, see Musgrave (1939).

2. See, for example, World Bank (1994, figure 2.2), which presents estimates of revenues as a percentage of costs for (mostly public) providers of gas, water, power, and telecommunications.

3. For surveys of evidence on the effect of infrastructure investment on output, see, for example, Easterly and Servén (2003b), Estache (2004), Gramlich (1994), and IMF (2004a). Calderón and Servén (2004) provide new evidence that infrastructure stocks increase economic growth.

4. On the analysis of fiscal sustainability, see, for example, Hemming and Petrie (2002), Burnside (2004), and Bandiera, Budina, Klijin, and van Wijnbergen (2007).

5. It needs, in other words, to be sensitive to the value of real options (see, for example, Dixit and Pindyck 1994).

6. Debt is an exception, because its value often approximates the present value of future debt-service payments. When the loans are concessional, and the present value of debt-service payments is much lower than the face value of the debt, analysts may report an explicitly estimated present value.

7. The income statement is sometimes called the statement of profit and loss or the statement of financial performance. The balance sheet is sometimes called the statement of financial position.

8. This ignores dividends and other flows between the entity and its owners.

9. IPSAS are set out in IFAC (2004a).

10. IFRS are set out in IASB (2004).

11. Information provided during a phone call with Mathew Bohun, secretariat to the International Public Sector Accounting Standards Board.

12. IPSAS 17—Property, plant, and equipment, available in IFAC (2004a).

13. GFSM takes a similar approach (IMF 2001, paragraph 7.7).

14. This point is made by Musgrave (1939). Note, however, that the tax-smoothing argument for borrowing depends on whether the asset is durable, not on whether it creates future revenues.

15. Governments would still be advised to value and monitor guarantees given to public enterprises as part of their internal management.

16. The relationships might be based, for example, on work set out in Calderón and Servén (2004). For examples, see Suescún (2005).

References

- Bandiera, Luca, Nina Budina, Michel Klijn, and Sweder van Wijnbergen. 2007. "The 'How To' of Fiscal Sustainability: A Technical Manual for Using the Fiscal Sustainability Tool." Policy Research Working Paper No. 4170, World Bank, Washington, DC.
- Buiter, Willem H. 1990. *Principles of Budgetary and Financial Policy*. Cambridge, MA: MIT Press.
- Buiter, Willem H., and Clemens Grafe. 2004. "Patching Up the Pact: Suggestion for Enhancing Fiscal Sustainability and Macroeconomic Stability in an Enlarged European Union." *Economics of Transition* 12 (1): 67–102.
- Burnside, Craig. 2004. "Assessing New Approaches to Fiscal Sustainability Analysis." Report for World Bank Latin American and Caribbean Region. September, Washington, DC.
- Calderón, César, and Luis Servén. 2004. "The Effects of Infrastructure Development on Growth and Income Distribution." Policy Research Working Paper No. 3400, World Bank, Washington, DC.
- Dixit, Avinash K., and Robert S. Pindyck. 1994. *Investment under Uncertainty*. Princeton: Princeton University Press.
- Easterly, William, and Luis Servén. 2003a. Introduction. In *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*, eds. W. Easterly and L. Servén, chapter 1. Washington, DC: Stanford University and World Bank.
- Easterly, William, and Luis Servén, eds. 2003b. *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*. Washington, DC: Stanford University and World Bank.
- Estache, Antonio. 2004. "Emerging Infrastructure Policy Issues in Developing Countries: A Survey of the Recent Economic Literature." World Bank, Washington, DC.
- Gramlich, Edward M. 1994. "Infrastructure Investment: A Review Essay." *Journal of Economic Literature* 32 (3): 1176–96.
- Hemming, Richard, and Murray Petrie. 2002. "A Framework for Assessing Fiscal Vulnerability." In *Government at Risk: Contingent Liabilities and Fiscal Risk*, eds. Hana Polackova Brixi and Allen Schick. Oxford University Press for the World Bank.
- H.M. Treasury. 2004. "Long-Term Public Finance Report: An Analysis of Fiscal Sustainability, December 2004." London.
- IASB (International Accounting Standards Board). 2004. International Financial Reporting Standards (IFRS). London.
- IFAC (International Federation of Accountants). 2003. *Transition to the Accrual Basis of Accounting: Guidance for Governments and Government Entities*, 2nd edition. Public Sector Committee. Available at www.ifac.org.
- . 2004a. *Handbook of International Public Sector Accounting Pronouncements*. Public Sector Committee. Available at www.ifac.org.

- . 2004b. "Accounting for the Social Policies of Governments: Invitation to Comment." Public Sector Committee, January. Available at www.ifac.org.
- IMF (International Monetary Fund). 2001. *Government Finance Statistics Manual, 2001*. Washington, DC: IMF.
- . 2004a. *Government Finance Statistics Yearbook, 2004*. Washington, DC: IMF.
- . 2004b. "Public Investment and Fiscal Policy." IMF, Washington, DC.
- . 2007. "New Zealand: Staff Report for the 2007 Article IV Consultation." IMF, Washington, DC.
- Mintz, Jack M., and Michael Smart. 2007. "Incentives for Public Investment Under Fiscal Rules." In this volume.
- Moody's. 2006. "Analysis: New Zealand." December. Available at <http://www.moody.com>.
- Musgrave, Richard A. 1939. "The Nature of Budgetary Balance and the Case for the Capital Budget." *The American Economic Review* 29 (2): 260–71.
- New Zealand Government. 2004. "Financial Statements of the Government of New Zealand for the Year Ended 30 June 2004." Available at <http://www.treasury.govt.nz>.
- Servén, Luis. 2007. "Fiscal Discipline, Public Investment, and Growth." In this volume.
- Standard & Poor's. 2006a. "Ratings Direct, New Zealand, December 3." Available at www.ratingsdirect.com.
- . 2006b. "Ratings Direct, Victoria (State of), August 29." Available at www.ratingsdirect.com.
- Suescún, Rodrigo. 2005. "Fiscal Space for Investment in Infrastructure in Colombia." World Bank Policy Research Working Paper No. 3629, World Bank, Washington, DC.
- Tanzi, Vito, and Hamid Davoodi. 1997. "Corruption, Public Investment, and Growth." IMF Working Paper, International Monetary Fund, Washington, DC.
- World Bank. 1994. *World Development Report 1994—Infrastructure for Development*. Washington, DC: World Bank.

Growth and Fiscal Effects of Infrastructure Investment in Brazil

*Pedro Cavalcanti Ferreira and
Carlos Hamilton Vasconcelos Araújo**

I. Introduction

Public investment in Brazil, as a share of gross domestic product (GDP), has been falling for the last 25 years. Although gross capital formation of the central government alone averaged 4.03 percent in the 1969–84 period, in the following 16 years it was only 1.85 percent. Since 1999, it has remained at around 0.9 percent of GDP, while the gross investment of total government is only 2.2 percent of output. Moreover, although timing varies, the cuts in infrastructure expenditure affected virtually all sectors. For instance, direct investment in roads from 1990 to 1995 in real terms was only one-fifth of investments made in the 1970–75 period (Ferreira and Maliagos 1998), while total public investment in the transportation sector today is less than 0.5 percent of GDP¹ (Afonso, Araújo, and Biasoto Jr. 2005), a small figure when compared with almost 1.8 percent in the peak year of 1979. Similar figures, if somewhat less dramatic, apply to the energy sector, ports, and other industries.

As a consequence, there has been a general decrease in the quality of infrastructure services and a relative scarcity of quantities supplied. With respect to the former, although not much data are available, casual

* The authors are thankful for the comments of Luis Servén, Leandro Nascimento, and seminar participants at LACEA 2005, Pontifícia Universidade Católica do Rio de Janeiro, Instituto de Pesquisa Econômica Aplicada, and Escola de Pós-Graduação da Fundação Getúlio Vargas.

evidence is abundant. The blackouts and rationing of energy in 2001–02 are believed to have been caused by the reduction in investment in the energy sector. Power-generating capacity, which grew at an average rate of 10 percent from 1960 to 1980, increased on average only 3 percent per year in the following 20 years. World Bank figures show that the total length of paved roads in the country has stagnated, if not decreased, during the last decade. At the same time, Velloso (2004) shows that in 2003 only 17 percent of roads in the country were considered in good or very good condition, and 42 percent were in poor or extremely poor condition.

The reduction of capital expenditures is a general phenomenon in Latin America (Calderón, Easterly, and Servén 2003) and is associated with the numerous economic crises the region experienced since Mexico's default in 1982. These crises were particularly acute in Brazil, as reflected, for example, by hyperinflation, fiscal crisis, the suspension of external debt payments, insolvent regional governments, increasing poverty, and other problems. According to many industry experts (for example, Calderón, Easterly, and Servén 2003; Mintz and Smart 2004; Roubini and Sachs 1989), in times of fiscal restrictions, public investments tend to be overly reduced and the burden of fiscal adjustment is felt first and with more intensity in infrastructure sectors.

This is somehow an expected, if myopic, outcome of the political process. If current and capital expenditures are weighted the same in the government budget decisions, policy makers with short-term tenures (for example, four or six years) have little incentive to consider the future gains of infrastructure expenditures. Although most of the expenses are incurred under their term, most of the benefits will be enjoyed after they leave office. Even if the net present value of the project is positive, its initial cash flow is always negative, and this is a critical factor in any political decision. In an environment with high political instability, such as Latin America, this problem tends to be amplified.

In the Brazilian case, aside from fiscal problems and widespread economic crisis, the public budget has become increasingly rigid in the recent past, with mandatory expenditures in education and health, and mounting expenses in payroll, social security, various social programs, and interest.² Moreover, fiscal targets—such as the target of 4.25 percent primary surplus in the current year—make no differentiation between current and capital expenditures. When adding up these factors, one should not be surprised by the reduction of public investment, in general, and infrastructure-capital expenditures, in particular, that are observed in Brazil.

This chapter analyzes the economic impact of the recent evolution of infrastructure investment in Brazil. It is divided into four sections in addition to this introduction. Section II presents the relevant stylized facts and comments on the relationship between investment flows and the observed variation of infrastructure stocks. Section III estimates the growth impact of public capital and of different measures of infrastructure stock. This has

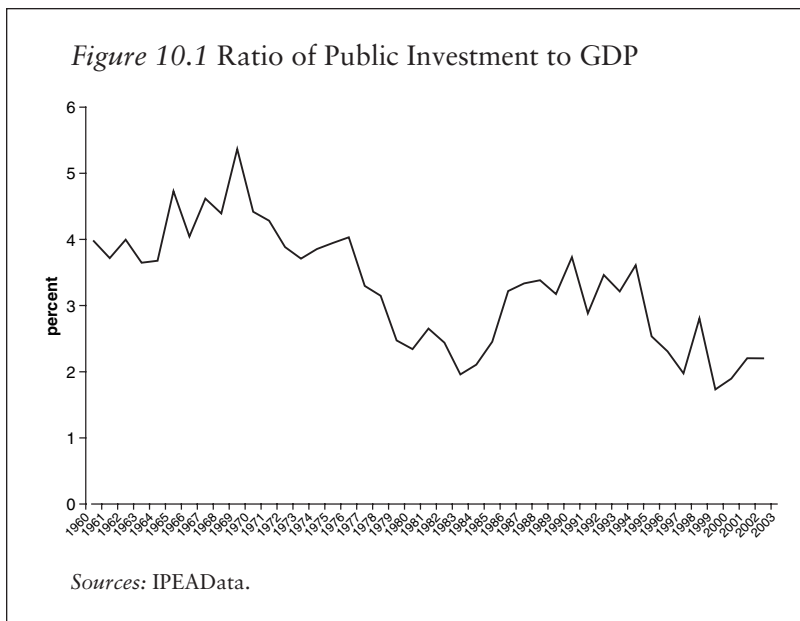
been found to be significant in a large number of studies (for example, Ai and Cassou 1995; Aschauer 1989; Canning and Bennathan 2002; Creel, Monperrus-Veroni, and Saraceno 2006; Easterly and Rebelo 1993) using different data and econometric methodology. We initially employ cointegration analysis to investigate the long-term association between output and infrastructure, extending in several directions the analysis presented in Ferreira and Maliagos (1998). These results are used to study the short-term dynamic of GDP and per capita GDP after shocks to public capital and infrastructure. The productive impact of the different measures of infrastructure was found to be relevant in the short and long term.

Section IV presents a simple simulation of tax collection, debt service, and public solvency after an increase in public capital stock entirely financed by debt issue. We show that, under reasonable assumptions, infrastructure does pay for itself in Brazil, as a given investment generates revenues more than sufficient to cover the debt service and additional investment. This result contrasts with those in Perotti (2004), who rejects the hypothesis that—for six member countries of the Organisation for Economic Co-operation and Development (OECD)—shocks to public investment are self-amortizing. Similarly, of the 12 European Union (EU) countries that Pereira and Pinho (2006) study, they estimate that public investment pays for itself in only two—Italy and Germany. In the remaining 10 countries, the hypothesis of productive impact of public investment was rejected or this impact was not strong enough to generate the necessary tax revenue. Both papers use methodologies close to ours. Section V presents concluding remarks.

II. Some Basic Stylized Facts

After reaching a peak of 5.3 percent of GDP in 1969, public investment today is only 2.2 percent of Brazil's GDP, as shown in figure 10.1. It experienced a timid recovery from 1987 to 1994, when the average ratio rose to around 3 percent, but after that it has remained quite small (see figure 10.1). Of today's total investment, a large fraction is due to municipalities (40 percent), which means parks, schools, street pavement, sidewalks, and similar expenditures that have little productive impact.

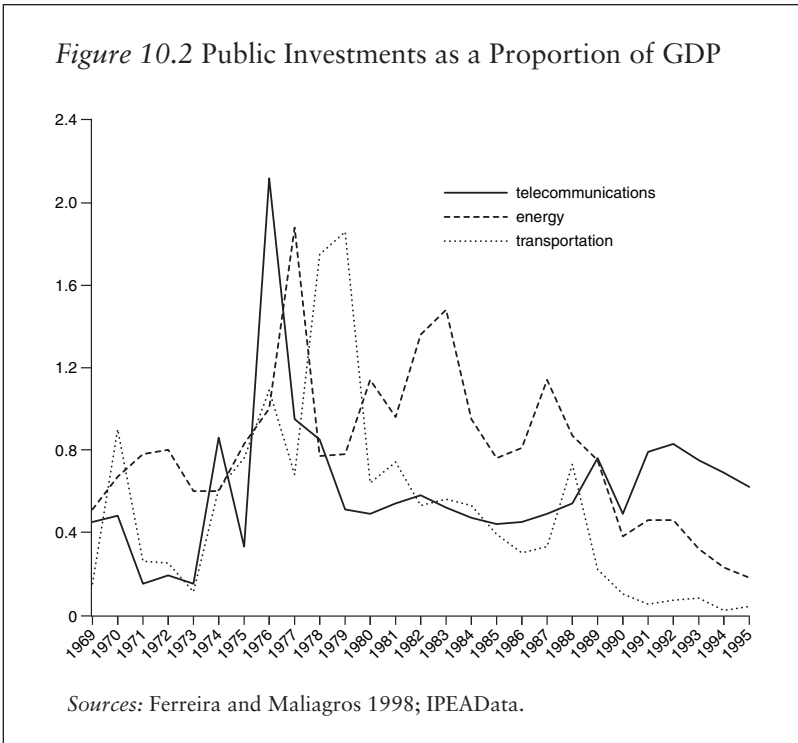
In fact, most of the (recent) observed fall in the public investment ratio is due to the central government, whose current investment, as a percentage of GDP, amounts today to half the 1994 value (it stands at 0.7 percent to 0.9 percent of GDP). Fiscal adjustment is the main explanation for this fall. After 1994, as part of the Real Plan, tighter controls over public finance were introduced in the country, perhaps for the first time. Although initially the adjustment was achieved mainly through tax increases, the numbers show clearly that investment, and particularly infrastructure investment, was badly affected. Public expenditure in Brazil



is extremely rigid, with mandatory outlays in education, health, personnel, social security, and so on. Even so, there are few restrictions—legal or political—on investment, which gives the government a relatively low-cost option to reduce public expenditure, or at least to compensate for spending increases in other dimensions.³

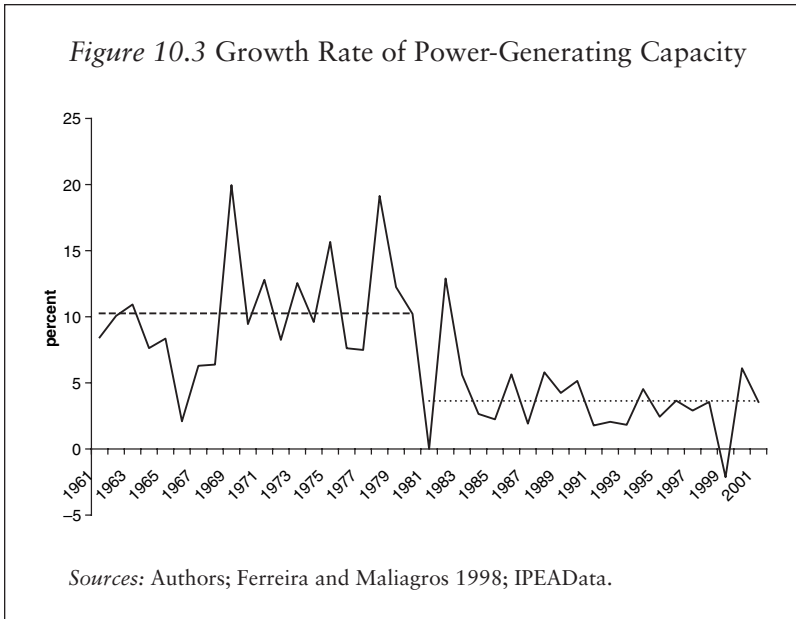
Figure 10.2 shows gross investment as a percentage of GDP by infrastructure sectors. It is apparent that the drop in infrastructure expenditure in Brazil affects all sectors. In almost all cases it started at least 20 years ago, when the first fiscal crisis (in 1982, after Mexico's default) exploded. Given that almost all telecommunication businesses were privatized before 1999, the recent fall in (public) investment in this sector comes as no surprise. As for investments in energy, they reached a peak in 1976 and remained relatively high until the early to mid-1980s. Since then, a pronounced downward trend has continued until today. The fall in transportation investment is even more pronounced.⁴ Numbers in Velloso (2004) show that in 2003 the investments of the Ministry of Transportation accounted for only 0.1 percent of GDP. According to Afonso, Araújo, and Biasoto Jr. (2005), the investment of the three levels of government in 2003 in the transportation sector accounted for only 0.5 percent of GDP.

Investment in electricity suffered a steep decrease from the 1980s on. In fact, investment in power generating in 1995 was less than 30 percent of corresponding investment achieved in the peak year of 1982, which is more or less the same picture observed for total investment. Figure 10.3



shows that the decrease in investment had a strong effect on the expansion of generating capacity, whose growth rate decreases after 1981. The slow-down of capacity of generating growth continued after 1995, as shown in figure 10.3. This figure also displays the mean growth before and after 1980: 10.3 percent and 3.6 percent, respectively.⁵

It is relevant to understand the relationship between infrastructure investment and variations in infrastructure stocks. In other words, good theoretical reasons (see Pritchett 2000) and anecdotal evidence in Brazil show that money invested or accounted as investment does not necessarily end up as actual variation in infrastructure stock.⁶ Figure 10.4 presents total investment in roads (all investment figures are from Ferreira and Maliagos (1998), and *new* paved roads, constructed from World Bank data. Until 1978, both new construction and investment grew more or less together, but correlations are less pronounced after 1980. Except for a steep fall in 1978 that looks like a data problem, however, the extension of new paved roads has fallen less than investments in the last two decades. When a trend line is adjusted to include investment and new roads, the downward slope of investment starts at 1976–77 and is never reverted. In the case of new roads, the trend was never negative after



the break in the same period. The correlation figures also point to some change of patterns. Between 1961 and 1980, the investment and new roads correlation is 0.54, but it is only 0.07 from 1980 to 1995, and it is 0.36 for the entire period.⁷

To further explore the relationship between investment flow and stock variation, we performed some simple econometric analysis in a previous version of this chapter. In this earlier analysis, the annual change of three physical measures of infrastructure—paved roads (*PAV*), main telephone lines (*TEL*), and power-generating capacity (*CAP*)—was regressed on the respective investment series. Table 10.1 presents a sample of these regressions.⁸

In the models above (and many others we ran), the estimated coefficients are significant and have the right sign. Moreover, the magnitude of the estimated elasticities is considerably large. For instance, a 10 percent increase in investments in the energy sector implies an 8 percent expansion in generating capacity. Similar results were obtained for the transportation and telecommunication sectors. In general, the explanatory power of the regressions, as given by the R^2 , is high. This suggests that once infrastructure investment is allowed to increase, the corresponding expansion of power-generating capacity and paved roads, for instance, will be vigorous, even if there is a small amount of waste in the process.

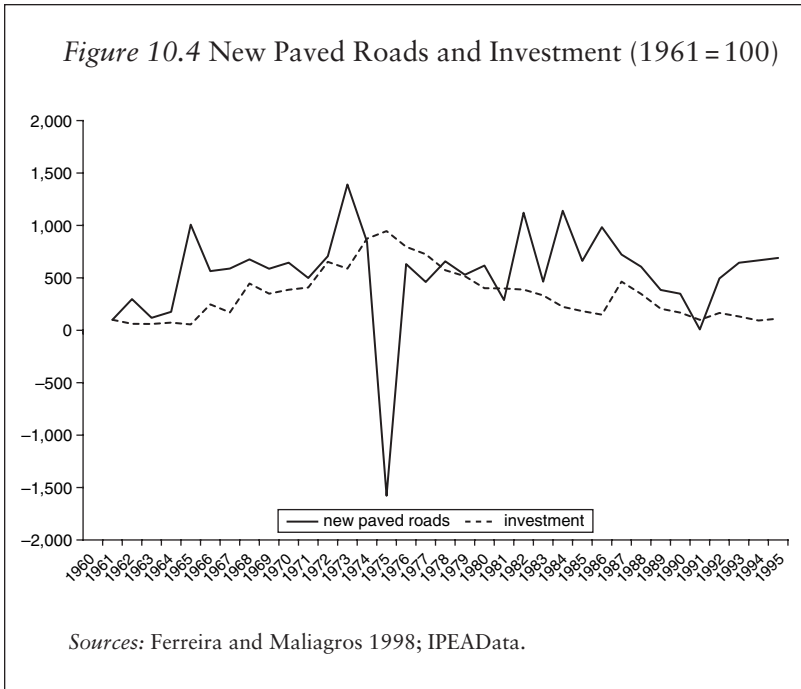


Table 10.1 Regressions of Stock Change on Investment Flows

	<i>Equation</i>	1	2	3
		ΔPAV	ΔCAP	ΔTEL
C		4.23 (6.32)	0.61 (0.26)	1.12 (2.15)
Investment in roads		0.37 (2.24)		
Investment in energy			0.80 (2.98)	
Investment in telecommunications				0.75 (7.50)
Observations		31	29	28
R^2		0.09	0.40	0.46

Source: Authors.

Note: White's heteroscedasticity correction used in all regressions.

III. The Growth Impact of Infrastructure

Having established a firm relationship between investment flows and infrastructure capital variation, the next step is to assess relationships between public capital and GDP (and per capita GDP). After that, we verify the short- and long-term impact of public capital shocks on output.

Figure 10.5 presents the evolution of GDP and public administration net stock of capital (IPEA data series) from 1960 to the present.⁹ The latter is divided between structures and machinery and equipment capital.

As one might expect, given the likelihood that public capital measures and GDP contain a common trend, these series move closely. The same can be said of physical measures of infrastructure capital and GDP. Another exploratory analysis of this relationship is presented in the correlation table (table 10.2), in which variables are expressed in level below the main diagonal and in first differences above it. *Y* stands for GDP, *y* for per capita GDP, *KGs* for public structures, and *KG_e* for public stock of machinery and equipment.

Not surprisingly, the correlations in levels are all large and close to one. However, the correlations in first differences are all positive and not small either. A similar pattern can be found in the correlations between physical measures of infrastructure and GDP, as shown in table 10.3.

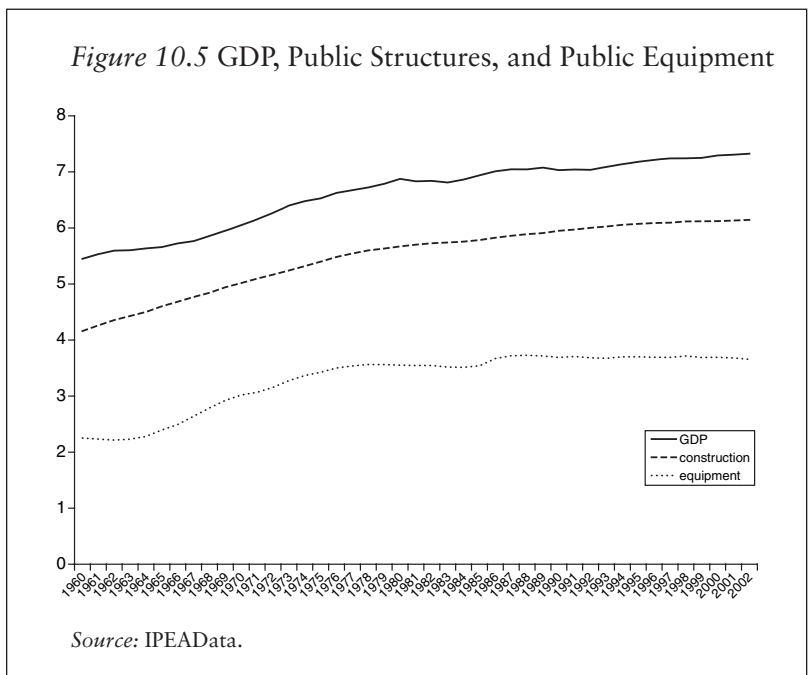


Table 10.2 Correlation Matrix, Structures and Machinery

	Y	y	KGs	KGe
Y		0.994	0.493	0.543
y	0.973		0.409	0.506
KGs	0.970	0.971		0.598
KGe	0.927	0.965	0.979	

Source: Authors.

Note: Variables are in level under main diagonal and in first difference above it.

Table 10.3 Correlation Matrix, Physical Assets

	Y	y	CAP	PAV	TEL
Y		0.994	0.485	0.255	0.303
y	0.991		0.421	0.216	0.301
CAP	0.995	0.977		0.090	0.284
PAV	0.972	0.950	0.972		-0.201
TEL	0.974	0.942	0.985	0.938	

Source: Authors.

Note: Variables are in level under main diagonal and in first difference above it.

Again, correlations between GDP (and also per capita GDP, *y*) and infrastructure stocks are close to one. The first difference correlations are, as expected, smaller, and the largest magnitude corresponds to the case of power-generating capacity (*CAP*). The correlations with the variation of paved roads (*PAV*) were the weakest among all pairs, while that of main telephone lines (*TEL*) displays intermediate values. As a first indication, a positive link seems to exist between output and public capital and infrastructure.¹⁰

We next use time-series econometric techniques, particularly vector-autoregressive (VAR) models, to study the relationship between output and public capital and infrastructure. We want to estimate long-term relationships to build a dynamic model to be used in impulse-response exercises. In essence, we estimate the output impact of changes in infrastructure capital.

The first step is to test variables for unit roots. We used Augmented Dickey-Fuller, Phillips-Perron, and Kwiatkowski-Phillips-Schmidt-Shin tests, and in all three cases and for all variables, we could not reject the hypothesis of the variables being integrated of order one.

Table 10.4 presents, in rows, the result of the cointegration estimation of output per worker on public and private capital per capita and human

capital. We used the KGs series for public infrastructure; the IPEAD data series of private stock of machines and equipment, KPe, for private capital; and secondary attainment, from the Barro and Lee (2000) database, for human capital, KH.

Ferreira, Issler, and Pessôa (2004) test different production functions used in growth studies and their results favor the Mincerian specification of human capital against more traditional specifications such as that used by Mankiw, Romer, and Weil (1992). In practical terms, once we apply logarithms, the only difference between functional forms is whether human capital enters in logs or levels. In table 10.4, we included both. Although we are not estimating production functions, results are sensible to the way we introduce human capital in the regression. We found one cointegration vector and the constant term is omitted.

In all estimations shown, the coefficient of public capital was estimated with the right sign; however, in most cases, it was not statistically significant at the usual confidence levels. When we use a different time period, 1960–96 instead of 1996–2000, estimations are more precise with respect to the coefficient of KGs. In the case of the fourth regression, when capital enters in levels, the fit is much better, confirming a long-term relationship between output and public capital. The estimated coefficients might be interpreted as long-run elasticities; hence, from a steady state to another, the estimates of this last equation show that a 10 percent change in public infrastructure stock is associated with a change of 2.2 percent in output per worker. This shall be our benchmark model. It is important to control for human capital and private capital, because the omission of any of these variables would boost the estimated impact of public infrastructure on output. In fact, bivariate cointegration regressions between y or Y and

Table 10.4 Cointegration Equations, Variables per Worker

Sample	Y	KGs	KPe	KH*	KH
60–00	1.0	–0.04	–0.59		–0.94
	0	(0.08)	(0.06)		(0.11)
60–96	1.0	–0.16	–0.53		–0.75
	0	(0.11)	(0.07)		(0.17)
60–00	1.0	–0.06	–0.59	–0.25	
	0	(0.09)	(0.06)	(0.03)	
60–96	1.0	–0.22	–0.51	–0.19	
	0	(0.12)	(0.08)	(0.04)	

Source: Authors.

Note: ADF/PP/KPSS tests support the hypothesis of first-order integration of all variables. Variables in logs, except KH*.

KGs or *KGe* found long-run elasticities above one, as the latter most probably were capturing the effect of omitted variables.

Estimations are more precise when we normalize variables by population instead of labor force; although the latter makes more sense from an economic perspective. However, the population series is an official statistic from the Instituto Brasileiro de Geografia e Estatística (IBGE, the Brazilian statistic bureau); while the labor force data is constructed interpolating census data, and therefore it is somewhat arbitrary. As a double check, the results are presented in table 10.5.

Similar to the per-worker estimations, regression results with the full sample are less precise. In all cases, however, the coefficient of *KGs* has the right sign and its magnitude is in line with the literature. Once again, the best fit was obtained when using human capital in levels and the shorter sample. In this case, the estimated coefficient was larger than before, implying that a 10 percent increase of the stock of public infrastructure would raise long-term output per capita by 3.3 percent.

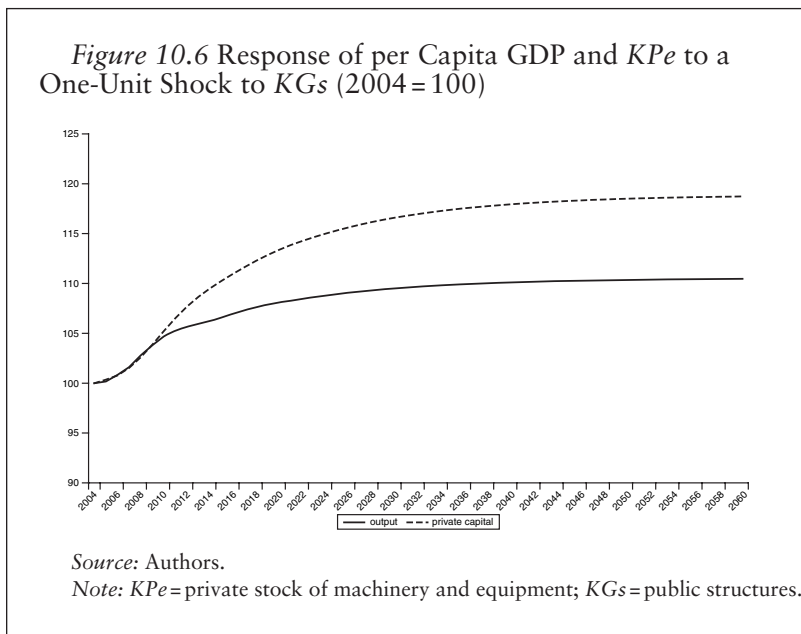
For a set of integrated variables, the Granger Theorem of Representation establishes the equivalence between cointegration and Vector Error Correction Model (VECM). Hence, we estimated the corresponding VECM for the fourth model in table 10.4 (1960–96 sample, *KH* in levels), which uses the smaller sample, and from which we obtained a dynamic system of equations for *y*, *KGs*, *KPe*, and *KH*, with the latter variable expressed in levels. We used this VAR system to simulate the response of economic variables to infrastructure shocks.¹¹ Figure 10.6 presents the response of per capita output and private capital to a shock corresponding to 1 percent of GDP.

Table 10.5 Cointegration Equations, Variables per Capita

Sample	<i>Y</i>	<i>KGs</i>	<i>KPe</i>	<i>KH</i> *	<i>KH</i>
60–00	1.00	–0.21 (0.20)	–0.38 (0.13)		–0.79 (0.32)
60–96	1.00	–0.25 (0.14)	–0.50 (0.08)		–0.84 (0.25)
60–00	1.00	–0.09 (0.10)	–0.59 (0.06)	–0.30 (0.04)	
60–96	1.00	–0.33 (0.15)	–0.46 (0.09)	–0.19 (0.07)	

Source: Authors.

Note: ADF/PP/KPSS tests support the hypothesis of first-order integration of all variables. Variables in logs, except *KH**



The cumulative impact of changes in public capital on private capital and output per capita is relatively sizeable, particularly if we consider the long-term response. Per capita output increases by 10 percent in the long term and KPe by almost 20 percent. The autoregressive character of the growth rate of output has a significant feedback impact in all equations and in the propagation of the initial shock. In this sense, after its initial shock of 1 percent, public infrastructure increases in the long term by almost 8 percent, and its convergence rate is faster than those of other variables. The cumulative responses are large and well above similar exercises that use U.S. and OECD country data (see, for instance, Perotti 2004). These results are robust, and they do not change significantly when we use the full sample or change the form in which human capital enters in the regression.¹² The productive impact of infrastructure in Brazil is significant and large.

IV. An Experiment on Cash Flow and Solvency

We next perform a (partial equilibrium) simulation of the impact of increasing public investment, using debt finance, on tax collection, debt, and public solvency. The experiment is simple, but it can be useful as a first approximation and provides an idea of the magnitudes of the impact and the limitations of this type of policy. We investigate the impact of one single project—that is, public investment increases by 1 percent of GDP in

one year—on the government' future cash flow and net worth. In essence, we want to study whether public investment in infrastructure pays for itself, especially in the form of increased tax collection.

We use the impulse-response system of section III to simulate in the first place the paths of GDP and KG_s after a shock to the latter at time zero (time zero is set to be 2004), and the initial increase in KG_s is financed entirely by debt. From the simulated path of output, we calculate the variation of tax revenues, assuming that the tax ratio remains forever at the current level, 35 percent. This is trivially given by $dTax_t = 0.35 \gamma dY_t$, and the trajectory of taxes follows that of GDP.

Moreover, from the path of KG_s , we have to calculate the increase in gross public investment, which is a cost. This is done using the following formula:¹³

$$I_t = KG_{s,t+1} - KG_{s,t} + (KG_{s,t} - KG_{s,0}) \delta \quad (1)$$

Additional assumptions were necessary to run this experiment. First, we set the real interest rate constant at 8 percent for the entire period. This is not far from its current value. Currently, interest rates on central government bonds are close to 8.5 percent to 9 percent in real terms, although this is clearly not an equilibrium value. When considering longer periods (say, the last 20 to 30 years) this rate may be below 8 percent, but discount rates used in the privatization of public infrastructure in general were above this rate, which is also close to the rate at which the federal government finances its investment projects.

Note, however, that the assumption of a constant interest rate, although necessary for the simulations in this subsection, may be problematic. First, in the long term, public capital accumulation and the increase in government net worth will decrease the interest rate. In contrast, given current levels of the debt-to-GDP ratio, short-term growth in debt and reduction in net revenues will pressure this rate upward. Given the simple partial equilibrium methodology we use, it is impossible to verify which effect dominates. We relax, albeit arbitrarily, this assumption in one simulation presented in figure 10.7.¹⁴ Second, we abstract any general equilibrium consequence of public capital on private capital, which can be positive or negative, depending on many factors, and which can certainly affect tax collection.

Finally, results are somewhat influenced by depreciation rate, as it affects gross investment and costs. We used as a benchmark 5 percent, but also 3.5 percent and 10 percent, as a robustness check. The chosen value may seem low, but we consider it adequate for public capital structures. Moreover, it is close to most estimates in the literature. For instance, Morandi and Reis (2004) estimated that the depreciation rate in Brazil is, on average, 3.7 percent. Pereira and Ferreira (2007), using standard calibration techniques, found that the depreciation rate of the public capital stock is around 5.4 percent.

A common way to analyze the impact of a given project on fiscal sustainability is to study its influence in the government net worth:

$$NW = \sum_{t=0}^T \frac{(Tax_t - I_t - C_t)}{(1+r)^t} - D_0 \quad (2)$$

As is standard, the net worth is the present value of government primary surplus, $(Tax_t - I_t - C_t)$, minus the initial value of debt. This is a straightforward calculation, given the simulated values of tax collection and investment above and the hypothesis that public consumption, C , does not change with new capital projects. In equation (2), we are not considering user fees nor are we taking into account the increase in the value of public assets, that is, the variation of KG s.

We performed this exercise for different models (that is, human capital in level or in logs) and time periods (full sample or the 1960–96 sample). Results are somewhat influenced by whether we use per capita or per labor values, but qualitative results do not change. Following Perotti (2004), we report result in table 10.6, assuming the final date T to be 5, 10, or 20 years, and the order of the models follows that of table 10.4.

Net worth values are presented as a proportion of 2004 GDP and correspond to the models in per worker terms. Given the large response of GDP to public capital shocks observed in the exercises of the previous section, the net worth of an investment project, which is equivalent to an increase of 1 percent in GDP public capital stock, is positive in the very long term (after 20 years). Hence, public investment does pay for itself, in the sense that the increase in tax collection is more than enough to offset the debt increase and the necessary investment implied by the increase in public capital after the initial shock. This result contrasts with the results

Table 10.6 Net Worth as Proportion of GDP

<i>Sample</i>	<i>5 years</i>	<i>10 years</i>	<i>20 years</i>
60-00 (KH)	-0.3	-1.6	3.1
60-96 (KH)	-2.3	0.4	7.0
60-00 (KH)	-2.6	-0.6	3.9
60-96 (KH)	-2.1	0.9	7.1

Source: Authors.

Note: Obs. = models in each line correspond to those in table 10.4.

in Perotti (2004), who rejects the hypothesis (for six OECD countries) that shocks to public investment are self-amortizing.

Note, however, that in all cases the transition involves negative values during a long period. In all models, net worth is negative after five years and in two of them it is still negative after 10 years. This is so because the response of public capital is initially faster than that of GDP and taxes, which is a fixed proportion of the former. Estimations using the full sample reached more modest outcomes in the long term (around half the values obtained with the smaller sample). In the benchmark model (line four, human capital in levels and shorter sample) net worth is positive but close to zero 10 years later. This could mean that, if the government decides to implement annually a sequence of projects using debt finance, the costs along the transition could be too high and not sustainable, even if in the long term solvency is guaranteed.¹⁵

Results depend on the value of the interest rate and on the depreciation rate used in the investment equation. Larger depreciation rates imply higher investment in the future, and consequently net worth falls. However, there is no significant change when parameters are kept within realistic bounds. For instance, with $\delta = 10$ percent, net worth as a proportion of GDP after 20 years decreases to 6.1 percent in the benchmark model.

Similarly, net worth falls with interest rate, as we heavily discount the future. However, the benchmark model delivers positive net worth of this type of investment project for any reasonable combination of parameters, and interest rate has to be well above 15 percent—everything else constant—to change results qualitatively. In the full sample model, results are somewhat more sensitive to parameters' values, but even in this case, only with $r = 12$ percent and $\delta = 10$ percent, does the net worth as a proportion of current GDP fall to zero.

The same holds true for the assumption that tax collection will stay forever at 35 percent of GDP. If this value falls in the future, investment may not pay for itself. It is more likely, however, that taxation will grow in Brazil, because in the previous 15 years it went from 25 percent of GDP to 35 percent, so a decline does not seem likely. Moreover, even with tax collection at 25 percent of output, net worth is still positive when considering the 20-year period. All in all, we do not think that results are driven by our assumptions, and they look quite robust to reasonable changes in the parameters' values.

One variation of equation (1) is worth studying, which is to take into account the increase in the value of public assets, that is, to add the variation of *KGs* to the government net worth. In doing so, we have to decide what fraction of new public structures are liquid or what is the relationship between the estimated variation in real terms of *KGs* and its market value. A one-to-one hypothesis is certainly extreme, because a large part of infrastructure in this country (for example, most roads and sewage systems in poor regions) cannot be sold to private agents at a positive price because

demand is low or at least low enough not to pay for the investment. Just as a benchmark, for lack of a better number, let's say that half the increase in public capital could be sold at its estimated value.

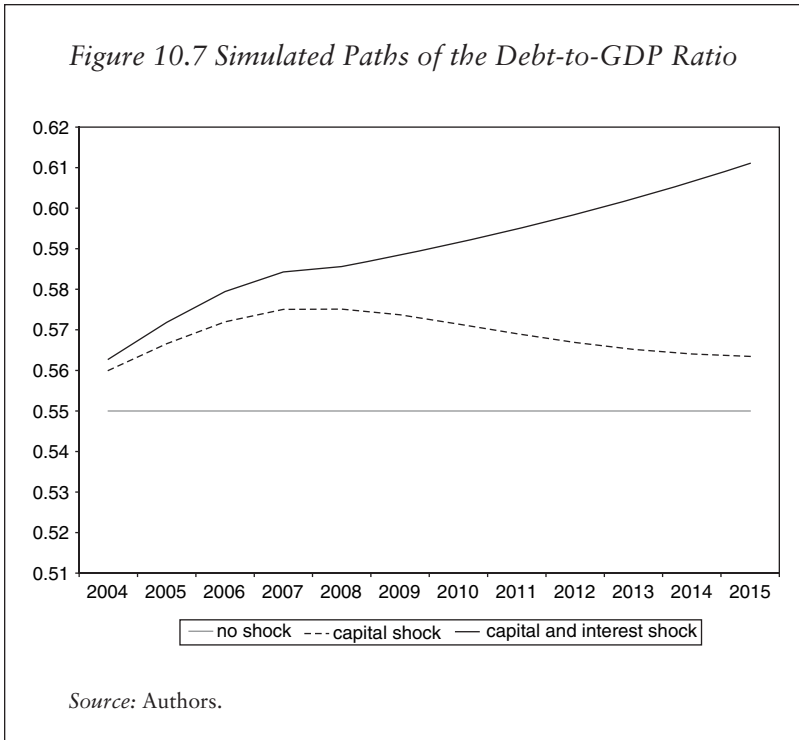
Another required decision concerns the date when these assets would be sold. If we set a date too far in the future, the variation of *KGs* in present value tends to zero. We will estimate this modified net worth (equation (1) plus the present value of the variation of public capital) following the years shown in table 10.6. As expected, solvency improves. In the benchmark case, the net worth of a project corresponding to an initial increase of *KGs* of 1 percent of *GDP* is now only 2 percent after five years and 2.1 percent when considering 10 years, as opposed to -2.1 percent and 0.9 percent, respectively, observed in table 10.6. In the case of the full-sample model (human capital in levels) net worth after 10 years is now positive.

Although results in general are favorable to the argument that investment pays for itself and that one should not impose too many restrictions on debt finance of capital expenditures, some caution is necessary. First, not all types of public structures are liquid or can be sold at a premium. Most probably, the majority are not, and the recent public-private partnership (PPP) law is an indication of that. Moreover, in the impulse-response exercise, there is no loss or inefficiency—that is, there are no “white elephants” and every Brazilian real invested turns into public capital that generates enough tax revenue or is potentially interesting to the private sector. It is highly unlikely that all new public assets could be classified as such.

This does not imply that our results are invalid, it only qualifies them. On the one hand, there are clear and robust indications that debt finance is worth pursuing as a mechanism to fund public infrastructure. On the other hand, our methodology assumed that all public investment projects are (equally) “good projects,” which is not the case. Moreover, as noted before, estimated elasticities and the response of *GDP* to *KGs* shocks are large and well above those obtained in similar studies for other countries.

Figure 10.7 presents the paths of public debt ratio corresponding to two simulation exercises. In both cases, debt and *GDP* series were obtained separately: the former is the old debt plus the initial shock, compounded in each subsequent period by the interest rate, while the *GDP* path is obtained from the impulse-response exercise.

The horizontal line assumes that primary surplus would stay at a level high enough to hold constant the debt ratio in the absence of shocks. The line in the middle corresponds to the previous simulation (a temporary shock to *KGs* of 1 percent of *GDP* financed by debt issue) and shows that new public investment expenses may lead to short-term problems for public finances (as the debt ratio overshoots), although in the medium to long term the debt ratio falls. However, after 10 years, the debt ratio is still marginally above its preshock level, and it will take some years to fall below such a level.¹⁶



If investors respond to the negative fiscal shock by demanding higher interest rates to refinance old public debt and to finance the new project, the short-term problems become more acute (see upper line). In this simulation, the interest rate increased by 0.5 percent in 2005 and decreased subsequently by 0.1 percent a year, until it returned to 8 percent, its original level. In this case, 10 years after the shock, the debt ratio is still six points above 55 percent and it exceeds this value for decades. This adds another caveat to the results in table 10.6.

V. Conclusion

In this chapter we have shown, using different data sets and methodologies, that the productive impact of infrastructure in Brazil is relevant. Impulse-response exercises indicated that the observed decrease in capital expenditures in the recent past might have hurt growth and brought about high output and social costs. In most exercises, we showed that shocks to infrastructure stock can generate sizeable variations in output.

There is now consensus in Brazil on the need to expand capital and maintenance expenditures in the infrastructure sector. However, fiscal irresponsibility in the past led the public sector to record-high indebtedness levels, which demanded tight fiscal policies from the central and state governments in recent years. Such policies are often perceived as the cause of the reduction of infrastructure expenditures, so that under current rules, it is not realistic to expect a considerable expansion of public investment. Moreover, simulations reported in this chapter showed that if entirely financed by debt, the expansion of public capital expenditures might lead in the short and medium term to debt-to-GDP ratios above the current level. Given that this ratio in Brazil is already extremely high, public sector solvency is an issue. Small increases in this ratio, even a short-term variation backed by future tax collection or user fees, may lead to increases in the interest rate of public bonds that could offset future revenue gains. For this not to be the case, Brazil will first have to increase creditworthiness and achieve debt tolerance, primarily by reducing debt ratios well below the current level.

Further discussion of new rules and regimes for financing public investment is beyond the scope of this chapter. Given that the gap in infrastructure investment has significant productive impacts, however, this is an important question that should be immediately addressed by policy makers and academics. We showed in the net worth simulations that public investment most likely “does pay for itself.” The present value of tax revenues and the capital gain associated with new investment projects is, in the long term, above the costs involved. Although we made somewhat strong assumptions about the market value of public assets and efficiency of public investment, this result is robust. This is an indication that debt finance could be used, but that it should be restrictive and selective and should be associated with projects that clearly generate enough revenue or are potentially interesting to the private sector.

Annex 10.1 Dynamic System of Section III

The system below corresponds to the benchmark model and was used in the simulations in sections III and IV.

$$\begin{aligned}
 Y_t &= 0.82 + 0.57Y_{T-1} - 0.04Y_{T-2} - 0.67Y_{t-3} + 0.16KPU_{T-2} - 0.42KPU_{t-3} \\
 &\quad + 0.04KPR_{T-1} + 0.06KPR_{T-2} + 0.11KPR_{t-3} - 0.49KH_{T-2} + 0.34KH_{t-3} \\
 KG_{st} &= 0.01 - 0.008Y_{T-1} - 0.11Y_{T-2} - 0.09Y_{t-3} + 1.65KPU_{T-1} - 0.41 \\
 &\quad KPU_{T-2} - 0.23KPU_{t-3} \\
 &\quad + 0.22KPR_{T-1} - 0.45KPR_{T-2} + 0.24KPR_{t-3} - 0.11KH_{T-1} + 0.07 \\
 &\quad KH_{T-2} + 0.04KH_{t-3}
 \end{aligned}$$

$$\begin{aligned}
 Kpe = & 0.23 + 0.04Y_{T-1} - 0.06Y_{T-2} - 0.30Y_{t-3} + 0.38KPU_{T-1} - 0.24 \\
 & KPU_{T-2} - 0.07KPU_{t-3} \\
 & 1.52KPR_{T-2} - 0.29KPR_{T-2} - 0.05KPR_{t-3} - 0.36KH_{T-1} + 0.41 \\
 & KH_{T-2} + 0.01KH_{t-3}
 \end{aligned}$$

Notes

1. Note that at least one-third of public investment in the transport sector is due to municipalities and does not include roads and ports.

2. See Afonso, Araújo, and Biasoto Jr. (2005) for a detailed exposition of the recent evolution of Brazilian public finances.

3. Note that only a small part of the reduction in investment by the central government is related to privatization of services (for example, telecommunications) and industrial enterprises (for example, steel and chemistry).

4. Investments in transportation in figure 10.2 do not include those from the municipalities.

5. Not by accident, in 2001–02 the country experienced energy rationing, most likely for lack of investment.

6. Losses, inefficiencies, or even corruption may result. In the first two cases, consider the billions spent on the Brazilian Nuclear Program, the Transamazônica highway, and the Ferrovia do Aço railroad, huge projects that were either never finished (sometimes finished but never implemented) or ended up costing much more than planned.

7. In most of the exercises in this section, we used 1995 as the end year of our sample. Investment data in the aggregation level used have this limitation, although World Bank data goes up to 2001 in most cases. This is less problematic in the case of roads because data in the final years of the sample are suspect in any case: from 1997 to 2001, total paved roads fell by 45 percent, and in the three years before that, they did not change at all.

8. Variables are in logs and stock data are from the World Bank. There were no cointegration vectors between any pair of variables we tested. We chose to run regressions in OLS, because no error-correction term is omitted in these regressions.

9. The public capital stock series in the IPEAD data (the economic and regional database of the Instituto de Pesquisa Econômica Aplicada) were constructed from past public investment series using the perpetual inventory method.

10. The physical measures include private and public infrastructure, as opposed to the monetary measures in which private and public stocks are separated. For most of the period, however, private infrastructure stocks are small.

11. Alternative ordering of the impulse-response exercises did not significantly change the results.

12. In contrast, when we employ per capita variables, the cumulative impact on (per capita) output and private capital was found to be much smaller, 3 percent and 6 percent, respectively.

13. Note that we subtracted $KG_{S_0} * \delta$ to eliminate the investment necessary to make up for the depreciation of the existing capital stock.

14. One option we tried to pursue without success was to endogenize the interest rate so that its value would be determined, for instance, by the debt-to-GDP ratio. In this case, the problem is the absence, to our knowledge, of any

study of the determinants of the real interest rate in Brazil, much less any stable relationship with $(t)/Y(t)$. Absent such studies, there was no safe way to calibrate the behavior of r .

15. Estimations using per capita variables in two cases reached different outcomes. When using the 1960–2000 sample, even after 20 years, net worth is negative, no matter how human capital is specified. In this case, net worth reaches zero only about 100 years later.

16. This result is sensitive to sample period and specification. In general, the debt ratio falls faster when we use the per-worker specification and the 1960–96 sample.

References

- Afonso, J. R., E. Araújo, and G. Biasoto Jr. 2005. "Fiscal Space and Public Sector Investments in Infrastructure: A Brazilian Case-Study." *Textos para Discussão* No. 1141, Instituto de Pesquisa Econômica Aplicada, Rio de Janeiro.
- Ai, C., and S. Cassou. 1995. "A Normative Analysis of Public Capital." *Applied Economics* 27: 1201–09.
- Aschauer, D. 1989. "Is Public Expenditure Productive?" *Journal of Monetary Economics* 23: 177–200.
- Barro, R., and Lee, J. W. 2000. "International Data on Educational Attainment: Updates and Implications." NBER Working Paper No. 7911, National Bureau of Economic Research, Cambridge.
- Calderón, C., W. Easterly, and L. Servén. 2003. "Infrastructure Compression and Public Sector Solvency in Latin America." In *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*, eds. W. Easterly and L. Servén. Palo Alto, CA and Washington, DC: Stanford University Press and the World Bank.
- Canning, D., and E. Bennathan. 2002. "The Social Rate of Return on Infrastructure Investment." World Bank Policy Research Discussion Paper No. 2390, World Bank, Washington, DC.
- Creel, J., P. Monperrus-Veroni, and F. Saraceno. 2006. "Estimating the Impact of Public Investment for the United Kingdom: Has the Golden Rule of Public Finance Made a Difference?" Unpublished manuscript, L'Observatoire français des conjonctures économiques (OFCE), Paris.
- Easterly, W., and S. Rebelo. 1993. "Fiscal Policy and Economic Growth: An Empirical Investigation." *Journal of Monetary Economics* 32: 417–58.
- Ferreira, P. C., J. V. Issler, and S. A. Pessôa. 2004. "Testing Production Functions Used in Empirical Growth Studies." *Economic Letters* 83 (1): 29–35.
- Ferreira, P. C., and T. Maliagros. 1998. "Impactos Produtivos da Infra-Estrutura no Brasil—1950/95." *Pesquisa e Planejamento Econômico* 28 (2): 315–38.
- Mankiw, G., D. Romer, and D. Weil. 1992. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107 (2): 407–37.
- Mintz, J., and M. Smart. 2004. "Incentives for Public Investment under Fiscal Rules." Unpublished paper, University of Toronto.
- Morandi, L., and E. J. Reis. 2004. "Estoque de capital fixo no Brasil—1950–2002." XXXII Encontro Nacional de Economia, ANPEC.

- Pereira, R., and P. C. Ferreira. 2007. "Efeitos de Crescimento e Bem-estar da Lei de Parceria Público-Privada no Brasil." Unpublished manuscript, EPGE, Getulio Vargas Foundation, Rio de Janeiro.
- Pereira, A., and M. Pinho. 2006. "Public Investment, Economic Performance and Budgetary Consolidation: VAR Evidence for the 12 Euro Countries." Department of Economics, WP 40, The College of William and Mary, Williamsburg, VA.
- Perotti, R. 2004. "Public Investment: Another (different) Look." Unpublished paper, Università Bocconi.
- Pritchett, Lant. 2000. "The Tyranny of Concepts: CUDIE (cumulated, depreciated, investment effort) Is Not Capital." *Journal of Economic Growth* 5 (4): 361–84.
- Roubini, Nouriel, and Jeffrey Sachs. 1989. "Government Spending and Budget Deficits in the Industrial Countries." *Economic Policy* 8: 99–132.
- Velloso, R. 2004. "Cortar gastos correntes é a solução?" *Estudos e Pesquisas do Inae*. Discussion Paper No. 78.

Index

References to boxes, figures, tables, and notes are indicated by “b,” “f,” “t,” and “n.”

A

- accounting, 31, 286, 287, 288–289
 - principles, 234–235, 269–270
 - standards, 255*n*, 274, 288
- accounting gimmicks, 212, 235
- accounting model of budget, 226
- accounting practices, by country, 236*t*
- accrual accounting, 31, 31*t*, 35, 226, 235
 - adopting, 279, 281
 - Australia and UK, 245
 - budget types, 233
 - by country, 236*t*
 - debt financing, 279*t*
 - information provided, 278, 293*t*
 - limits of, 283–284, 285–286
- acyclical policy, 139
- Allen elasticity of substitution, 95
- Argentina, 3*f*, 6*f*, 17, 153, 154*n*
 - budget restrictions, 151–152
 - Convertibility, 131
 - cyclical response, 137*t*
 - debt determinants, 4*f*
 - fiscal federalism, 129–131
 - fiscal responsibility laws, 181, 182
 - procyclicality, 141*t*, 142*t*, 143, 144
 - by province, 145*t*
 - provincial debt, 128
 - structural and actual balances, 187*f*
 - structural primary balance, 184
 - subnational governments, 124, 138, 143
 - surplus change, 136*t*
 - taxation, 140
- Armington investment function, 94
- assets and liabilities, 286, 287
- asymmetric response to business cycle, 169
- asymmetry indicator, 170
- Augmented Dickey-Fuller test, 305
- Australia, 240*t*, 245, 283
- Austria, 240*t*
- automatic stabilizers, 7, 11–12, 76, 77, 79, 85, 104
 - business cycle volatility, 108*f*
 - expenditure side, 34
 - fiscal rules-based policy, 16
 - government size, 14*f*
 - increasing size and effectiveness, 33
 - model, 109
 - response to cyclical conditions, 86*f*
 - by country, 13*f*

B

balance sheet, 278, 279*t*, 294*n*
 elements of, 280*t*
 ideal, 292
 long-term projections, 290
 balance, overall, 30, 184, 185*f*
 balance, primary, 184, 185*f*
 balance, structural, 68
 balance, structural and actual, 187*f*
 Balanced Budget Amendment, 44
 balanced budgets, 67
 Banco de la Nación, 131, 154*n*
 Banco Provincia, 154*n*
 Barro-Ramsey economy, 104
 Barro-Ramsey model, 117*n*
 Belgium, 240*t*
 benefit taxes, 230
 biases, . *See* deficit bias; investment bias; macroeconomic biases
 Bolivia, 164
 bonds, 91, 131, 260, 262
 Brazil, 3*f*, 4*f*, 6*f*, 18
 budget, 298
 budget restrictions, 151, 152–153
 degree of procyclicality, 146–150
 fiscal adjustment, 299
 fiscal federalism, 132–135
 fiscal rebalancing, 33
 fiscal responsibility law, 181
 fiscal strategies, 32
 output growth and fiscal variables, 148*t*, 149*t*
 productive impact of
 infrastructure, 313–314
 public investment, 299, 315*n*
 and GDP, 300, 300*f*, 301*f*
 decline of, 297
 Real Plan, 299
 subnational governments, 124
 Brazilian Fiscal Crimes Law, 16
 budget balance variables, 82
 budget balances, deterioration of, 43
 budget sensitivity to government size, 77
 budgetary rules, 65
 budgets, 8, 68, 232–233

accounting model, 226
 constraints, 201, 247
 investment agency impact, 263–264
 separating capital expenditures, 265, 268
 transparency, 261–262, 266
 business cycle, 12, 70*n*, 175*f*
 and government size, 77
 and tax code, 96
 asymmetric response, 169
 behavior analysis, 88
 controlling through policy, 44
 demand-driven, 79
 fluctuations, 8, 60, 107
 model and LAC, 102
 shocks, 80, 104
 volatility, 108*f*

C

Canada, 241*t*, 246, 254*n*, 255*n*
 capital accounts, 226, 253
 capital budgeting, 226, 233, 235, 237–239, 253–254
 distortions, 265
 fiscal rules, 239–240
 for and against, 268
 for new investments, 254*n*
 United States, 268–269
 capital flows, 163*f*, 175
 capital income tax, 105*f*, 106*f*
 capital market access, 127, 128–129
 cash accounting, 31, 31*t*, 225–226, 234
 debt financing, 279*t*
 information provided, 293*t*
 cash balance, 234–235
 cash deficit, 277, 278
 cash flow, 196, 214–215, 289, 290*f*
 targets, 23, 24, 210, 211
 cash-balance rule, 227–228, 229–230
 cash-flow statement, 278, 279*t*, 280*t*
 Central Bank of Brazil, 150

- Central Bank, Chile, 183
- Chile, *3f*, *6f*, 173, 176, 179
- Copper Stabilization Fund, 16, 178, 183, *190n*
 - fiscal rules, 34
 - structural balance rule, 182–184, *183f*
 - structural surplus rule, 246
- clean-surplus accounting, 278
- Code of Good Practices on Fiscal Transparency, 188
- Coffee Fund, Colombia, 178
- Colombia, *3f*, *4f*, *6f*, 32, 178, 181
- Colombian Oil Stabilization Fund, 178, 180
- commercialization of public services, 29
- commodity prices, fixed or moving average, 180
- consumption, *100t*, *111t*–*116t*
- consumption elasticity estimate, 94
- consumption tax, *105f*, *106f*, 107
- consumption volatility, model simulation, 102
- contingent liabilities, 286
- coparticipation (coparticipación), 130, 131, *141t*, *142t*
- Coparticipation Law, 135
- Copper Stabilization Fund, Chile, 16, 178, 183, *190n*
- cost-benefit analysis, 234
- countercyclical fiscal policy, 5, 135, 159, 182–183
- creative accounting, 235
- credibility, 176–177
- cyclical GDP, *78f*, 124
- cyclical properties of LAC and model economies, 98, *100t*
- cyclical response, *137t*
- cyclical sensitivity, 11, *36n*, 77, 79, 83, *84f*, *108f*
- by country, *165t*
- cyclical stabilization, 7
- cyclically adjusted fiscal balance, 48
- cyclically adjusted rule, 16–17
- D**
- debt, 2, 277, *294n*
- and fiscal balance, *3f*
 - determinants, *4f*
 - discretionary fiscal policy response, *10f*
- debt ratios, 2, 5, 9
- debt rules, 66, 200
- debt targets, 23
- debt write-down and write-up, 202, *218n*
- debt-financing, 231, 233–234, 252–253, 312
- accounting implications, 228–229
 - in cash and accrual accounting, *279t*
 - under golden rule, 250
- debt-output ratio, *101t*
- debt-to-GDP ratio, 66, 202, 312–313, *313f*
- decentralization, 17–18, 54, 81, 132, 152
- default risk, 16, 174
- deficit bias, 15, 16, 166, 169, 174–175, 186
- rigid rules, 177
- deficit rules, 200
- deficits, 198, 260, 268
- EU, *199f*, 259
 - Maastricht Treaty, 229, 240
 - measuring fiscal health, 196, 212
 - SGP, 244, *267t*
- Denmark, *241t*
- depreciation, 235, 267, 309–310, 311
- derivatives, *255n*, 286
- Diamond-Samuelson model, *117n*
- discretionary fiscal policy, 5, 7, 50, 63, 75, 76
- and volatility, 60, 61–62
 - effects and determinants, 8–9
 - examples of, 45–46
 - measuring, 49
 - neutralizing stabilizers, 34
 - procyclical, 164
 - reaction function, *10f*
 - volatility of, 8, 55

discretionary spending, 52–53
 disposable income, 102, 111*t*–116*t*
 distortions, 250, 251

E

Economic and Financial Council
 (ECOFIN), 244
 Economic and Monetary Union
 (EMU), 65, 66–68, 76, 260
 economic crises, 298
 economic instability, 124, 161
 Ecuador, 178, 179, 181
 education, 27, 238–239
 El Salvador, 282, 283*t*
 elasticity, 55, 58, 60, 95
 and output volatility, 61
 model economy, 94
 summary statistics, 51*t*
 elections, 52, 53, 54
 electoral institutions, 65
 Emerging Markets Bond Index
 (EMBI), 175*f*
 euro bonds, 260
 European Central Bank, 66
 European Commission, 46, 68, 69
 bond guarantees, 262
 SGP proposal, 260–261
 European System of Accounts, 255*n*
 European Union (EU), 19, 46,
 244, 259
 countercyclical fiscal policy, 159
 deficits and public investment,
 21*f*, 199*f*, 259
 fiscal rules, 241*t*
 SGP, 15, 271*n*
 expansionary policies, 15–16,
 34, 174

F

fair value, 284
 financial statement elements, 280*t*
 financing constraints, short-term, 274
 Finland, 241*t*
 fiscal activism, 75
 fiscal adjustment, 19, 23, 195, 196

 and public investment, 197–198,
 197*f*
 Brazil, 134, 299
 correcting for deficits, 47
 decline in investment, 248
 illusory, 212
 investment bias, 210
 solvency and economic growth, 20
 fiscal analysis, 276, 285
 fiscal analysts, 282–283, 290, 291
 fiscal balance, 3*f*, 5, 36*n*
 and output, 135
 cyclically adjusted, 48
 measuring, 235
 SGP, 244
 fiscal discipline, 200, 212–213
 fiscal federalism, 128, 129–134
 fiscal gap, closing, 32
 fiscal health, 2, 23, 196
 measuring by cash flows, 214–215
 short-term focus, 160
 using deficit to gauge, 212
 fiscal indicators, 31*t*, 277
 short-term focus, 21, 23, 24, 35
 fiscal information, 30–31, 293*t*
 fiscal policy, 7, 31–33, 61*t*, 69
 constraints, 49–50, 53–54
 cyclicality measure, 103
 effects of restrictions, 58
 in good times and bad, 66–67
 long-term, 229–231
 reducing biases, 186
 responsiveness, 59*t*
 restrictions, 60, 65
 rules-based, 16
 separation of reactions, 48
 smoothing fluctuations, 46
 volatility, 55, 56*t*, 75
 fiscal policy management, 43–44,
 45, 65, 135
 fiscal reaction function, 85
 fiscal reporting, 274, 281, 284,
 287–288
 Fiscal Responsibility Law, Brazil, 150
 Fiscal Responsibility Law, Chile, 183
 Fiscal Responsibility Law, Ecuador,
 178–179

- Fiscal Responsibility Laws (FRLs),
15, 134, 177, 180–182
- fiscal rules, 15, 16, 67–68, 153,
189*n*, 232, 246, 265
- adopting, 190*n*
 - capital budgeting, 226, 239–240
 - cash balance, 229
 - constraining policy, 49–50
 - costs of breaking, 176
 - cyclically adjusted, 16–17, 34
 - deficit financing limits, 253
 - effect on spending behavior, 49
 - EU, 244
 - impact on public investment,
200, 245
 - incentives and exit costs,
175–176
 - investment bias, 26–28
 - OECD countries, 240*t*–243*t*
 - political pressures, 188
 - preferential treatment, 237
 - public resource waste, 215
 - reducing procyclicality, 176–177
 - reduction in capital
expenditures, 248
 - rewriting SGP, 260
- fiscal solvency, 20, 24, 195, 204, 292
- and rules, 26
 - arithmetics of, 201–204
 - constraints, 274
 - debt-to-GDP ratio, 202
 - golden rule, 27
 - measuring, 210
 - public investment effect, 213
 - taxable capacity, 230
 - uncertainty, 276
- fiscal statistics' preparation, 274, 281
- fiscal variables and output, 139*f*,
148*t*, 149*t*
- flexibility, 67–68, 176–177
- fluctuation sources, 80
- France, 244, 259
- G**
- Germany, 241*t*, 244, 245, 259
- SGP, 262, 268
- golden rule, 26, 27, 35, 68, 215,
228, 244–245
- investment incentive, 249–251
 - limitations, 28
 - modified, 35, 252–253, 254
- government borrowing, 15, 26, 28
- government consumption, 121
- government debt, 111*t*–116*t*.
- See also* public debt
- government expenditures, 144,
186*f*. *See also* public
expenditures
- during slowdown, 173*f*
 - productive and unproductive, 210
 - recurrent, 231
 - restraining in booms, 179
- government size, 76, 77, 109, 117*n*
- cyclical sensitivity, 85
 - stabilizing role, 14*f*, 78*f*, 79,
107, 109, 110*f*
- government spending, 56*t*, 103,
111*t*–116*t*
- behavior and fiscal rules, 49
 - cyclical properties, 100*t*
 - discretionary changes, 52
 - for analysis of fiscal policy, 49
 - persistence determinants, 57*t*
 - policy responsiveness, 59*t*
 - procyclicality, 8, 121, 126–129
 - public investment and fiscal
adjustments, 198
 - shocks, 104, 107
- governments, 6*f*, 43, 71*n*, 174
- “bad,” 236–237, 252
 - constraining behavior, 44
 - decentralization, 17–18
 - policy flexibility, 276
 - policy implementation
constraints, 53–54
 - political pressure, 127, 128
 - responsible spending in booms
and busts, 174, 176
 - subnational, 124, 134
- Granger Theorem of
Representation, 307
- growth, 60, 63*t*, 302*f*, 78*f*, 162*f*
and volatility, 47–48, 62

- detrimental effects of
 - procyclicality, 126
 - due to fiscal corrections, 20
 - economic instability effects, 161
 - impact of investment, 166, 205, 216, 217, 219*n*, 304–308
- guarantees, 286, 288

- H**
- health care, 27, 238
- Hodrick-Prescott filter, 102, 103, 112*tn*, 147
- human capital, 231, 306, 307

- I**
- IFRS. *See* International Financial Reporting Standards
- Imposto Sobre Produtos Industrializados (IPI), 150
- Impostos Sobre Circulação de Mercadorias e Prestação de Serviços (ICMS), 149, 150
- impulse-response, 309, 312
- incentives, 1, 175–176
- income statement, 278, 279*t*, 280*t*, 292, 294*n*
- income tax, 79, 105*f*, 106*f*, 107
 - as stabilizer, 11
 - progressivity, 92, 104
- income, cyclical properties, 100*t*
- inflation, 70*n*, 117*n*, 152
- infrastructure. *See* public infrastructure
- Infrastructure SpA, 271*n*
- institutional constraints, 12
- institutional effects on fiscal policy, 50
- institutions, 59*t*, 60–62, 69, 151
 - environment, 50, 53
 - impact on policy, 55, 58, 60
- interest rates, 208–209, 309, 311
- intergenerational equity, 231, 251
- intergenerational fairness, 275
- International Financial Reporting Standards (IFRS), 281, 286
- International Monetary Fund (IMF), 17, 69, 159
 - accounting standards, 282
 - public enterprise consolidation, 287
 - structural balance framework, 188, 189
- International Public Sector Accounting Standards (IPSAS), 274, 281, 284, 286, 287
 - uncertainty, 288–289
- intertemporal budget constraint, 27, 201, 210, 215–216
- investment agencies, 29–30, 263, 264, 266
 - design of, 270–271
- investment bias, 18–20, 20–21, 23–28, 169, 186, 215, 33, 226, 200, 253–254
- investment deduction, 105*f*, 106*f*
- Italy, 246–247

- J**
- Japan, 242*t*
- JP Morgan Latin American Eurobond Index (LEI), 94

- K**
- Krueger, Anne, 70*n*
- Kwiatkowski-Phillips-Schmidt-Shin test, 305

- L**
- La Rioja, 130
- LEI. *See* JP Morgan Latin American Eurobond Index
- lending spread, 104, 107
- liabilities. *See* assets and liabilities
- liquidity, 23, 30, 31
- long-term projections, 31, 31*t*, 35, 289–292, 290*f*, 293*t*

M

- Maastricht Treaty, 66, 68, 117, 159, 225, 244, 229, 240, 245, 248–249
 - deficit targets, 198
- macroeconomic aggregates,
 - persistence of, 115*t*–116*t*
- macroeconomic biases, 45–46
- macroeconomic performance, 8, 60, 61–62, 69
- Macroeconomic Stabilization Fund, Ecuador, 178, 179, 181
- Macroeconomic Stabilization Fund, Venezuela, 178
- maintenance spending, 24, 208, 209, 219*n*, 220*n*, 275, 291, 314
 - see also* operations and maintenance expenditures
- Mankiw's Savers-Spenders Theory of Public Finance, 81
- market access, 17, 36*n*, 144*t*
- market failures, 174–175
- Markov process, 103
- Mercosur, 190*n*
- Mexico, 3*f*, 4*f*, 6*f*, 179
- monetary policy, 8, 66, 69, 76, 77
- money growth volatility, 163
- monitoring, 67, 69, 70
- Monte Carlo experiments, 103–104
- Moody's, 282
- moral hazard, 236–237, 250–251
- Multilateral Development Bank, 189

N

- Netherlands, the, 242*t*
- New Zealand, 242*t*, 282*t*
 - financial statement, 280*t*, 281
 - long-term projections, 290*f*, 291
- Nicaragua, 164
- nondiscretionary fiscal policy, 75–76
- Norway, 242*t*, 245

O

- Oil Stabilization Fund, Mexico, 179
- operating balance, 235, 245
- operating-balance rule, 228, 229–230
- operations and maintenance
 - expenditures, 208, 209, 219*n*, 220*n*
- opportunism, 276–277
- opportunistic cycle, 52
- optimizing households, 87–89
- ordinary least squares (OLS), 83
- Organisation for Economic Co-operation and Development (OECD), 46, 240*t*–243*t*
- Organization of Eastern Caribbean States (OECs), 8, 76
- output, 103, 135, 306*t*
 - and public capital, 305, 306–307
 - correlations, 113*t*–114*t*
 - provincial, 138, 139*f*
 - relationship to subnational variables, 148*t*
 - response to shock, 308, 308*f*
 - volatility, 105, 105*f*, 106*f*, 107 and investment, 64*f*
 - automatic stabilizers, 76
 - costs, 47
 - fiscal policy characteristics, 61*t*
 - link to discretionary fiscal policy, 60
 - relation to growth, 62
 - shocks, 80
- output gap, 9
- output ratio, cyclical properties, 100*t*
- overall balance, 30, 211, 211*f*

P

- parameter values for model
 - economy, 93–97, 99*t*
- parameterization strategy results, 97–98
- partisan cycle, 52
- Pechman's indicator (PI), 81, 83, 84*f*, 108*f*

- permanent-balance rule, 27,
 - 71*n*, 215, 228–229, 251–252, 274
 - limitations, 28
- Peru, 3*f*
- Phillips-Perron test, 305
- Poland, 242*t*
- political budget cycles, 52
- political constraints, 9, 12, 53, 71*n*
 - impact on policy, 55, 58, 60
- political decisions, 130, 298
- political incentives, 16, 24, 34, 37*n*
- political manipulations, 21, 45, 51, 54, 236–237
- political pressures, 127, 188
 - during boom and bust, 174, 176
- Ponzi scheme, 201
- Portugal, 244, 259
- poverty, 161, 163, 164
- primary balance, 148
- primary deficit, 7*f*, 30
- private sector investment, 209, 234
- privatization, 29, 200, 218*n*, 315*n*
- procyclical consumption, 121
- procyclical fiscal policy, 5, 11, 15, 23, 33, 34, 46, 103, 122*f*, 123*f*, 124, 166, 186
 - asymmetric response to business cycle, 169
 - decentralization, 17–18
 - from subnational governments, 150
 - investment bias, 20–21, 21
 - macroeconomic effects, 46, 163
 - political constraints, 71*n*
 - public investment performance, 22*f*
- procyclical revenues, 140
- procyclical spending, 121, 126–129, 135, 144
- procyclicality, 125*f*, 126, 136*t*, 154*n*, 143, 164
 - asymmetry of public investment response, 171*f*, 172*f*
 - by country, 165*t*
 - coefficient estimates, determinants, 17
 - effects of responsibility laws, 181
 - in Brazil, 146–150
 - measuring, 36*n*, 143–144, 170
 - policies and institutions, 12, 15–17
 - provincial resources, 141*t*, 142*t*
 - provincial revenues, 139–140
 - public investment, 166, 167*f*, 168*t*
 - revenues, 144, 149, 151
 - rules that reduce, 176–177
 - sources of, 146*t*, 148–149, 173–174
 - subnational government spending, 150
 - testing at subnational level, 144*t*
 - productivity of public capital, 217
 - progressive income tax, 79, 92, 104, 105*f*, 106*f*, 107
 - projects, self-liquidating and tax-financed, 230–231
 - projects, wasteful, 18–19, 28–29, 215
 - PSNB and PSNCR. *See* public sector net borrowing and net cash requirement
 - public capital, 232, 237, 306–307, 306*t*
 - cost and returns, 24, 233, 254*n*
 - expenditures, 27, 225, 226, 238–239, 253, 265, 298, under golden rule, 250
 - public debt, 46–47, 128, 260. *See also* government debt
 - public enterprise consolidation, 287–288
 - public enterprises, commercialization of, 26, 29
 - public expenditures, 8, 9, 12, 15, 25–26, 239. *See also* government expenditures
 - composition, 210, 211*f*
 - productive, 24, 212–213
 - health and education, 27
 - primary, 6*f*
 - subnational procyclicality, 17–18

- public infrastructure, 19, 285, 306–308
 - physical measures, 304, 305, 305*t*, 315*n*
 - productivity, 213, 220*n*
 - public infrastructure investment, 5, 7*f*, 18, 19*f*, 24, 32–33, 36*n*, 111*t*–116*t*, 195, 196, 200, 204–205, 214, 218*n*, 245, 247, 249, 261, 265–66, 277, 284, 307
 - and deficits, 20*f*, 198
 - and fiscal adjustments, 197–198, 197*f*
 - and future revenues, 23
 - and GDP, 232, 300, 300*f*, 301*f*
 - and primary deficit, 21*f*
 - and private investment, 209
 - and procyclicality, 167*f*, 168*t*, 171*f*, 172*f*
 - and stock variations, 301–302, 303*t*
 - arithmetic of, 262–264
 - debt-financed, 207, 209, 233–234
 - effect on net worth, 203–204, 206, 293–294
 - EU, 199*f*
 - impact on growth, 166, 205, 216, 217, 219*n*
 - impacts of increasing, 308–313
 - new roads, 303*f*, 303*t*
 - privatization, 200
 - projections, 291
 - relationship with output volatility, 62, 64*f*
 - returns, 161, 205, 207, 213
 - self-financing, 25, 35, 213, 214, 309–312
 - self-liquidating assets, 28
 - SGP, 268
 - wasteful projects, 18–19, 28–29, 215
 - public investment decisions, 28–33, 232, 233–234, 275
 - under golden rule, 250
 - public investment management, 246, 266
 - public investment performance, 20–21, 22*f*
 - public investment, commercial-type, 232, 252
 - public investment, net, 266–267, 268
 - public net worth, 25, 28, 202, 210, 207, 211, 211*f*, 278
 - debt-financed investment, 204
 - fiscal rule, 28
 - investment impacts, 203, 206, 293–294
 - measuring, 35
 - simulation, 310, 310*t*, 311
 - targets, 26, 211
 - public sector cash flow focus, 23
 - public sector net borrowing (PSNB) and net cash requirement (PSNCR), 245, 255*n*
 - public-private partnerships, 25–26, 247
 - purchase agreements, 25–26
 - purchase contracts, long-term, 286
- Q**
- Quadratic Determinantal Equation, 98
- R**
- Real Plan, 299
- recessions, 173*f*, 174, 176
 - impact on poor, 166
 - procyclical spending, 126
- recurrent expenditures, 27, 231
- research and development, 126
- resource constraints, 92–93
- revenue guarantees, 25–26
- revenue response to cyclical fluctuations, 12
- revenue stabilizers. *See* automatic stabilizers
- revenues, 17, 139–140, 144, 239
- Ricardian households, 81, 88, 102
 - cyclical properties, 101*t*
 - output volatilities, 105*f*
- roads and investment, 303*f*, 303*t*

S

seemingly unrelated regression (SUR), 218*n*

self-liquidating projects, 230. *See also* public investment

sensitivity of the budget balance (SBB), 81, 82, 84*f*, 117*n*

SGP. *See* Stability and Growth Pact

shocks, 71*n*, 76, 80, 97, 104

short-term focus, 35, 160

smoothing, 77, 107, 109, 138

taxes, 27, 79

social costs of funds, 234

social expenditures, 164–165

social returns, 265

social security programs, 239

Spain, 242*t*

Stability and Growth Pact (SGP), 15, 23, 43, 66, 68, 117, 159, 240, 247

 deficits allowed, by country, 267*t*

 economic impacts, 259

 fiscal balance, 244

 golden rule, 27

 investment effects, 248–249

 modified, 268

 weaknesses and recommendations, 260–262

Stabilization Fund, Chile, 183

stabilization funds, 176, 177–180

Stabilizing Transfer Laws, 177

Standard & Poor's, 282, 283

stationarity-inducing approaches, 117*n*–118*n*

stock change regressions, 303*t*

structural balance rule, 182–184, 185*f*, 188

structural deficit, 260

structural fiscal balance, 36*n*, 109

structural primary surplus, 165*t*

Sub-Saharan Africa, 19, 20*f*

subnational governments, 17–18, 134, 135

 accessing national resources, 128, 143

 acyclical policy, 139

 fiscal variables and output, 148*t*

 procyclicality, 139–140, 147, 148–149, 150

 smoothing business cycle, 138

 tax base and procyclicality, 126

 tax revenue allocation, 132

 taxes, cyclical properties of, 140

 vertical imbalances, 124

substitution elasticity, 94, 95

surplus rule, 182

surplus, structural, 188

surpluses, 16, 26, 136*t*, 174, 175

sustainability, 66–67, 160, 166, 229

sustainable investment rule, 244

Sweden, 243*t*

Switzerland, 243*t*

System of National Accounts, 255*n*

T

targets, 25–26, 35, 68, 210, 215, 273, 289

 expenditure composition, 211*f*

 short-term, 23, 24

tax buoyancy, 117*n*

tax burden, shifting to future, 251

tax code effect on business cycles, 96

tax code exemptions, 105, 105*f*, 106*f*

tax code parameters, simulation, 99*t*

tax collection, 207, 311

 recessions and booms, 127

 value of future payments, 285

tax policy activism, 8

tax revenue, 83, 101*t*, 102, 111*t*–116*t*

 procyclicality, 17, 149

 source, 148–149, 151

tax smoothing, 27, 230, 231, 275

tax structure, 106*f*, 117*n*

 degree of stabilization provided, 104

tax system, 79, 133, 140

 deadweight cost, 275

 flexibility, 85, 108*f*

 measurement of flexibility, 81, 84*f*

 responsiveness to fluctuations, 83

 smoothing fluctuations, 77

 stabilizing role, 11, 33, 109

tax-sharing agreement, 130

- taxable capacity and solvency, 230
 technology shocks, 104
 telecommunications investment, 19*f*
 Tequila crisis, 154*n*
 terms-of-trade shocks, 80, 104, 107
 terms-of-trade volatility, 163*f*
 Thailand, 282
 trade balance, 100*t*, 111*t*–116*t*
 transfer laws, 181
 transfer schemes, 12
 transfers, 130, 134, 150, 151
 transparency, 261–262, 266, 270, 291
 transportation investment (land), 19*f*
 Tremonti Plan, 247
 turnover taxes, 133
- U**
- unemployment expenditures, 117*n*
 unemployment insurance, 77
 United Kingdom (UK), 245, 255*n*, 271
 fiscal rules, 243*t*, 244
 golden rule, 27, 273
 United States, 43, 65, 83
 capital budgets, 268–269
 fiscal rules, 243*t*
 user fees, 230, 284–285, 291
- V**
- valuation distortions, 251
 valuation of infrastructure assets, 284–286
 value added tax (VAT), 79, 149
 vector autoregression (VAR)
 approach, 213, 305
 vector error correction model (VECM), 307
 vertical imbalance, 124, 129–130, 154*n*
 volatility, 161, 162*f*, 163, 163*f*
 and growth, 47–48
 due to procyclical responses, 103
 government spending, 50, 52
 of fiscal policy, 45–46, 55
 public investment, 218*n*
 summary statistics, 51*t*
 terms-of-trade shocks, 80
 voracity effect, 17, 36*n*, 127, 128, 143, 144*t*, 175
- W**
- workfare programs,
 self-selecting, 34
 world business cycle
 innovations, 107

ECO-AUDIT

Environmental Benefits Statement

The World Bank is committed to preserving endangered forests and natural resources. The Office of the Publisher has chosen to print *Fiscal Policy Stabilization and Growth* on recycled paper with 30 percent postconsumer fiber in accordance with the recommended standards for paper usage set by the Green Press Initiative, a nonprofit program supporting publishers in using fiber that is not sourced from endangered forests. For more information, visit www.greenpressinitiative.org.

Saved:

- 15 trees
- 10 million BTUs of energy
- 1,293 lbs. of CO₂ equivalent
- 5,366 gallons of wastewater
- 689 lbs. of solid waste



LATIN AMERICAN DEVELOPMENT FORUM

Fiscal policy in Latin America has been guided primarily by short-term liquidity targets whose observance was taken as the main exponent of fiscal prudence, with attention focused almost exclusively on the levels of public debt and the cash deficit. Very little attention was paid to the effects of fiscal policy on growth and on macroeconomic volatility over the cycle. Important issues such as the composition of public expenditures (and its effects on growth), the ability of fiscal policy to stabilize cyclical fluctuations, and the currency composition of public debt were largely neglected. As a result, fiscal policy has often amplified cyclical volatility and dampened growth.

Fiscal Policy, Stabilization, and Growth explores the conduct of fiscal policy in Latin America and its consequences for macroeconomic stability and long-term growth. In particular, the book highlights the procyclical and anti-investment biases embedded in the region's fiscal policies, explores their causes and macroeconomic consequences, and assesses their possible solutions.



THE WORLD BANK

ISBN 978-0-8213-7084-1



SKU 17084