The Sources of Economic Growth: An Overview

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The importance of economic growth cannot be overstated. Income growth is essential for achieving economic, social, and even political development. Countries that grow strongly and for sustained periods of time are able to reduce their poverty levels significantly, strengthen their democratic and political stability, improve the quality of their natural environment, and even diminish the incidence of crime and violence.[1] Economic growth is not a panacea; but it greatly facilitates the implementation of public programs that complement its effects and correct its deficiencies, even if its direct beneficial impacts are modest.

It comes as no surprise, then, that an enormous amount of talent and effort has been invested in understanding the process of economic growth. The recent surge in academic research on endogenous growth and the policy preoccupation with poverty-alleviating growth are just two examples indicating that economic growth is a focal point in research and policy circles.

The present collection of studies contributes to this literature on two dimensions. First, it provides a systematic account of the stylized facts that characterize economic growth and, in particular, of the role that policies play in fostering periods of sustained growth. Some of the papers revisit the question of what drives long-run economic growth, drawing on new and improved data, while others

1. See Barro (1996); Easterly (1999); Dollar and Kraay (2002a); Fajnzylber, Lederman, and Loayza (2002).

Economic Growth: Sources, Trends, and Cycles, edited by Norman Loayza and Raimundo Soto, Santiago, Chile.

analyze the consequences that growth has on various aspects of development and welfare. These studies share a concern for identifying the most efficient policies to promote or facilitate growth. They thus critically analyze a broad spectrum of policies, such as financial development, public infrastructure, regulatory framework, and direct government intervention in industrial policies. Second, the papers in this volume focus on new and potentially crucial questions regarding the intricate relationship between economic growth and cyclical fluctuations, particularly whether business cycles have prolonged effects on long-run growth.

The studies included in the volume apply to most countries, particularly in the developing world. Some studies, however, provide specific applications to Chile or use this country for illustration of general issues. Moreover, Chile's experience may be of independent interest to scholars and policymakers, in that it provides an example of a developing country that suffered protracted stagnation (in the 1970s) and then conducted successful economic reforms (in the 1980s and 1990s).

1. Recent Trends

Growth performance has varied notably across regions and countries in the last four decades; in some economies, it has also experienced major shifts over time. For the world as a whole, the rate of growth of per capita output has followed a declining path since the 1960s (see figures 1 and 2 and table 1).[2] To some extent, this reflects the trend in industrialized countries and its influence on developing economies. There are, however, some notable differences across geographic regions. The economic growth rates in East Asia and the Pacific were not only among the highest but also the most stable of all developing economies, showing a steady increase in the 1970s and 1980s and only a mild decline in the 1990s. South Asia also had a relatively successful growth experience in the last two decades, achieving rates of per capita output growth beyond 3 percent per year with remarkable stability.

Other regions have had rather unsatisfactory growth performances. The economic growth rates of Eastern Europe and Central Asia exhibit the fastest decline from the 1960s onward; the negative rates in

2. When comparing per capita growth rates over long periods of time, changes in demographic factors can distort the conclusions. We nevertheless use per capita GDP figures—as opposed to per worker GDP or per family income—to maintain comparability with the rest of the literature.

Figure 1. Growth Rates of GDP per Capita, GDP-Weighted Average by Region, 1961-1999 (constant sample)

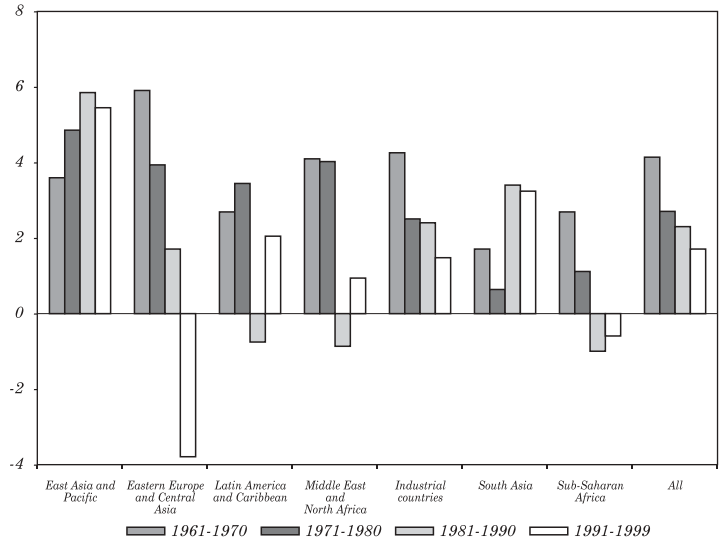

Figure 2. Coefficient of Variation of GDP per Capita, GDP-Weighted Average by Region, 1961-1999 (constant sample)

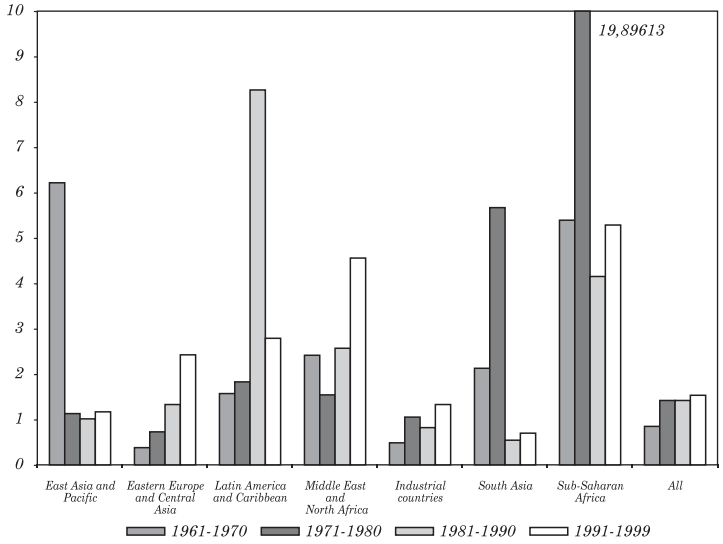

Table 1. Growth Rates of per Capita GDP by Region, 1961–1999[a]
Percent

		Period			
Region	*Observations*	*1961–1970*	*1971–1980*	*1981–1990*	*1991–1999*
All countries	109	4.15	2.68	2.29	1.72
Industrial countries	21	4.28	2.50	2.42	1.48
Developing countries					
East Asia and the Pacific	14	3.58	4.90	5.88	5.44
Eastern Europe and Central Asia	4	5.92	3.94	1.73	–3.80
Latin America and the Caribbean	26	2.71	3.44	–0.74	2.05
Middle East and North Africa	9	4.11	4.00	–0.86	0.94
South Asia	5	1.72	0.64	3.40	3.23
Sub-Saharan Africa	30	2.68	1.08	–1.00	–0.58

Source: *World Development Indicators* and authors' calculations.
a. GDP-weighted average growth rate by region. Sample is constant over time.

the 1990s reveal the high costs of adjustment from planned to market economies. Sub-Saharan Africa shares some interesting features with the Middle East and North Africa: both regions had similar growth rates in the 1960s, and both experienced a large decline in growth rates in the 1970s and 1980s. The Middle East and North Africa recovered to positive growth rates in the 1990s, but sub-Saharan Africa continued its downward spiral. Not only did sub-Saharan Africa suffer from negative average growth in the last two decades, but its growth performance was also the most volatile in the world. Meager growth and high volatility in Africa appear to be the result of an unfortunate combination of poor policies and negative external shocks on these resource-dependent economies. For Latin America and the Caribbean, the 1960s and 1970s were decades of moderate but stable growth rates. This situation changed in the 1980s, when the growth rate of per capita output fell to negative values and its volatility increased notably. In the 1990s, economic growth became positive again but did not recover its pre-1980s level.

The countries within each region display some interesting disparities as well as common features. Consider, for instance, the case of Latin America in the last decades (see table 2). The large majority of Latin American countries experienced negative growth rates in the 1980s. The only exceptions were Chile and Colombia, and for good reasons. Up to the 1980s, Colombia was the country with the best record of

Table 2. Growth Rates of per Capita GDP in Selected Latin American Countries, 1961–1999
Percent

	Period			
Region and country	*1961–1970*	*1971–1980*	*1981–1990*	*1991–1999*
Southern Cone				
Argentina	2.31	1.32	–2.99	3.72
Brazil	3.18	5.75	–0.42	1.07
Chile	1.82	1.22	2.08	5.00
Paraguay	1.79	5.69	–0.30	–0.60
Uruguay	0.36	2.60	–0.66	2.70
Andean Community				
Bolivia	0.35	1.67	–1.95	1.53
Colombia	2.21	3.05	1.26	0.72
Ecuador	1.24	5.65	–0.47	–0.43
Peru	2.31	0.84	–2.99	2.32
Venezuela	1.46	–0.76	–1.75	–0.30
Central America				
Costa Rica	1.93	2.75	–0.32	3.48
El Salvador	2.15	–0.18	–1.47	2.67
Guatemala	2.56	2.87	–1.62	1.43
Honduras	1.52	2.06	–0.73	0.12
Mexico	3.37	3.58	–0.29	1.42
Nicaragua	3.36	–2.84	–4.07	0.33
Panama	4.70	1.47	–0.71	2.80

Source: *World Development Indicators* and authors' calculations.

macroeconomic stability and external credit worthiness in the region, and this played to the country's advantage in the turmoil of the debt crisis that characterized the decade. Chile, on the contrary, did not enjoy such status, and it suffered a deep banking crisis and, consequently, a large fall in output in the first part of the 1980s. This country, however, found its way back to growth starting in the second half of the decade, after substantial reforms in the financial sector allowed the economy to reap the benefits of the market-oriented reforms started in the 1970s. Mexico was hit by similar shocks and had a similar crisis but chose to delay paying the costs of reform, inevitably postponing its recovery.[3]

For most of Latin America, the 1990s was a decade of reform and recovery. Except for Paraguay and (surprisingly) Colombia, all countries

3. For a comparative analysis of the debt crisis and its aftermath, see Bergoeing and others (2002).

in Latin America underwent an increase in growth rates in the 1990s relative to the previous decade. The improvement was quite notable in Argentina, Chile, Bolivia, Peru, Costa Rica, El Salvador, Uruguay, and Mexico. These countries have in common that they conducted strong market-oriented reforms and accomplished processes of economic and political stabilization. Only in a few instances, however—Argentina, Chile, Costa Rica, and El Salvador—did the recovery of the 1990s result in economic growth rates that surpassed those of the 1960s and 1970s.

The 1980s was thus a lost decade for growth and socioeconomic development in many countries and almost entire regions. The 1990s started with high expectations as it witnessed economic reforms in many places around the world, particularly in Latin America. It was a decade full of promise, and, all in all, the performance of reforming countries was not disappointing. Toward the end of the decade, however, some worrisome signs threatened to spoil the growth excitement. Repeated international crises, cases of interrupted reforms, and instances of macroeconomic mismanagement led to severe economic downturns in a number of countries around the world at the start of the new century. For policymakers, particularly in developing economies, one of the most pressing questions is how their countries can find or recover the path of high and sustained growth.

Fortunately, the task of identifying the keys to economic growth does not necessitate the launching of a new research venture. The economics profession has inherited a vast and rich literature. The objective of this volume is to contribute to that literature by exploring some of the issues that are most relevant to developing countries in the present context.

2. The Origins of the New Growth Literature

In the 1950s, Robert Solow and Trevor Swan revitalized the study of economic growth by modeling it as the result of factor accumulation in the medium term and as the outcome of technological progress in the long run. Despite its parsimony, the Solow-Swan model was rich in conclusions and practical implications. Some of these were examined empirically, particularly in the United States, as exemplified by the work of Dale Jorgenson and research associates. However, academic interest in economic growth dwindled and gradually turned to the study of business cycles and stabilization policies.

After about twenty-five years, interest in economic growth studies was rekindled for a number of reasons, of which we highlight two.

First, the use of new theoretical tools allowed researchers to model growth paths as a result of dynamic, intertemporal optimization. Second, the development of new and more reliable databases facilitated cross-country comparisons of per capita income levels and growth rates. The databases generated by Summers and Heston and by the World Bank helped researchers check the sometimes ethereal economic theories against reality.

The new literature on economic growth starts precisely as a reaction to the apparent shortcomings of the neoclassical model in explaining some actual facts. At least in its simplest forms, the neoclassical model implies that owing to diminishing returns, poorer economies should grow faster than richer ones. It further predicts that the return differentials generated by large gaps in capital stocks would produce massive capital flows from richer to poorer countries. Both implications are strongly rejected by the evidence.

The weakness of the neoclassical growth model led several researchers to propose alternatives. Paul Romer (1986) presents a model in which economic growth in the long run occurs not because of exogenous technological progress, but because the accumulation of capital generates externalities that compensate for diminishing returns. Robert Lucas (1988), another pioneer of the new growth literature, introduces a model in which human capital plays a fundamental role in perpetuating economic growth and preventing diminishing returns to physical capital accumulation. Lucas opens his 1988 article with the now famous words, "Once one starts to think about [the human welfare consequences of economic growth], it is hard to think about anything else." These were premonitory words judging by the large number of talented people who, in the years to follow, devoted their energies to describing the stylized facts of economic growth, deciphering its theoretical puzzles, and proposing public policies to promote and support it.

The paper by Xavier Sala-i-Martin in this volume is devoted to reviewing the main contributions of the new growth literature. Sala-i-Martin identifies three defining characteristics of this literature. They are, first, the empirical touch, that is, the close connection between the new theories and the empirical data and methods used to test them; second, the emphasis on endogenous technological progress, in particular on the type that generates increasing returns and is provided by the market through monopolistic competition; and third, the merging of different strands of economics, which is both a feature of the new growth literature and a consequence of it. One particular example is the fruitful interaction, induced by economic growth, between macroeconomics—previously

dominated by business cycle theories—and economic development—formerly centered on institutional analysis and economic planning. Sala-i-Martin's article derives its authoritative perspective partly from his work on the already classic textbook on economic growth that he coauthored with Robert Barro (Barro and Sala-i-Martin, 1995).

3. Determinants of Economic Growth[4]

As an introduction to the study of growth determinants, which is the common thread of the papers in this volume, we now estimate an encompassing model of economic growth. We follow the largest strand of the empirical endogenous-growth literature, which seeks to link a country's economic growth rate to economic, political, and social variables using a large sample of countries and time periods.[5] Although our interpretation of the results accords with the mainstream of the literature, we acknowledge the caveats on this type of exercise pointed out by Steven Durlauf, whose study is included in the volume and discussed below.

3.1 Setup

We estimate the following variation of a growth regression:

$$y_{it} - y_{it-1} = \alpha y_{it-1} + \alpha_C (y_{it-1} - y^T_{it-1}) + \beta' X_{it} + \mu_t + \eta_i + \varepsilon_{it}$$

where y is the log of per capita output, y^T represents the trend component of per capita output, $(y_{it-1} - y^T_{it-1})$ is the output gap at the start of the period, X is a set variables postulated as growth determinants, μ_t is a period-specific effect, η_i represents unobserved country-specific factors, and ε is the regression residual. The subscripts i and t refer to country and time period, respectively (for simplicity, the length of the time period is normalized to 1). The expression on the left-hand side of the equation is the growth rate of per capita output in a given period. On the right-hand side, the regression equation includes the level of per capita output at the start of the period (to account for transitional convergence) and a set of explanatory variables measured during the same period. The inclusion of the output gap as an explanatory variable allows us to control for cyclical output movements and thus to

4. This section is based on Loayza, Fajnzylber, and Calderón (2002).
5. See, for example, Barro (1991, 1999); King and Levine (1993).

differentiate between transitional convergence and cyclical reversion. The time-specific effect, μ_t, allows us to control for international conditions that change over time and affect the growth performance of all countries in the sample. The term η_i accounts for unobserved country-specific factors that both drive growth and are potentially correlated with the explanatory variables.

3.2 Growth Determinants

A large variety of economic and social variables can be proposed as determinants of economic growth. We focus on the variables that have received the most attention in the academic literature and in policy circles. These variables can be divided into five groups: transitional convergence, cyclical reversion, structural policies and institutions, stabilization policies, and external conditions (see appendix A for details on definitions and sources).

Transitional convergence

One of the main implications of the neoclassical growth model, and indeed of all models that exhibit transitional dynamics, is that the growth rate depends on the initial position of the economy.[6] The "conditional convergence" hypothesis maintains that, ceteris paribus, poor countries should grow faster than rich ones because of decreasing returns to scale in production . We control for the initial position of the economy by including the *initial level of real per capita GDP* in the set of explanatory variables.

Cyclical reversion

Although our main objective is to account for long-run trends in economic growth, in practice, we work with relatively short time periods (five- or ten-year averages) for both econometric estimation and forecasts. At these frequencies, cyclical effects are bound to play a role. We include some explanatory variables that are not standard in the long-run growth literature but capture important elements of the business cycle. One of them deals with cyclical reversion to the long-run trend. Other cyclical factors are included under the category of stabilization

6. See Barro and Sala-i-Martin (1995) and Turnovsky (2002) for a review.

policies, which is introduced below. We account for cyclical reversion by including the output gap at the start of each period as a growth determinant. Apart from improving the regression fit, controlling for the initial output gap allows us to avoid overestimating the speed of transitional convergence, which is inferred from the coefficient on initial per capita output. The output gap used in the regression is obtained as the difference between potential and actual GDP around the start of the period. We use the Baxter-King filter to decompose GDP and estimate annual series of potential (trend) and cyclical output for each country in the sample.

Structural policies and institutions

The underlying theme of the endogenous growth literature is that the rate of economic growth can be affected by public policies and institutions. Although there may be disagreement on which policies are most conducive to growth or on the sequence in which policy changes must be undertaken, there is no doubt that governments can and do influence long-run growth in their countries. Theoretical work usually concentrates on one policy in particular or the combination of a few policies, whereas empirical work tends to be comprehensive in the sense of considering a wide array of policy and institutional determinants of growth.[7] Given our objective, we also take a comprehensive approach to explaining economic growth performance. Thus, we consider explanatory variables representing all major categories of public policies. This subsection focuses on structural policies and institutions; the next considers stabilization policies. We recognize that to some extent the separation between structural and stabilization policies is arbitrary. However, the division helps us examine the trends and roles of policies directed at growth in the long run from those related also to cyclical fluctuations.

The first area of structural policies is *education*, and human capital formation in general. Human capital can counteract the forces of diminishing returns in other accumulable factors of production—such as physical capital—to render long-run growth. Apart from its direct role as a factor of production, education and human capital can serve as a complement to other factors such as physical capital and natural resources, determine the rate of technological innovations in countries that produce

7. See Barro (1991); De Gregorio (1992); Easterly and Rebelo (1993); King and Levine(1993); Levine, Loayza, and Beck (2000).

technology, and facilitate technological absorption in countries that imitate it. We measure the policies directed toward increasing education and human capital with the rate of gross secondary school enrollment.[8]

The second policy area is related to *financial depth*. Well-functioning financial systems promote long-run growth. They influence economic efficiency and economic growth through different channels. Financial markets facilitate risk diversification by trading, pooling, and hedging financial instruments. They can help identify profitable investment projects and mobilize savings to them. Moreover, financial systems can help monitor firm managers and exert corporate controls, thereby reducing the principal-agent problems that lead to inefficient investment. Firm-level, industry-level, and cross-country studies provide ample evidence that financial development leads to higher growth.[9] Our measure of financial depth is the ratio of private domestic credit supplied by private financial institutions to GDP.

The third area of economic policy is *international trade openness*. The literature points out five channels through which trade affects economic growth.[10] First, trade leads to higher specialization and, thus to gains in total factor productivity (TFP), by allowing countries to exploit their areas of comparative advantage. Second, it expands potential markets, which allows domestic firms to take advantage of economies of scale, thus increasing their TFP. Third, trade diffuses both technological innovations and improved managerial practices through stronger interactions with foreign firms and markets. Fourth, freer trade tends to lessen anticompetitive practices of domestic firms. Finally, trade liberalization reduces the incentives for firms to conduct rent-seeking activities that are mostly unproductive. The bulk of the empirical evidence indicates that the relationship between economic growth and international openness is indeed positive, and that it reflects a virtuous cycle by which higher openness leads to growth improvement, which, in turn, generates larger trade. Our measure of openness is the volume of trade (real exports plus imports) over GDP, adjusted for the size (area and population) of the country, for whether it is landlocked, and for whether it is an oil exporter.[11]

8. This is the variable used as a proxy for human capital in Barro (1991), Mankiw, Romer, and Weil (1992), and Easterly (2001).

9. See Levine (1997) for a review of the theoretical foundations of the role of financial development and a summary of the available macro- and microeconomic empirical evidence.

10. See Lederman (1996).

11. See Pritchett (1996) for a similar adjustment.

The fourth area is related to the *government burden*; it focuses on the drain that government may represent for private activity. Although government can play a beneficial role for the economy (as discussed below), it can be a heavy burden if it imposes high taxes, uses this revenue to maintain ineffective public programs and a bloated bureaucracy, distorts markets incentives, and interferes negatively in the economy by assuming roles most appropriate for the private sector.[12] We account for the burden of government through a proxy, namely, the ratio of government consumption to GDP.

The fifth important area of policy involves the availability of *public services and infrastructure*. The importance of productive public services in generating long-run growth has been highlighted in the analytical work of Barro (1990) and Barro and Sala-i-Martin (1992), among others. These papers underscore the channels through which public services and infrastructure affect economic growth. Whether they are treated as classic public goods or as subject to congestion, public services and infrastructure can affect growth by entering directly as inputs of the production function, by serving to improve total factor productivity, and by encouraging private investment as they help protect property rights. In any case, their theoretical importance is well established, and recent empirical studies confirm this conclusion.[13] There are a few alternative measures of public services and infrastructure. Among these, the variables with the largest cross-country and time-series coverage focus on the provision of infrastructure. Because of data considerations, we work with telecommunications capacity, measured by the number of main telephone lines per capita.

The last area is related to *governance*. This large area comprises several aspects of the institutional quality of government, including the respect for civil and political rights, bureaucratic efficiency, absence of corruption, enforcement of contractual agreements, and prevalence of law and order. After the seminal work by Mauro (1995) and Knack and Keefer (1995), governance has received increasing attention as a determinant of economic growth.[14] In our regression analysis, we use the first principal component of four indicators reported by Political Risk Services in their publication *International Country Risk Guide* (ICRG). They are the indicators on the prevalence of law and order, quality of the bureaucracy, absence of corruption, and accountability of public officials.

12. See Corden (1991); Fischer (1993).

13. See Loayza (1996); Calderón, Easterly, and Servén (2001).

14. See, for instance, Barro (1996); Kaufman, Kraay, and Zoido-Lobatón (1999b); and the survey in Przeworski and Limongi (1993).

Stabilization policies

Including stabilization policies as determinants of economic growth is important because the regression's fit and forecasting power increases significantly over horizons that are relevant to economic policy (say, five to ten years). An even more important reason is that stabilization policies affect not only cyclical fluctuations, but also long-run growth. In fact an argument can be made that cyclical and trend growth are interrelated processes (see Fatás, in this volume), which implies that macroeconomic stabilization and crisis-related variables have an impact both over short horizons and on the long-run performance of the economy (see Fischer, 1993). Fiscal, monetary, and financial policies that contribute to a stable macroeconomic environment and avoid financial and balance-of-payments crises are thus important for long-run growth. By reducing uncertainty, they encourage firm investment, reduce societal disputes for the distribution of ex post rents (for instance between owners and employees in the face of unexpected high inflation), and allow economic agents to concentrate on productive activities (rather than trying to manage high risk).

The first area in this category is related to macroeconomic stabilization policies. This is a vast subject, and we consider two interrelated effects of fiscal and monetary policies. The first is the *lack of price stability*, which we measure by the average inflation rate for the corresponding country and time period. This is a good summary measure of the quality of fiscal and monetary policies, and it is positively correlated with other indicators of poor macroeconomic policies such as fiscal deficits and the black market premium on foreign exchange.[15] The second aspect is the *cyclical volatility of GDP*, which reflects the lack of output stability. It is measured by the standard deviation of the output gap for the corresponding country and period.

The second area is related to *external imbalances and the risk of balance-of-payments crises*. This factor is measured by an index of real exchange rate overvaluation, which is constructed following the methodology in Dollar (1992). Real exchange rate overvaluation captures the impact of monetary and exchange rate policies that distort the allocation of resources between the exporting and domestic sectors. This

15. The correlation coefficient between the inflation rate and the ratio of fiscal deficit to GDP and the black-market premium is, respectively, 0.24 and 0.26. The inflation rate is the indicator of macroeconomic stability in many cross-country growth studies, including Fischer (1993); Easterly, Loayza, and Montiel (1997); Barro (2001).

misallocation leads to large external imbalances, whose correction is frequently accompanied by balance-of-payments crises and followed by sharp recessions.

The third area concerns the occurrence of *systemic banking crises* and serves to account for the deleterious effect of financial turmoil on economic activity, particularly over short and medium horizons. Banking crises may be the product of an inadequate regulatory framework for financial transactions, which leads to overlending and unsustainable consumption booms. They can also result from monetary and fiscal policies that put undue burden on creditors and financial institutions. This is the case, for instance, of monetary policies that are overly contractionary or fiscal policies that tap scarce domestic financial resources excessively, only to default on debt repayment later on. The occurrence of banking crises is measured by the fraction of years that a country undergoes a systemic banking crisis in the corresponding period, as identified in Caprio and Klingebiel (1999).

External conditions

A country's economic activity and growth are shaped not only by internal factors, but also by external conditions. These have an influence on the domestic economy in both the short and long runs. There is ample evidence of transmission of cycles across countries via international trade, external financial flows, and investors' perceptions of the expected profitability of the global economy.[16] Changes in long-run trends can also be spread across countries. This is achieved through, for example, the demonstration effect of economic reforms and the diffusion of technological progress.[17]

We take external conditions into account by including two additional variables in the growth regression: the *terms-of-trade shocks* affecting each country individually and a *period-specific shift* affecting all countries in the sample. Terms-of-trade shocks capture changes in both the international demand for a country's exports and the cost of production and consumption inputs.[18] The period-specific shifts (or time dummy variables) summarize the prevalent global conditions at a given period of time and reflect worldwide recessions and booms,

16. See Boileau (1996).
17. See Keller (2002).
18. The terms-of-trade shocks variable is important in several empirical studies on growth, including Easterly and others (1993); Fischer (1993); Easterly, Loayza and Montiel (1997).

changes in the allocation and cost of international capital flows, and technological innovations.

3.3 Sample and Estimation Methodology

As mentioned above, we estimate a dynamic model of per capita GDP growth rates using cross-country, time-series panel data. Our sample is dictated by data availability; it contains seventy-eight countries representing all major world regions (see appendix B for a complete list). The regression analysis is conducted using averages of five-year periods. Each country has a minimum of three and a maximum of eight nonoverlapping five-year observations spanning the years 1960–1999 (evidently, the panel is unbalanced). A minimum of three observations per country is required to run the instrumental variable methodology outlined below. Since one observation must be reserved for instrumentation, the first period in the regression corresponds to the years 1966–1970. The total number of observations is 350.

Our main econometric methodology is the generalized method-of moments (GMM) estimator developed for dynamic models of panel data, which was introduced by Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991), and Arellano and Bover (1995).[19] The growth regression to be estimated poses three challenges. First, the regression equation is dynamic in the sense that it represents a lagged-dependent-variable model. Second, the regression equation includes an unobserved country-specific effect, which cannot be accounted for by regular methods (such as the within estimator) given the dynamic nature of the model. Third, the set of explanatory variables includes some that are likely to be jointly endogenously determined with the growth rate. The GMM methodology that we use allows us to control for country-specific effects and joint endogeneity in a dynamic model of panel data. For comparison purposes, we also report the results obtained with a simple pooled ordinary least squares (OLS) estimator.

3.4 Estimation Results

Table 3 presents the results obtained by estimating the empirical model. The results obtained with the pooled OLS estimator are quite

19. This methodology has been applied to empirical growth models in, for instance, Caselli, Esquivel, and Lefort (1996); Levine, Loayza, and Beck (2000); Gallego and Loayza (in this volume).

Table 3. Determinants of Economic Growth: Panel Regression Analysis[a]

Explanatory variable	*(1)*	*(2)*
Transitional convergence		
Initial per capita GDP (in logs)	–0.0139** (–3.49)	–0.0176** (–3.80)
Cyclical reversion		
Initial output gap (log[actual GDP/potential GDP])	–0.2834** (–6.13)	–0.2371** (–8.52)
Structural policies and institutions		
Education (secondary enrollment, in logs)	0.0085** (2.52)	0.0172** (6.70)
Financial depth (private domestic credit/GDP, in logs)	0.0031 (1.57)	0.0066** (4.28)
Trade openness (structure-adjusted trade volume/GDP, in logs)	0.0083** (2.67)	0.0096** (3.14)
Government burden (government consumption/GDP, in logs)	–0.0125** (–3.16)	–0.0154** (–3.18)
Public infrastructure (main telephone lines per capita, in logs)	0.0073** (3.08)	0.0071** (2.71)
Governance (first principal component of ICRG indicators)	0.0012 (1.02)	–0.0012 (–0.68)
Stabilization policies:		
Lack of price stability (inflation rate, in log [100+inf. rate])	–0.0085** (–2.61)	–0.0048* (–1.89)
Cyclical volatility (standard deviation of output gap)	–0.3069** (–3.58)	–0.2771** (–3.76)
Real exchange rate overvaluation (in logs; overvaluation if greater than 100)	–0.0080** (–2.71)	–0.0061** (–3.90)
Systemic banking crises (frequency of years under crisis: 0-1)	–0.0171** (–3.96)	–0.0289** (–7.42)
External conditions:		
Terms-of-trade shocks (growth rate of terms of trade)	0.0619** (2.34)	0.0720** (4.98)
Period shifts[b]		
1971–1975	—	–0.0090**
1976–1980	0.0017	–0.0092**
1981–1985	–0.0147**	–0.0238**
1986–1990	–0.0110**	–0.0194**
1991–1995	–0.0158**	–0.0258**
1996–1999	–0.0168**	–0.0270**
Intercept	0.1418** (4.12)	0.1216** (2.79)

Table 3. (continued)

Explanatory variable	*(1)*	*(2)*
Summary statistics		
No. countries	78	78
No. observations	350	350
Specification tests (*P* values)		
Sargan test		0.996
Serial-correlation test, first-order	0.000	0.000
Serial-correlation test, second-order	0.021	0.461

Source: Authors' calculations.
* Significant at the 10 percent level.
** Significant at the 5 percent level.
a. The dependent variable is the growth rate of per capita GDP. The estimation method in column 1 is pooled OLS, while column 4 uses a system GMM estimator. Observations correspond to nonoverlapping five-year periods spanning the years 1966–1999. *T* statistics are in parentheses.
b. The benchmark for column 1 is 1971–1975; the benchmark for column 2 is 1966–1970.

similar to those found with the GMM estimator. In what follows, we concentrate on the latter given its superior properties. The specification tests (namely, Sargan and serial-correlation tests) support the GMM system estimator of our model.

Transitional convergence. The coefficient on the initial level of per capita GDP is negative and statistically significant. It is consistent with conditional convergence—that is, holding constant other growth determinants, poorer countries grow faster than richer ones. Given the estimated coefficient, the implied speed of convergence is 1.84 percent per year, with a corresponding half-life of about thirty-eight years (this is the time it takes for half the income difference between two growing countries to disappear solely due to convergence).[20]

20. Linearizing the neoclassical growth model around the steady state, the annual speed of convergence is given by the formula $(-1/T)*\ln(1 + Ta)$, where T represents the length of each time period (that is, five in the main sample) and a is the estimated coefficient on initial per capita GDP. The half-life in years is given by $\ln(2)/$*annual speed of convergence*. See Knight, Loayza, and Villanueva (1993). This estimate for the speed of convergence is almost identical to estimates reported in the early cross-country growth regressions (such as Barro, 1991). Previous panel regressions estimate faster speeds of convergence, claiming that this is due to their correction of the downward bias produced by unobserved country-specific effects (see Knight, Loayza, and Villanueva, 1993; Caselli, Esquivel, and Lefort, 1996). By working with shorter time periods, however, these panel studies introduced an upward bias owing to cyclical reversion to the trend; for instance, a post-recession recovery was confused with faster convergence. In this paper we control for both country-specific effects and cyclical factors, and we find that their corresponding biases on the speed of convergence nearly cancel each other.

Cyclical reversion. The estimated coefficient on the initial output gap is negative and significant. This indicates that the economies in the sample follow a trend-reverting process. In other words, if an economy is undergoing a recession at the start of the period, it is expected that its growth rate be higher than otherwise in the following years, so as to close the output gap. This result is symmetric, such that a cyclical boom is expected to be followed by lower growth rates. The cyclical reversion effect is sizable: according to the point estimate, if initial output is, say, 5 percent below potential output, the economy is expected to grow about 1.2 percentage points higher in the following years.

Structural policies and institutions. All variables related to structural policies present coefficients with expected signs and statistical significance. Economic growth increases with improvements in education, financial depth, trade openness, and public infrastructure. It decreases when governments apply an excessive burden on the private sector. These results are broadly consistent with a vast empirical literature on endogenous growth, including Barro (1991) on the role of education, trade, and government burden; Dollar (1992) on trade openness; Canning, Fay, and Perotti (1994) on public infrastructure; and Levine, Loayza, and Beck (2000) on financial depth.

Perhaps surprisingly, we find that governance does not have a statistically significant impact on economic growth, and the corresponding coefficient even presents a negative sign. This is so despite the fact that among the proposed explanatory variables, the governance index has the second largest positive correlation with the growth rate of per capita GDP.[21] Dollar and Kraay (2002b) obtain a similar result: various measures of governance become insignificant in their growth regressions when they control for trade openness. We interpret these results as saying that the effect of governance on economic growth most likely works through the actual economic policies that governments implement and maintain.

Stabilization policies. For the variables in these categories, all estimated coefficients carry the expected signs and statistical significance. Economic growth generally decreases when governments do not carry out policies conducive to macroeconomic stability, including the ab-

21. To check the robustness of this result, we replaced the ICRG index with each of its components in turn, namely, the indicators on bureaucratic efficiency, corruption, law and order, and accountability. We also replaced it with Gastil's index on civil rights. The estimated coefficients were never statistically significant, although the coefficient sign became positive for some governance proxies (law and order and bureaucratic efficiency).

sence of financial and external crises. Like Fischer (1993), we find that an increase in the inflation rate leads to a reduction in economic growth. The volatility of the cyclical component of GDP also has a negative impact on the growth rate of per capita GDP. This reveals an important connection between business cycle factors and economic growth, a subject seldom explored in the endogenous growth literature. Our results in this regard are consistent with the theoretical and empirical work by Fatás (in this volume).

The overvaluation of the real exchange rate is also negatively related to economic growth. This is explained by the misallocation of resources away from export-oriented sectors and the risk of balance-of-payments crises that real exchange rate overvaluation entails. Finally, the frequency of systemic banking crises has a negative effect on economic growth. This effect is particularly large, as it indicates that countries that experience a continuous banking crisis over, say, a five-year period suffer a slowdown in their annual growth rate of almost 3 percentage points.

External conditions. Negative terms-of-trade shocks have the effect of slowing down the economy's growth rate. This result is consistent with previous studies. Easterly and others (1993), for instance, find that good luck (in the form of favorable terms-of-trade shocks) is as important as good policies in explaining growth performance over medium-term horizons (such as decades).

Regarding the period shifts (or time dummies), we find that world growth conditions experienced a gradual change for the worse after the 1960s, with the biggest downward break occurring at the beginning of the 1980s. Broadly speaking, the deterioration of world growth conditions between the 1970s and 1980s leads to a decrease in a country's growth rate of about 1.5 percentage points. Considering only world growth conditions, our results indicate that any country in the sample is expected to grow almost 3 percentage points more slowly in the 1990s than in the 1960s. This is a considerable effect. After noting the world growth slowdown after 1980, Easterly (2001) concludes that worldwide factors are partly responsible for the stagnation of developing countries in the last two decades despite policy reforms.

4. The Contributions of This Volume

As mentioned, the article by Sala-i-Martin reviews the economic growth literature of the last fifteen years and thus provides the academic context for the volume. Most of the studies included therein apply to all countries, particularly in the developing world. Some studies, however,

provide specific applications to Chile or use this country for illustration of general issues. For didactical purposes, we divide the studies included in the volume into five groups. The first addresses the characteristics and causes of economic growth from an international perspective. The second undertakes the analysis of the relationship between business cycles and long-run growth. The third group analyzes the role that specific public policies may play in promoting economic growth. The fourth considers the relevance of the financial sector for economic growth and development more generally. Finally, the fifth group of papers derives a number of lessons from the Chilean experience, which can be useful for understanding the path of other developing economies.

4.1 Causes and Characteristics of Economic Growth

William Easterly and Ross Levine's paper describes what the authors believe are the most salient characteristics of economic growth as it happens around the world. The first is that the differences in economic growth across countries are explained not by the rate of capital accumulation, but by the growth of productivity. The second is that the levels of per capita income in different countries do not tend to converge—that is, the gap between rich and poor countries has widened in the last decades.[22] While Easterly and Levine's finding of absolute divergence across countries is not optimistic, their conclusion that growth does not occur randomly, but responds to the quality of public policies is more encouraging. In this paper, the authors also seek to identify the theoretical models that best match the stylized facts. They favor the models that emphasize the growth in productivity, such as those of increasing returns, technological innovations, and externalities. Easterly and Levine recognize, however, that empirical studies have not yet advanced sufficiently to be able to discern among different concepts of productivity growth.[23] They pose this as a challenge for future theoretical and empirical work.

Rómulo Chumacero offers an alternative view on the issue of absolute convergence, and he questions the interpretation of the statistical

22. This finding of absolute divergence is not inconsistent with conditional convergence, which requires that the analyst control for policies and other growth determinants before assessing whether growth diminishes with the level of output.

23. Parente and Prescott (2000) provide an alternative mechanism through which policies can explain the observed differences in productivity levels and growth. Their evidence suggest that policies in low productivity economies usually inhibit technical progress in order to serve interest groups that extract rents from privileged positions.

evidence on the subject. His paper starts by reviewing the empirical tests that have been used to demonstrate or reject the finding of income convergence across countries. Chumacero then asks how effective these tests are in detecting convergence in data generated by models in which *by construction* there is convergence. He designs his experiment by formulating stochastic growth models (that is, with random productivity shocks), generating artificial data from them, and applying the usual convergence tests to these data. Revealingly, Chumacero finds that very often, statistical tests incorrectly reject convergence across countries, particularly when productivity shocks are persistent and somewhat volatile. Apart from its cautionary message regarding convergence, this result should alert researchers to the limitations of empirical tests designed from nonstochastic models and encourage the inclusion of stochastic elements in growth models. In this regard, Chumacero's contribution is an interesting empirical complement to the reservations expressed by Steven Durlauf (in this volume) with regard to the policy interpretations derived from cross-country regression results.

Robert Barro's study links economic growth to the general process of development. Using the cross-country framework for which he is renowned, Barro examines the economic, social, and political elements that accompany economic growth, whether as its causes or consequences. These aspects of human development determine the quality of people's lives and are, consequently, the ultimate objectives of public policy and private actions. Economic growth that promotes human development can thus be considered high quality growth. Barro's study attempts to measure the quality of economic growth by examining its relationship with socioeconomic variables (such as life expectancy, fertility, income inequality, and environmental degradation), political variables (such as democracy, rule of law, and corruption in the public administration), and cultural and social variables (such as criminality and religiosity). The importance of Barro's study is that it gives a human and social face to mere economic progress.

The paper by Steven Durlauf provides an interesting critique of the use of growth regressions to derive policy implications. The author challenges the conventional interpretation of empirical results, arguing that current econometric practice has yielded a body of evidence that is not policy relevant. Extending his own previous work, Durlauf raises two issues of critical importance for policy purposes.[24] First, policy recommendations arising from growth regressions are usually based on the

24. See, for example, Brock and Durlauf (2001).

statistical significance of some regression coefficients, which does not necessarily constitute a valid evaluation of alternative policy trajectories. Moreover, the statistical significance of a parameter does not provide information on the relative merit of the parameter for the objectives of policymakers. Second, growth regressions as conventionally constructed do not provide credible evidence of economic structure. Consequently, policymakers are unable to make better decisions based only on regression results. Durlauf proposes an alternative approach to the interpretation of growth regression based on Bayesian averaging techniques, which allow the weighting of different growth determinants relative to the payoff function of the policymaker and in the context of model uncertainty (because the modeler does not know what growth determinants must be included in a model or what forms of country-level heterogeneity need to be accounted for in the model).

4.2 Business Cycles and Long-Run Growth

As explained in our brief review of growth determinants (section 3), the processes of business cycles and trend growth are not independent. The connection between the two processes opens up a number of interesting questions for academic and policy analyses. Two studies in this volume address some of these questions.

The paper by Antonio Fatás presents evidence from cross-country empirical analysis that reveals an interesting and significant connection between cycles and growth. Fatás examines two main aspects of this relationship. The first consists of a strong positive correlation between the persistence of short-term fluctuations and long-run growth, which implies that business cycles cannot be regarded as temporary deviations from a trend. One way to understand this correlation is that business cycles affect long-run growth, and it is this explanation that Fatás presents in a stochastic endogenous growth model. The second aspect is the connection between business cycle volatility and growth. The author presents robust empirical evidence that countries that suffer from more volatile cycle fluctuations exhibit lower rates of economic growth. Consistent with the evidence in Carkovic and Levine's and Caballero's work (discussed below), Fatás finds that the negative effect of business cycle volatility on growth is much larger for poor countries or countries with weak financial development. Fatás also provides preliminary evidence on the growth effect of different sources of volatility related to monetary and fiscal policies, thus augmenting the paper's practical value for policymakers.

While the linkages between cyclical fluctuations and long-run growth pose a theoretical puzzle to scholars, they pose a much more pressing challenge to policymakers, namely, to determine whether observed high or low growth rates in GDP correspond to turning points in the business cycle or long-term changes in the growth path of an economy. Andrew Harvey's article explores this issue and proposes a novel methodology for separating out trends and cycles, which overcomes the well-known limitations of standard filters such as those of Hodrick and Prescott (1997) and Baxter and King (1999). Harvey's method combines unobserved components with an error correction mechanism and allows the decomposition of a series into trend, cycle, and convergence components. This provides insight into what happened in the past, enables the current state of an economy to be more accurately assessed, and gives a procedure for the prediction of future observations. The methods are applied to data on the United States, Japan, and Chile.

4.3 Public Policies That Promote or Inhibit Growth

The problem of disentangling economic growth from cyclical fluctuations is at the root of several dilemmas that authorities face when choosing among different sets of policies. On the one hand, whenever growth weakens and a country faces external shocks, it is common to hear voices calling for a revision of the policies in place and recommending new mechanisms to help the country cope with the hardships of recessionary periods. A typical suggestion is that of enacting so-called industrial policies that favor specific sectors. On the other hand, whenever growth resumes and a country enjoys a bonanza, the reforms that should be implemented to guarantee future growth are easily postponed or dismissed, under the wrong impression that the country has already achieved its optimal economic structure. Industrial policies and the need for second-generation (governance-related) reforms are the respective subjects of the papers by Marcus Noland and Howard Pack and by Harald Beyer and Rodrigo Vergara.

When countries undergo a stage of stagnation, government authorities are increasingly pressured to embark on policies that promote specific industries and economic sectors. The experience of East Asian countries is often cited as an example of the success of industrial policies. Marcus Noland and Howard Pack exhaustively review the experience of industrial policies in three successful East Asian economies: Japan, South Korea, and Taiwan. The authors focus on two questions. First, were industrial policies indeed the engine of

growth in these countries? Second, are their current economic stagnation problems a legacy of the same industrial policies? Noland and Pack provide original and systematic evidence that, notwithstanding industrial policies' positive effects on industrial development and international trade in certain sectors, they had at best a minor contribution to the overall growth of East Asia. Moreover, the implementation of industrial policies distorted the economic incentives faced by the corporate sector. Industrial policies encouraged firms to take undue risks and allocate their resources inefficiently, given the policies' implicit guarantees and explicit relative-price distortions. Industrial policies also pushed firms to devote an important share of their human and financial resources to rent-seeking activities. It is not surprising, then, to see the grave cases of corruption of public officials that occurred particularly in Japan and Korea. Noland and Pack end their paper by admonishing governments to refrain from picking winners, an activity for which they are ill-prepared, and to focus on growth-enhancing measures that do not differentiate among sectors, such as improving primary and secondary schooling, building a large and efficient social infrastructure, and promoting international technology transfer.

Industrial policies are only one component of the incentive scheme faced by entrepreneurs when making investment and production decisions. Surely a larger component for the majority of firms comprises the facilities and restrictions inherent in public laws and institutions. Harald Beyer and Rodrigo Vergara's paper studies how economic growth and, specifically, factor productivity are affected by the structure of incentives in the areas of property rights, market regulation, legal and economic institutions, and political stability. The authors conduct their examination on two levels. First, they use cross-country data to evaluate the effects of broadly defined governance-related rules and institutions. Second, they discuss specific incentives, regulations, and restrictions that affect firm investment and productivity growth, using Chile as an example. Beyer and Vergara's objective for the latter part is to identify specific issues and policies that can be improved in Chile at the macro- and microeconomic levels. Even in a country as advanced as Chile in terms of market-oriented reforms, Beyer and Vergara conclude that further reduction in bureaucracy's red tape, removal of certain excessive regulations, and improved opportunities to compete in external markets can contribute to larger growth in the country.

4.4 The Role of the Financial Sector

The financial system has two major roles in the economy. The first is to promote sustained growth by channeling savings to profitable investment opportunities and monitoring firms to ensure the proper use of such financial resources. The second is to protect consumers and investors from the risks inherent in economic activity. The two papers on the financial sector included in this volume deal, respectively, with each of the major roles of the financial system.

Ross Levine and Maria Carkovic's paper presents confirmatory evidence on the growth-promoting impact of private banking and stock market development. With the clear objective of identifying proper financial policies, the paper also examines the commercial bank regulations and supervisory practices that lead to banking sector development. The authors thus use cross-country regression analysis to find that the depth and activity of banking and stock market operations have a large and significant effect on the growth rate of per capita output. They also expand on previous work by Barth, Caprio, and Levine (2001) to show that bank regulatory and supervisory policies that support private sector monitoring of banks, impose few restrictions on bank entry and activities, and curb the generosity of their deposit insurance schemes achieve stronger banking development than do other policy regimes. Taking Chile as an illustrative example, Levine and Carkovic note that this country is an outlier in the regression analysis on the connection between financial development and economic growth—Chile has less liquid stock markets and lower levels of banking development than other fast growing countries. This implies, first, that there must be some impediments to the development of the financial sector in Chile despite its relatively high level of income and growth and, second, that the removal of such impediments should confer potentially large gains. The analysis of regulatory and supervisory practices that lead to banking development serves as the basis for identifying potential problems in Chile in this regard. The authors conclude that at least part of the problem resides in the fact that Chile has comparatively few regulations to encourage private sector monitoring, while at the same time it imposes tight restrictions on bank entry and activities and provides an overly generous deposit insurance.

Ricardo Caballero's paper addresses the importance of financial development from a different perspective. Caballero's main concern is reducing a country's vulnerability to external shocks. Although the paper focuses on Chile, it can readily be applied to small developing

countries that face imperfect financial markets. The large domestic macroeconomic imbalances that characterized the 1980s are no longer a problem in most countries, yet the external sector remains a source of instability. As Caballero argues in the case of Chile, the business cycle in most small countries is driven by external shocks, such as a decline in the terms of trade. In practice, these shocks have an effect many times larger than predicted in the presence of perfect financial markets. The financial system's inability to limit the effects of external shocks has large consequences over employment, income, and productivity growth not only during the crisis itself, but also over the long run. Caballero argues that the excess sensitivity to external shocks is primarily a financial problem, in that, first, access to international financial markets contracts sharply precisely when the country needs it the most and, second, this access is distributed inefficiently among competing domestic borrowers. Caballero's diagnosis of the problem leads him to recommend a structural solution based on two pillars. The first is the formation of institutions that are conducive to the development of the domestic financial system and its integration with international markets. This is a long-run solution that may take many years to implement, such that it requires a complementary solution to be applied right away. The second pillar, to which Caballero devotes the most effort in the paper, is the design of an appropriate international liquidity management strategy—specifically, to encourage the private sector's development of financial instruments that are contingent on the country's main external shocks. The Central Bank could aide in the process by issuing a benchmark instrument contingent on these shocks. In addition, the Central Bank could design a countercyclical monetary policy with the main goal of persuading banks and investors to hold larger and more liquid foreign asset positions in anticipation of crises.

4.5 Lessons from an Emerging Economy

As mentioned above, in the past twenty-five years, Chile has successfully implemented substantial reforms to its economy. Nevertheless, growth faltered in recent years, raising a number of questions that are addressed in the last set of papers. These questions relate to three aspects that are of obvious interest to every emerging economy. First, what is the engine of growth, and will it ran out of fuel in the near future? Second, when facing adverse shocks, can monetary and fiscal policies ameliorate the effects without jeopardizing the

sustainability of growth? And third, is it possible and useful to base policies on the notion of potential long-run output growth?

As argued in the introduction, the welfare impact of economic growth can be profound. Even small changes in growth rates can have substantial welfare effects if they last over sustained periods of time. An interesting example of these effects is Chile. Between 1960 and 1980, GDP grew at a moderate average rate of 3 percent per year. Nevertheless, per capita consumption levels—and, to a large extent, welfare—remained basically constant. The Chilean economy responded vigorously to the promarket reforms of the late 1970s. Between 1980 and 2001, GDP grew at around 5.5 percent a year, while per capita consumption levels nearly doubled and poverty levels halved. Since a number of countries have applied or are implementing reforms similar to the Chilean initiatives, it is natural to ask why these reforms were so successful. The paper by Francisco Gallego and Norman Loayza provides a simple, but powerful message: the most important factor behind Chile's success is that market-oriented reforms were implemented strongly and jointly.

Gallego and Loayza's paper applies the concepts and methodologies of cross-country empirical analysis to an examination of the process of economic growth in Chile. First, using a variety of methods ranging from Solow growth decompositions to vector regression analysis, the paper describes the main stylized facts of growth in Chile over the last three decades. The authors highlight, in particular, the change that occurred after 1985: growth in Chile jumped to a higher level, became less volatile and more balanced across sectors, and featured a greater role for productivity improvements. Second, Gallego and Loayza use international evidence from regression analysis to explain what they call the golden age of growth in Chile. Their model is able to explain about 70 percent of the change in the growth rate from the period before 1985 to the period after 1985. According to the authors, the expansion of growth in the golden age stems from improvements in human capital, financial depth, government efficiency, public infrastructure, and, most importantly, the joint implementation of public policies. For the future, the paper identifies the importance of improving the quality of education, expanding the provision of public infrastructure, and eliminating excessive regulatory restrictions as the engines for renewed and sustained economic growth.

Vittorio Corbo and José Tessada's study provides a thorough revision of the post-1998 slowdown in economic growth in Chile. This was a rather turbulent period in economic history, and as such, it provides

ample space for speculation on the causes of the slowdown and its likely solutions. The authors use an econometric model to test three competing hypotheses and derive general implications from the analysis. The first hypothesis puts the blame on bad luck resulting from external shocks: namely, terms-of-trade losses and a slowdown in capital inflows following the Asian crisis. A second hypothesis blames the slowdown on policies implemented as a response to the deteriorating external conditions, in particular the inability to achieve a balanced mix of monetary and fiscal policy during the 1997–1998 period. Fiscal imbalances and restrictive monetary policy, it is argued, led to very high capital costs, thus reducing profitability and the incentives to invest. Finally, a third explanation is that the slowdown resulted from the completion of a high growth cycle associated with the structural reforms introduced in the 1985–1995 period. After a careful evaluation of the econometric results, Corbo and Tessada conclude that the slowdown in the Chilean economy was a mix of severe external shocks and lack of cooperation between fiscal and monetary policies.

Gabriela Contreras and Pablo García examine different methodologies for the estimation of potential output levels and, consequently, long-run growth rates. Beyond the technical aspects of these methodologies—which are thoughtfully discussed by the authors—the motivation for the paper lies with the importance of long-run growth estimates for monetary and fiscal policies. This is of particular relevance in an emerging economy (such as Chile) where the Central Bank pursues an inflation target and the fiscal sector usually has to accommodate activity shocks. Under inflation targeting, the forecast path of aggregate demand largely determines monetary policy; errors in estimating the output gap or trend growth can misguide monetary policy and jeopardize the achievement of the inflation target. Information on the duration and nature of the shock is also vital for fiscal policy. For instance, real shocks usually have significant effects on tax revenues and, consequently, on fiscal deficits, and they should be accommodated or not depending on whether they are transitory. Moreover, in countries that have adopted stabilization mechanisms (such as commodity funds) to smooth out cyclical fluctuations, their efficacy largely depends on the ability to determine the magnitude and frequency of transitory shocks, that is, to separate trends from cycles. Contreras and García's study provides key elements for correctly characterizing the shocks hitting the economy and their effects on cyclical fluctuations and potential output, which is essential for conducting proper stabilization and growth-promoting policies.

5. Concluding Remarks

Economic growth is, and most likely will continue to be, one of the most dynamic fields in economic analysis. The question of why most economies in the world are not decisively moving toward a state of development challenges both scholars and policymakers. Economic theory has progressed enormously in the last fifteen years in explaining the mechanics of growth. Its empirical counterpart has provided substantial evidence on the relative importance of the different determinants of growth across countries and on the role of policies in promoting sustained progress. Nevertheless, our knowledge on important aspects of the problem is still rather limited, and creative research is badly needed in these areas.

This volume contributes to the field on two dimensions. First, it extends the frontiers of our understanding about the determinants of sustained growth, going beyond the realms of macroeconomic policies—such as stabilization and basic structural reforms—and into areas dealing with microeconomic and regulatory policies, technological adoption, market formation, and governance institutions. Second, most of the papers in the volume focus on the intricate relationship between long-run growth and cyclical fluctuations, and some provide analytical models or statistical techniques that allow for a rigorous analysis of how and when short-term fluctuations affect long-run growth trends. In this volume, the recent experiences of several developed and developing countries—in particular, Chile—are dissected and studied to provide further insights on and quantification of the determinants of long-run growth and its relationship with business-cycle fluctuations.

APPENDIX A

Definitions and Sources of Variables Used in Regression Analysis

Variable	*Definition and construction*	*Source*
Output		
Real per capita GDP (in 1985 US$ PPP)	Ratio of total GDP to total population. GDP is in 1985 PPP-adjusted US$. Growth rates are obtained from constant 1995 US$ per capita GDP series.	Authors' construction, based on Summers and Heston (1991) and World Bank (2002).
Cyclical reversion		
Initial output gap	Difference between the log of actual GDP and (the log of) potential (trend) GDP around the start of the period. The Baxter-King filter is used to decompose the log of GDP.	Authors' calculations.
Structural policies and institutions		
Gross secondary-school enrollment	Ratio of total secondary enrollment, regardless of age, to the population of the age group that officially corresponds to that level of education.	World Bank (2002).
Domestic credit to the private sector (% of GDP)	Ratio to GDP of the stock of claims on the private sector by deposit money banks and other financial institutions.	Beck, Demirgüç-Kunt, and Levine (2000).
Openness (% of GDP)	Residual of a regression of the log of the ratio of exports and imports (in 1995 US$) to GDP (in 1995 US$), on the logs of area and population, as well as dummies for oil-exporting and landlocked countries.	Authors' calculations, based on data from World Bank (2002).
Government consumption (% GDP)	Ratio of government consumption to GDP	World Bank (2002).
Main telephone lines per 1,000 workers	Telephone mainlines are telephone lines connecting a customer's equipment to the public switched telephone network. Data are presented per 1,000 population for the entire country.	Canning (1998); International Telecommunications Union.
Governance (index)	First principal component of four indicators: prevalence of law and order, quality of bureaucracy, absence of corruption, and accountability of public officials.	*International Country Risk Guide* (ICRG)

APPENDIX A (continued)

Variable	*Definition and construction*	*Source*
Stabilization policies		
Inflation	Measured by the consumer price index: annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services.	World Bank (2002).
Cyclical volatility of GDP	Standard deviation of the output gap for the period.	Authors' calculations.
Real exchange rate overvaluation	Real effective exchange rate, with the level adjusted such that the average for 1976–1985 equals Dollar's (1992) index of overvaluation (based on the ratio of actual to income-adjusted Summers-Heston purchasing power parity comparisons).	Easterly (2001).
Systemic banking crises	Number of years in which a country underwent a systemic banking crisis, as a fraction of the number of years in the corresponding period.	Authors' calculations, based on data from Caprio and Klingebiel (1999) and Kaminsky and Reinhart (1999).
External conditions		
Terms-of-trade shocks	Log difference of the terms of trade. Terms of trade are defined as customary.	World Bank (2000).
Period-specific shift	Time dummy variable.	Authors' construction.

APPENDIX B
Sample of Countries

The database is constructed of observations from a five-year panel sample for the period 1961-1999. The sample includes seventy-nine countries, but not all countries have observations for all of the subperiods. The table below shows the available observations per country and time period. The first two observations per country are reserved for differencing and serve as instruments. The regression sample thus comprises 350 observations in levels and an equal number in first differences.

	Period							
Country	*1961–1965*	*1966–1970*	*1971–1975*	*1976–1980*	*1981–1985*	*1986–1990*	*1991–1995*	*1996–1999*
Algeria			x	x	x	x	x	
Argentina	x	x	x	x		x	x	x
Australia	x	x	x	x	x	x	x	
Austria	x	x	x	x	x	x	x	x
Bangladesh						x	x	x
Belgium	x	x	x	x	x	x	x	x
Bolivia				x	x	x	x	x
Botswana					x	x	x	x
Brazil					x	x	x	x
Burkina Faso					x	x	x	x
Canada			x	x	x	x	x	x
Chile	x	x	x	x	x	x	x	x
Colombia	x	x	x	x	x	x	x	x
Congo, Democratic Rep. of the (Zaire)		x	x	x	x	x	x	

APPENDIX B (continued)

	Period							
Country	*1961–1965*	*1966–1970*	*1971–1975*	*1976–1980*	*1981–1985*	*1986–1990*	*1991–1995*	*1996–1999*
Congo, Republic of the	x	x	x	x	x	x	x	x
Costa Rica		x	x	x	x	x	x	x
Côte d'Ivoire	x	x	x	x	x	x	x	x
Denmark	x	x	x	x	x	x	x	x
Dominican Republic				x	x	x	x	x
Ecuador	x	x	x	x	x	x	x	x
Egypt, Arab Republic of		x	x	x	x	x	x	x
El Salvador	x	x	x	x	x	x	x	x
Finland	x	x	x	x	x	x	x	x
France	x	x	x	x	x	x	x	x
Gambia				x	x	x	x	
Ghana	x	x	x	x	x	x	x	x
Greece	x	x	x	x	x	x	x	x
Haiti					x	x	x	x
Honduras			x	x	x	x	x	x
Iceland	x	x	x	x	x	x	x	
India		x	x	x	x	x	x	x
Indonesia		x	x	x	x	x	x	x
Iran, Islamic Republic of				x	x	x	x	x
Ireland	x	x	x	x	x	x	x	x
Israel	x	x	x	x	x	x	x	x

APPENDIX B (continued)

	Period							
Country	*1961–1965*	*1966–1970*	*1971–1975*	*1976–1980*	*1981–1985*	*1986–1990*	*1991–1995*	*1996–1999*
Italy	x	x	x	x	x	x	x	x
Jamaica	x	x	x	x	x	x	x	x
Japan	x	x	x	x	x	x	x	x
Jordan					x	x	x	x
Kenya	x	x	x	x	x	x	x	x
Korea, Republic of			x	x	x	x	x	x
Madagascar	x	x	x	x	x	x	x	x
Malawi					x	x	x	x
Malaysia	x	x	x	x	x	x	x	x
Mexico	x	x	x	x	x	x	x	x
Morocco	x	x	x	x	x	x	x	x
Netherlands	x	x	x	x	x	x	x	x
Nicaragua				x	x	x	x	x
Niger		x	x	x	x	x	x	x
Nigeria					x	x	x	x
Norway	x	x	x	x	x	x	x	x
Pakistan	x	x	x	x	x	x	x	x
Panama				x	x	x	x	x
Papua New Guinea			x	x	x	x	x	
Paraguay	x	x	x	x	x	x	x	x
Peru	x	x	x	x	x	x	x	x

APPENDIX B (continued)

	Period							
Country	*1961–1965*	*1966–1970*	*1971–1975*	*1976–1980*	*1981–1985*	*1986–1990*	*1991–1995*	*1996–1999*
Philippines	x	x	x	x	x	x	x	x
Portugal	x	x	x	x	x	x	x	
Senegal		x	x	x	x	x	x	x
Sierra Leone				x	x	x	x	
South Africa	x	x	x			x	x	x
Spain	x	x	x	x	x	x	x	x
Sri Lanka	x	x	x	x	x	x	x	x
Sweden	x	x	x	x	x	x	x	x
Switzerland	x	x	x	x	x	x	x	
Syrian Arab Republic		x	x	x	x	x	x	x
Thailand		x	x	x	x	x	x	x
Togo				x	x	x	x	x
Trinidad and Tobago	x	x	x	x	x	x	x	x
Tunisia						x	x	x
Turkey						x	x	x
Uganda						x	x	x
United Kingdom	x	x	x	x	x	x	x	x
United States	x	x	x	x	x	x	x	
Uruguay	x	x	x	x	x	x	x	x
Venezuela			x	x	x	x	x	x
Zambia						x	x	x
Zimbabwe				x	x	x	x	x

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