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Growth and Adjustment in East Asia and Latin America

Growth rates around the world have varied greatly over the last four decades. The four East Asian tigers—Hong Kong, Singapore, South Korea (henceforth Korea), and Taiwan—grew at an average of over 6.0 percent a year in per capita terms between 1960 and 2000. In contrast, many countries in Latin America and the Caribbean recorded less than 1.0 percent growth during the same period. Comparing the high growth of East Asian countries with the poor performance of Latin American and Caribbean economies leads to the question of which factors are fundamental for explaining such differences and what countries should do to spur growth.

This paper assesses the evolution of growth in these two regions in order to explain the poor performance of Latin America and the Caribbean relative to East Asia. Based on cross-country growth regressions, we find that the traditionally important growth factors—investment, population growth, and the quality of human resources—explain almost half of the difference in per capita GDP growth between East Asia and Latin America. Economic policy and institutional factors—such as the rule of law, government consumption, macroeconomic stability, and the degree of openness—explain the other half of the growth differences between the two regions. Balance-of-payments crises have also contributed to lower growth in Latin America and East Asia, although both regions have suffered from their effects.

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We extend the discussion on growth determinants to the role of income distribution and the quality of education. Although those variables do not enter satisfactorily into growth regressions as a result of collinearity or lack of available data, we provide evidence that they help explain why the regions have different institutions and policies.

When we compare the East Asian and Latin American experiences of adjusting from currency crises, we find that the adjustment process is generally consistent with the stylized V-shaped pattern observed in all crisis episodes worldwide. The mean growth rates hit bottom either at the time of the crisis or one year later, and they return to the precrisis trend rate within two or three years.

Output losses have been severe in some recent crises, such as the East Asian meltdown of 1997. By examining regional adjustment patterns following past crisis episodes, we identify the factors that help countries avoid a large decline in growth during the crisis and quickly recover to the precrisis potential growth path. Adequate international liquidity, real exchange rate depreciation, and a sound banking system play a critical role in avoiding severe repercussions from a crisis. A good external environment also speeds recovery and limits the cost of the crisis. Moreover, an expansionary monetary policy may dampen the crisis costs, but fiscal policy has no significant effect.

The paper is organized in five sections. First we present an overview of East Asian and Latin American growth over the past forty years. The subsequent section uses cross-country regressions to identify the critical factors behind Latin America and the Caribbean's low growth performance relative to East Asia, and it also discusses prospects for the future. We then undertake a comparative analysis of the regional patterns of adjustment from previous crisis episodes. Next, we investigate the factors that help countries avoid severe output losses following a crisis and quickly return to the precrisis potential growth path. The final section concludes.

Overview

Compared with the East Asian experience, Latin America's growth performance over the past four decades was disappointing. Table 1 presents growth rates for the sample of twenty-one Latin American and Caribbean

TABLE 1. Economic Growth in East Asia and Latin America[a]

Region and country	GDP per capita (PPP U.S. dollars)[b] 1960	2000	2000/1960	Average annual per capita GDP growth (percent) 1960–70	1970–80	1980–90	1990–2000	1960–2000	1970–2000
East Asia									
China	682	3,747	5.50	1.79	2.72	5.14	7.41	4.26	5.09
Hong Kong	3,090	26,703	8.64	7.45	6.59	5.04	2.48	5.39	4.70
Indonesia	936	3,637	3.89	1.50	5.56	4.08	2.45	3.40	4.03
Korea	1,495	15,881	10.62	5.97	5.68	7.32	4.67	5.91	5.89
Malaysia	2,119	9,937	4.69	3.08	5.26	2.92	4.19	3.86	4.12
Philippines	2,015	3,424	1.70	1.73	3.17	−0.89	1.30	1.33	1.19
Singapore	2,161	27,186	12.58	8.93	7.76	4.48	4.16	6.33	5.47
Taiwan	1,430	18,718	13.09	6.68	7.44	6.27	5.36	6.44	6.35
Thailand	1,091	6,857	6.28	5.13	4.05	5.71	3.50	4.60	4.42
Regional average	1,669	12,899	7.44	4.69	5.36	4.45	3.95	4.61	4.58
Latin America and the Caribbean									
Argentina	7,371	10,995	1.49	2.29	1.38	−3.87	4.22	1.00	0.57
Bolivia	2,354	2,722	1.16	0.60	2.01	−2.22	1.08	0.37	0.29
Brazil	2,371	7,185	3.03	4.23	5.67	−0.26	1.46	2.77	2.29
Chile	3,853	9,920	2.57	2.19	1.22	1.28	4.79	2.37	2.43
Colombia	2,530	5,380	2.13	2.23	3.11	1.35	0.87	1.89	1.78
Costa Rica	3,476	5,863	1.69	1.85	2.59	−0.94	1.75	1.31	1.13
Dominican Republic	1,695	5,271	3.11	1.75	3.69	0.80	5.12	2.84	3.20
Ecuador	2,004	3,467	1.73	1.35	6.16	−1.17	−0.85	1.37	1.38
El Salvador	3,310	4,435	1.34	2.24	0.05	−1.66	2.30	0.73	0.23
Guatemala	2,344	3,914	1.67	2.44	3.05	−1.21	0.84	1.28	0.90
Haiti	1,065	1,658	1.56	−1.03	1.78	−2.50	6.51	1.19	1.93
Honduras	1,700	2,054	1.21	0.91	2.03	−0.25	−0.82	0.47	0.32
Jamaica	2,746	3,692	1.34	3.43	−1.14	1.72	−1.05	0.74	−0.16
Mexico	3,980	8,766	2.20	3.28	3.27	−0.43	1.78	1.97	1.54
Nicaragua	2,877	1,767	0.61	3.25	−2.70	−3.00	−2.42	−1.22	−2.71
Panama	2,325	6,066	2.61	4.98	3.35	−0.69	1.96	2.40	1.54
Paraguay	2,425	4,682	1.93	1.70	4.46	1.01	−0.58	1.64	1.63
Peru	3,228	4,583	1.42	3.73	0.45	−3.13	2.47	0.88	−0.07
Trinidad &Tobago	4,370	11,148	2.55	4.10	3.77	−0.90	2.43	2.35	1.76
Uruguay	5,874	9,613	1.64	0.43	2.70	−1.00	2.81	1.23	1.50
Venezuela	7,841	6,420	0.82	2.95	−2.79	−1.36	−0.80	−0.50	−1.65
Regional average	3,321	5,695	1.81	2.33	2.10	−0.80	1.61	1.29	0.94
Comparator countries									
Japan	4,545	24,672	5.43	9.27	3.09	3.53	1.05	4.23	2.55
United States	12,273	33,308	2.71	2.87	2.66	2.16	2.30	2.50	2.37
World average	3,823	7,503	1.96	2.53	1.99	0.98	1.32	1.70	1.43

Source: Heston, Summers, and Aten (2002).

a. Per capita GDP levels and growth rates are based on 1996 international prices (adjusted for purchasing power parity), based on the Penn World Table 6.1. Regional averages are not weighted by size, such that each country has the same weight (nine countries in the East Asian sample, twenty-one countries in the Latin American and Caribbean sample, and eighty-five countries in the world sample).

b. Adjusted for purchasing power parity (PPP).

countries and nine East Asian economies we analyze in this paper.[1] Average growth rates in Latin America were well below the East Asian averages. For Latin America as a whole, average per capita GDP growth was 1.3 percent from 1960 to 2000, compared with 4.6 percent in East Asia over the same period. This difference is astonishing. While per capita income in East Asia increased sevenfold, in Latin America it did not even double.

Latin America's bad performance in these forty years is not entirely a consequence of the debt crisis and the so-called lost decade of the 1980s. Its performance has been consistently poor, with average growth rates well below those of East Asia. The 1980s display the biggest difference in growth rates, however: our sample of East Asian countries grew by 4.5 percent on average, while the growth rate in Latin America and the Caribbean fell at an average rate of –0.8 percent. This pattern supports the view that growth performance was particularly poor during the debt crisis.

Average GDP per capita in Latin America and the Caribbean was more than twice the average in Asian countries in 1960. Low growth over the next 40 years reverted this situation, bringing the Asian average per capita GDP to twice that of Latin America. This is a crude proof of the income differences that can accumulate from having low growth vis-à-vis high growth over a period of forty years.

The growth performance of the East Asian region as a whole declined over the period. The average per capita GDP growth rates were 5.4 percent in the 1970s, 4.5 percent in the 1980s, and 4.0 percent in the 1990s. During the Asian crisis, growth rates plunged sharply in the five countries that were most affected by crises: Indonesia, Korea, Malaysia, the Philippines, and Thailand. When we look at the whole 1990s, however, growth fell in almost all countries—including star performers such as Hong Kong and Singapore—with the notable exception of China.

Growth recovered somewhat in Latin America and the Caribbean in the 1990s, but it was still lower than during the 1960s and 1970s. The region's growth experiences were much more diverse in the later decade relative to the earlier periods, however. The standard deviation of growth in the 1990s was almost twice that of the 1960s. The top four countries in terms of growth in the 1990s (namely, Argentina, Chile, the Dominican Republic, and Haiti)

1. We selected the countries in our sample on the basis of data availability for the regressions described in the next section. GDP data are from the Penn World Table version 6.1 (see Summers and Heston, 1991; Heston, Summers, and Aten, 2002).

grew faster than the top four of the 1960s (that is, Brazil, Panama, Peru, and Trinidad and Tobago). Six countries experienced negative growth in the 1990s, however, whereas none did in the 1960s. The region's good performance in the 1960s and 1970s must be placed in the context of strong growth of the world economy. As table 1 shows, Latin America grew 0.2 percentage point below the rate of the world economy in the 1960s and 0.1 percentage point above the world rate in the 1970s, whereas the regional rate was 0.30 percentage point above that of the world average in the 1990s. The good performance of the 1960s and 1970s was thus related more to the good performance of the world economy than to internal conditions.

Many factors may explain Latin America's low growth performance, and we revisit some of them in a later section of this paper. Previous studies that discuss empirical evidence concerning Latin American growth include De Gregorio, who uses five-year panel data for twelve Latin American countries between 1950 and 1985.[2] That paper finds that the two most important factors inhibiting growth in Latin American countries are low investment and high inflation. Latin America has had, by far, the highest inflation rate in the world over the past forty years, and this has hindered growth. Inflation affects growth through many channels.[3] As argued by Stanley Fischer, a high inflation rate is a summary statistic for macroeconomic mismanagement and for the inability of governments to put in place sound economic policy.[4] Corbo and Rojas, who use a panel data framework similar to that of De Gregorio, find that inflation and the black market premium are both significant determinants of growth when entered separately in the regressions, although the two variables are not significant when jointly included.[5] More recent evidence shows that inflation and the black market premium are both negatively correlated with GDP growth in a large sample of countries.[6] The evidence thus highlights the importance of macroeconomic stability for spurring growth. This includes not only inflation and the black market premium, but also a low budget deficit and structural measures such as trade openness and financial sector depth.

2. De Gregorio (1992).

3. See De Gregorio (1996) for further discussion on the channels through which inflation affects growth.

4. Fischer (1993).

5. Corbo and Rojas (1993); De Gregorio (1992).

6. Much of this early evidence is confirmed by recent work. See De Gregorio and Lee (1999) and Loayza, Fajnzylber, and Calderón (2004). The latter paper also separates the effects of cyclical recovery and trend growth.

Latin American and Caribbean countries made important progress in the 1990s in both macroeconomic stability and structural reforms. The poor growth performance toward the end of the 1990s led some observers to argue that the reforms had failed. Recent research suggests otherwise, however, that the main reasons for the disappointing performance were that the external environment deteriorated in the late 1990s and the reforms were not fully implemented.[7] Lora and Panizza show that the countries that had the best growth performance were also at the forefront of reform.[8] Contrary to previous studies, they find that reforms increase growth only temporarily: reforms explain an increase in growth of 1.3 percent in the early 1990s, but this contribution declines to 0.6 percent when the reform process decelerates. This finding is consistent with the neoclassical growth model, in which reforms increase long-term income and transitional growth. As time passes, the effect on growth diminishes, although the income gains remain.

The recent experience of Argentina provides a dramatic reminder that structural reforms are not enough to ensure progress. Macroeconomic stability and institution building are essential for avoiding large declines in income, which may neutralize all the gains achieved by reforms.

Determinants of Economic Growth: A Cross-Country Analysis

This section explores the main factors that influenced growth of per capita income in the past three decades. The analysis is based on a general framework of cross-country regressions, which puts the experience of an individual country in a global context. This exercise provides a basis for understanding future growth prospects of the East Asian and Latin American countries.

The Basic Empirical Framework

The basic empirical framework is based on an extended version of the neoclassical growth model.[9] This model predicts conditional convergence of income, implying that a country with a lower initial income relative to its own long-run (or steady-state) potential income level grows faster than a higher-income country over time. In the cross-country context, convergence

7. Fernández-Arias and Montiel (2001); Lora and Panizza (2002).
8. Lora and Panizza (2002).
9. The model and its empirical implications are described by Barro (1991); Mankiw, Romer, and Weil (1992); Barro and Lee (1994); Barro and Sala-i-Martin (2003).

implies that poorer countries should grow faster than richer countries, given that the analyst controls for the variables influencing the steady-state level of per capita income. A reduced form of the model can be represented by

$$(1) \qquad g_{yiT} = \frac{\log(y_{Ti}/y_{0i})}{T} = \beta_0 + \beta_2 \log(y_{0i}) + \beta_3 \mathbf{Z}_i + \varepsilon,$$

where the dependent variable is the growth rate of per capita income for country i in period T, $\log(y_{0i})$ is the log value of the initial level of per capita income for country i, and $\mathbf{Z}_i$ denotes an array of variables that influence the steady-state level of per capita income in country i. Conditional convergence implies a negative coefficient on initial income. The variables included in $\mathbf{Z}$ could affect either the productivity growth rate or the capital accumulation rate. Once we control for investment rates, however, we can interpret the effect of the other $\mathbf{Z}$ variables as affecting both the productivity growth rate and the catch-up in productivity.

A wide variety of external environment and policy variables affect growth rates by influencing long-run potential income and the productivity growth rate. The extended Solow-type neoclassical growth model emphasizes the investment rate, population growth, and human capital as important factors that determine the steady-state income level.[10] Our external environment variables include investment, fertility, and human resources.[11] Our measure of human resources includes a measure of the human capital stock, proxied by the average years of secondary and higher schooling for males aged 25 years and older.[12] We also use life expectancy at birth as a measure of health attainment.

10. See, for example, Mankiw, Romer, and Weil (1992).

11. Our empirical framework includes a representative set of the explanatory variables that have been widely used in previous work; see Barro and Sala-i-Martin (2003, chap. 12) for details. For a description of the data and basic statistics, see table A1 in the appendix.

12. Barro and Lee (2001). Most empirical studies confirm a positive association between the initial level of human capital stock, measured by average years of schooling, and economic growth. While this result is consistent with a long history of microeconomic evidence (à la Mincer) of the positive relation between education and income, the evidence at the aggregate level often is not very robust (see, for example, Klenow and Rodríguez-Clare, 1997). In addition, a number of recent studies fail to find a significant association between changes in years of schooling and economic growth. This evidence does not constitute a clear basis for rejecting the positive effect of education on growth, however, given that the average years of schooling change slowly and influence economic growth with a substantial time lag. See the detailed discussion of Bosworth and Collins (2003) on the specification and data measurement issues concerning the relation between human capital and growth.

Previous empirical research considers institutions and policy factors as the important determinants of long-run per capita income.[13] We thus include five variables to control for institutional and policy variables. The first variable is government consumption, defined as the average ratio of government consumption in final goods to GDP. The second variable is the overall maintenance of the rule of law in the economy. The third policy variable is the inflation rate. The fourth institutional variable is an index of democracy, which may have nonlinear effects on growth.[14] The fifth variable is a measure of openness that filters out the normal relation (estimated in another regression system) of international openness to the logs of population and area. This filtered variable thus reflects the influences of government policies, such as tariffs and trade restrictions, on international trade.[15]

Another exogenous factor we consider in our regressions are terms-of-trade shocks, measured as the ratio of export to import prices.

Finally, we want to estimate the effects of balance-of-payments crises on economic growth. Barro shows that currency crises have a negative influence on economic growth.[16] We define a balance-of-payments crisis dummy variable for each country during any five-year period to equal one if a crisis occurred during the period and zero otherwise.[17]

Our regression of equation 1 applies to a panel set of cross-country data over six five-year periods from 1970 to 2000, corresponding to the periods 1970–75, 1975–80, 1980–85, 1985–90, 1990–95, and 1995–2000.[18] The

13. Mauro (1995); Knack and Keefer (1995); Barro (1997).

14. As discussed in Barro (1997).

15. See Barro and Sala-i-Martin (2003, chap. 12). The literature contains a large number of alternative measures of trade openness, and economists disagree on the relation between openness and growth. For instance, Rodríguez and Rodrik (2001) claim that the indicators of openness frequently used in the literature are poor measures of trade policy and are highly correlated with other sources of growth, such as macroeconomic policies. Although these criticisms are valid to an extent, we believe that the positive effects of trade openness on growth—through channels such as imports of intermediate and capital goods and technology spillovers—has been proved. Frankel and Romer (1999) show that using a country's geographical attributes as instruments for trade volume results in international trade having a large and positive effect on per capita income. Wacziarg and Welch (2003) provide a comprehensive review of the facts, as well as additional evidence on the effects of trade liberalization. See also Lee (1993); Dollar and Kraay (2004).

16. Barro (2001)

17. We discuss our definition of a balance-of-payments crisis in a later section.

18. We do not include the 1960s in the regression because the currency crisis variable is only available from 1970 on.

dependent variables are the annual growth rates of real GDP per capita over the six five-year periods.

One concern in the empirical specification is that any effect from contemporaneous explanatory variables may reflect reverse causation from GDP growth to the explanatory variables. For example, the relation between contemporaneous investment and growth may reflect high growth causing high saving. We solve this problem by adopting an instrumental variables estimation technique, and we estimate this system of the six equations using three-stage least squares (3SLS).[19] The instrumental variables technique controls for the possible simultaneity problem when $\mathbf{Z}_i$—the control variables—are endogenously determined. Instruments are mostly lagged values of the independent variables.[20] We use prior colonial status (Spanish or Portuguese colonies and other colonies) as an instrument for the inflation rate. To control for the possible reverse causation from lower growth to higher frequencies of balance-of-payments crisis, we use the ratio of international reserves to monthly imports at the beginning of each five-year period as an instrument for balance-of-payments crises.

Regression Results

Table 2 presents our regression results using the basic framework of equation 1 and the explanatory variables just described. The three-stage least squares technique is applied to a data set of eighty-five countries. Column 1 of table 2 shows the result of the basic regression without including the balance-of-payments crisis dummy variable. Column 2 includes the balance-of-payments crisis dummy as an independent variable. Although columns 1 and 2 show a similar pattern of results, substantial differences arise for inflation and schooling variables. The estimated effect of inflation on growth becomes much smaller when we include the balance-of-payments crisis

19. The estimation weights countries equally but allows for different error variances in each period and for correlation of these errors over time. Some studies suggest estimating panel growth regressions by the fixed-effects estimation technique, which takes unobservable country fixed effects into account. However, the fixed-effects technique eliminates information from cross-section variations (see Barro, 1997, pp. 36–39). Temple (1999) discusses other statistical problems concerning the estimation and interpretation of cross-country growth regressions.

20. See the notes to table 2.

variable. This may reflect the strong positive correlation between inflation and balance-of-payments crises. In contrast, the schooling variable becomes more significant when the balance-of-payments crisis variable is added.

Since the balance-of-payments crisis variable itself enters very significantly, we focus on the results of column 2. These results show strong evidence for conditional convergence. The investment rate and fertility variables have strong effects on growth rate. The human resources variables also have a significantly positive effect on economic growth.

We find clear evidence that the institutional and policy variables play a significant role in determining economic growth. The government consumption variable has a significantly negative impact on growth: an increase

TABLE 2. Cross-Country Panel Regressions for Per Capita GDP Growth Rate[a]

	Three-stage least squares				*First-difference*	*Cross-section*
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Per capita GDP (in logs)	–0.0236	–0.0251	–0.0270	–0.0224	–0.0630	–0.0200
	(0.0036)	(0.0036)	(0.0039)	(0.0036)	(0.0115)	(0.0021)
Investment/GDP	0.0723	0.0560	0.0558	0.0497	0.0568	0.0326
	(0.0272)	(0.0274)	(0.0270)	(0.0280)	(0.0571)	(0.0222)
Total fertility rate (in logs)	–0.0180	–0.0151	–0.0153	–0.0132	–0.0353	–0.0094
	(0.0058)	(0.0060)	(0.0064)	(0.0060)	(0.0106)	(0.0050)
Male upper-level schooling	0.0021	0.0029	0.0031	0.0019	0.0014	0.0279
	(0.0017)	(0.0017)	(0.0018)	(0.0017)	(0.0037)	(0.0128)
Life expectancy (in logs)	0.0546	0.0653	0.0614	0.0661	–0.0723	0.1017
	(0.0209)	(0.0214)	(0.0237)	(0.0225)	(0.0318)	(0.0143)
Government consumption/GDP	–0.0723	–0.0722	–0.1068	–0.0646	0.0285	0.0012
	(0.0272)	(0.0239)	(0.0267)	(0.0238)	(0.0625)	(0.0172)
Rule-of-law index	0.0178	0.0179	0.0184	0.0161	–0.0127	0.0278
	(0.0074)	(0.0075)	(0.0084)	(0.0075)	(0.0160)	(0.0087)
Inflation rate	–0.0284	–0.0129	–0.0077	–0.0144	–0.0303	0.0074
	(0.0080)	(0.0090)	(0.0090)	(0.0091)	(0.0072)	(0.0064)
Democracy index	0.0556	0.0599	0.0562	0.0555	0.0014	0.0648
	(0.0183)	(0.0188)	(0.0212)	(0.0190)	(0.0301)	(0.0186)
Democracy index squared	–0.0456	–0.0472	–0.0387	–0.0422	–0.0029	–0.0660
	(0.0171)	(0.0175)	(0.0196)	(0.0179)	(0.0277)	(0.0175)
Openness measure	0.0072	0.0086	0.0112	0.0038	0.0259	–0.0004
	(0.0045)	(0.0046)	(0.0049)	(0.0046)	(0.0096)	(0.0038)
Growth rate of terms of trade	0.0312	0.0346	0.0558	0.0307	0.0220	–0.0287
	(0.0229)	(0.0233)	(0.0270)	(0.0234)	(0.0214)	(0.0593)
Balance-of-payments crisis		–0.0165	–0.0168	–0.0161	0.0025	–0.0229
(contemporaneous period)		(0.0053)	(0.0058)	(0.0051)	(0.0088)	(0.0054)

(*continued*)

TABLE 2. Cross-Country Panel Regressions for Per Capita GDP Growth Rate[a] (*continued*)

	Three-stage least squares				*First-difference*	*Cross-section*
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Lagged balance-of-payments crisis			0.0061 (0.0056)			
East Asian countries[b]				0.0106 (0.0056)		
Latin American countries[c]				−0.0033		(0.0041)
No. countries	85	85	85	85	84	85
No. observations	464	464	391	464	371	85

Source: Authors' calculations.

a. In columns 1, 2, and 4, the system has six equations, corresponding to the periods 1970–75, 1975–80, 1980–85, 1985–90, 1990–95, and 1995–2000. Column 3 and column 5 omit the 1970–1975 period (column 3 to include the lagged value of the balance-of-payments crisis variable and column 5 through differencing of the data). The dependent variables are the growth rates of per capita GDP in the respective period. The log of per capita GDP, the average years of male secondary and higher schooling, and the log of life expectancy at age one are measured at the beginning of each period. The ratios of government consumption and investment to GDP, the inflation rate, the total fertility rate, the growth rate of the terms of trade, and the democracy index are period averages. The rule-of-law index is the earliest value available (for 1982 or 1985) in the first three equations and the period average for the other equations. The openness variable is the period average. Estimation is by three-stage least squares (3SLS). Instruments are the actual values of the variables for schooling, life expectancy, openness, and the terms of trade; dummy variables for Spanish or Portuguese colonies and other colonies (which have substantial explanatory power for inflation); lagged values of the log of per capita GDP, the government consumption ratio, and the investment ratio; and the initial values for each period of the rule-of-law index and democracy index. In the first two equations, the instrument for the rule-of-law indicator is its value for 1982 or 1985. The initial values of the ratio of foreign reserves to imports are used as an instrument for balance-of-payments crises. Individual constants (not shown) are included for each period. Column 5 uses first differences of all variables (including instruments that are used in column 2) and is then estimated by three-stage least squares method. Column 6 uses means of all variables over the period 1970–2000 and is estimated by ordinary least squares (OLS). Standard errors of the coefficient estimates are shown in parentheses.

b. The group of East Asian countries comprises the nine countries listed in table 1.

c. The group of Latin American and Caribbean countries comprises the twenty-one countries listed in table 1.

in the government consumption ratio of one percentage point reduces growth by 0.07 percentage point a year. The rule-of-law index has a strong positive effect on growth, indicating that countries with effective enforcement of property and contractual rights tend to have higher growth rates than countries with weak enforcement of these rights. The openness variable appears to be positively associated with the growth rate.

The regression results confirm the nonlinear relation between democracy and growth found by Barro.[21] The coefficients on the indicator of democracy and its square are positive and negative, respectively, and both are statistically significant.

21. Barro (1997).

Column 2 further shows that inflation has a negative but statistically insignificant effect on economic growth. The coefficient is less than half the value of column 1, where inflation has a greater impact on growth. The problem, as mentioned above, is the correlation between balance-of-payment crises and inflation.

The regression results show that changes in the terms of trade have a negative effect on per capita GDP growth, but in some instances the effect is not significant.

Balance-of-payments crises turn out to have a strong, negative effect on economic growth. The estimated coefficient on the balance-of-payments crisis variable is –0.017 (with a standard error of 0.005). This implies that a balance-of-payments shock lowers the growth rate by 1.7 percentage points per year in a five-year period.

Column 3 of table 2 adds a lagged effect of a balance-of-payments crisis. Our results confirm those of Barro—namely, that the retardation of growth by a balance-of-payments crisis does not persist into the next five-year period.[22] The effect of a balance-of-payments crisis on economic growth in the subsequent five-year period turns out to be positive, but statistically insignificant. A balance-of-payments crisis reduces income permanently, but it has no permanent effects on growth.

Table 2 also shows the results of a regression that includes regional dummies (see column 4). A dummy variable for Latin America and the Caribbean has a statistically insignificant coefficient, while a dummy for East Asia is marginally significant at the 10 percent level. Earlier empirical studies find a significant and negative effect for a Latin American dummy variable.[23] This becomes insignificant in the current empirical framework, indicating that the explanatory variables included on the right-hand side explain most of the poor performance of Latin American economies. However, the point estimates, although small in magnitude and statistically insignificant, suggest that even when we take the included variables into account, Latin America has growth rates below the world average and East Asia has growth rates above the world average. The regression with the regional dummies shows that most of the explanatory variables are still significant and the estimated coefficients are of the same magnitude relative to those in column 2 of table 2.

22. Barro (2001).
23. Barro (1991).

The empirical technique we use assumes that there are no unobserved country-specific fixed effects.[24] Some studies suggest estimating panel growth regressions by the fixed-effects estimation technique so as to control for unobservable country fixed effects.[25] Column 5 of table 2 shows the results of a simple fixed-effects estimation of the growth regression represented in equation 1. The estimation uses first differences of all variables, which is a common method of removing unobservable country-specific factors ("within" estimator). The setup includes a system of five equations, since the first period is deleted by differencing of the data. The estimation also uses instruments for the first-differenced explanatory variables to control for potential endogeneity bias. Some variables have much stronger effects on growth in the first-difference specification than in the previous regressions. The estimated coefficients on the initial income, fertility, inflation, and openness variables become larger in magnitude, relative to those in column 2, and statistically significant. The estimated coefficients on other variables, however, are statistically insignificant or have wrong signs.

Although many researchers prefer the results from variants of fixed-effects estimation, the fixed-effects technique has also some drawbacks. It eliminates information from cross-section variations, and it may exacerbate the bias due to measurement errors in variables.[26] Column 6 presents our results from an estimation of cross-section data in which each country has one observation (that is, we use the means of all variables). Many explanatory variables that are statistically insignificant in the first-difference specification of column 5 have strong and statistically significant effects on economic growth in column 6; these include schooling, life expectancy, the rule-of-law index, democracy, and balance-of-payments crises. The standard errors of the coefficients are much smaller than in column 5, which implies that cross-country variations are more informative than the time-series variations within each country. While increasingly sophisticated techniques are being developed to deal with a dynamic panel data model, at this stage it seems unclear which technique is the best. For the discussion below, we rely mainly on the results of our 3SLS panel

24. See Temple (1999) for a discussion of statistical problems with the estimation and interpretation of cross-country growth regressions.

25. Caselli, Esquivel, and Lefort (1996); Loayza, Fajnzylber, and Calderón (2004); Fernández-Arias and Montiel (2001).

26. See the discussion in Barro (1997, pp. 36–42).

estimation, which combines both the fixed-effects and the cross-section estimates.

Economic Growth of Latin America in Comparative Perspective

The cross-country regression results allow us to analyze growth performance of the Latin American countries relative to performance in other regions. We compare the growth performance of Latin America to the best performance of East Asia. Average per capita growth rates for the nine East Asian economies were 5.4 percent, 4.5 percent, and 4.0 percent over each decade of the 1970–2000 period, while those for the twenty-one Latin American countries were 2.1 percent, –0.8 percent, and 1.6 percent, respectively.

We use the point estimates of the parameters in column 2 of table 2 for a simple accounting that breaks down the fitted values of growth rates for each country into the contributions from each of the explanatory variables. Although the residual errors in individual country growth rates are substantial, the differences in the explanatory variables provide clues to the sources of the differences in the fitted growth rates between East Asia and Latin America.

Table 3 presents the results. The basic regression can account for a substantial part of the growth differences between the two regions. For the twenty-one Latin American and Caribbean countries, the predicted growth rate is 3.1 percentage points lower, on average, than that of East Asia over the 1970–2000 period, while the actual difference was 3.6 percentage points. The largest difference corresponds to the lost decade of the 1980s.

This predicted difference can be broken down into the contributions of the twelve explanatory variables. The higher income level of Latin America in 1970 relative to that of East Asia led to lower growth in this region in the 1970–90 period, as a result of the convergence effect. The convergence effect favored Latin America after 1980, however, when the income of East Asia exceeded that of Latin America. The net convergence effect is therefore negligible over the three decades from 1970 to 2000.

Latin America and the Caribbean also had a slightly higher life expectancy and thus better conditions for growth than East Asia in 1970. Educational attainment, however, was lower in Latin America than in East Asia. The regional differences widened over time, and the net effect of human resources contributed to slower growth in Latin America by about 0.3 percentage point relative to Asia over the whole period.

TABLE 3. Contributions to Growth Differentials between East Asia and Latin America, 1970–2000[a]

Annual average, in percent

	Contribution to the difference in per capita GDP growth of East Asia relative to Latin America				
				1970–2000	
Indicator	*1970–80*	*1980–90*	*1990–2000*	*Contribution*	*Share*
Actual growth	3.26	5.33	2.29	3.62	
Predicted growth	3.40	3.97	1.87	3.08	100.0
Explanatory variable					
Initial income	0.91	−0.05	−1.28	−0.14	−4.5
Investment rate	0.43	0.65	0.73	0.60	19.6
Fertility	0.31	0.56	0.63	0.50	16.3
Human resources (total)	0.14	0.28	0.45	0.29	9.4
Schooling	0.17	0.20	0.34	0.24	
Life expectancy	−0.03	0.08	0.11	0.05	
Institutions and policy (total)	1.46	1.95	1.29	1.57	50.8
Government consumption	0.40	0.32	0.22	0.31	
Rule of law	0.41	0.32	0.37	0.37	
Inflation rate	0.16	0.55	0.22	0.31	
Democracy	0.04	0.12	−0.27	−0.04	
Openness	0.45	0.65	0.75	0.62	
Terms of trade	0.01	0.04	0.02	0.02	0.7
Balance-of-payments crisis	0.14	0.54	0.04	0.24	7.8

Source: Authors' calculations.

a. Our sample includes the nine East Asian economies and twenty-one Latin American countries listed in table 1. The predicted per capita growth rate is based on the estimation result of column 2 in table 2.

Investment and fertility rates had strong effects on Latin America's performance relative to East Asia, in that they lowered the per capita growth rate by about 0.6 and 0.5 percentage points per year, respectively, over the past three decades. Without this difference, Latin America's per capita income would have been 25 percent higher after the thirty years ending in 2000.

The institutional and policy variables similarly had a significant effect on the differences in growth rates. Differences in growth may stem from either low human and physical capital accumulation or low productivity growth. Institutions and policies can thus affect growth by changing the incentives for physical or human capital accumulation and by reducing productivity and the speed with which an industry catches up to the technological frontier. The combined effect of the differences in the five

policy variables—government consumption, rule of law, inflation, democracy, and trade openness—accounted for 1.6 percentage points of the slower growth in Latin America relative to East Asia over the period 1970–2000. The subperiod 1980–90 posted the strongest effect from these institutional and policy variables, with growth rates lowered by 2.0 percentage points in the decade. In other words, policies and institutions deteriorated significantly in Latin America during the debt crisis. As we emphasize below, although external conditions could have led to a deterioration of internal policies and institutions, Latin America's bad growth performance can largely be traced to bad policies and institutions, even in a period with as negative an external environment as the 1980s.

Within this group of variables, trade openness was the most important variable. Latin America's relatively inward-oriented trade strategy slowed growth by about 0.6 percentage point per year in the region. Most of the countries in our Latin American and Caribbean sample not only have a lower trade share (exports plus imports as a share of GDP) than the East Asian countries, but they also tend to be smaller in size and population, which further reduces their effective trade openness.

The high inflation rate in Latin America further reduced growth by 0.3 percentage point relative to east Asia over the 1970–2000 period. The negative effect of high inflation was most significant in the 1980s, when inflation lowered growth by 0.7 percentage point in Latin America vis-à-vis East Asia. The average inflation rate in the 1980s was 48.5 percent in Latin America and the Caribbean, versus 2.6 percent in our sample of nine East Asian countries. As discussed above, this effect does not include the likely detrimental effects of inflation on investment, although the evidence shows that the effects of inflation on investment are much smaller than its effects on productivity growth.[27]

Government consumption and the rule of law contributed to Latin America's low growth rate by 0.3 and 0.4 percentage points a year, respectively, over the three decades. In contrast, democracy played an insignificant role in the growth difference between the two regions.

Table 3 also shows that the effect of the relatively unfavorable terms-of-trade shock was small in Latin America and the Caribbean. This result undermines the view that the region's problem was its pattern of specialization in the face of a particularly unfavorable external scenario. According

27. De Gregorio (1996).

to advocates of Latin America's import substitution strategy of the 1960s, countries should pursue internal industrialization because the products they exported suffered declining terms of trade. The evidence from our regression, however, indicates that this argument is wrong and that it is precisely openness, in the context of good policies and institutions, that boosts fast and lasting growth.

The external environment could explain part of the poor performance during the debt crisis. The largest difference between predicted and actual growth occurs in the 1980s. The growth regressions cannot explain this difference of 1.4 percent, even after we control for policies, institutions, the terms of trade, and balance-of-payments crises. Of course, the output losses from a currency crisis do not depend solely on external factors, but also stem from internal factors such as initial conditions and policy responses.

The balance-of-payments crisis contributed about 0.2 percentage point to the shortfall in growth between Latin America and East Asia over the whole period. Its largest effect was in the 1980–90 period, when it explained 0.5 percentage point of the growth differential. Its contribution to the growth differential became negligible in the 1990s, however, when East Asian economies also suffered from balance-of-payments crises.

Thus, while initial income and external conditions explain only moderate differences in growth rates, the major differences are produced by investment, human resources, and the institutional and policy variables. Traditionally important growth factors such as investment, fertility, and the quality of human resources contributed significantly to the difference in per capita GDP growth between East Asia and Latin America. Relatively poor economic policies (such as trade protection, high inflation, and high government consumption) and lack of good institutions similarly were very important factors in the relatively slow growth of Latin American and Caribbean countries over the past three decades.

Table 3 focuses on the poor regional performance of Latin America and the Caribbean relative to East Asia, but the countries in our Latin American sample demonstrate tremendous variations in growth performance. The two best-performing countries (namely, the Dominican Republic and Chile) grew by 3.2 and 2.4 percent a year, respectively, in 1970–2000, while the worst performers (Nicaragua and Venezuela) registered negative growth rates of –2.7 and –1.7 percent. In addition, growth rates fluctuated considerably within each country. Average per capita growth in Chile, for example, was only around 1.2 percent over the period 1970–90, but it increased

dramatically to 4.8 percent in 1990–2000. In contrast, all of the East Asian countries except the Philippines had strong growth throughout most of those three decades, without significant variations.[28]

An important question in the literature on economic growth is whether growth occurs as a result of factor accumulation or total factor productivity (TFP) growth. Some recent evidence based on a development accounting approach suggests that differences in per capita output or income across countries are mostly due to TFP rather than physical capital or human capital.[29] Other studies based on a growth accounting approach indicate that differences in per capita output growth are largely attributed to differences in the growth of factor inputs rather than of total factor productivity. For instance, Bosworth and Collins examine seven East Asian countries over the period from 1960 to 2000; they estimate that the average growth rate of output per worker is 3.9 percent, which they break down into physical capital growth (2.3 percent), human capital growth (0.5 percent), and TFP growth (1.0 percent).[30] Over the same period, twenty-two Latin American countries experienced an average growth in per worker output of 1.1 percent, which the authors again decompose into physical capital growth (0.6 percent), human capital growth (0.4 percent), and TFP growth (0.2 percent). This study thus attributes the difference in the growth rates of output per worker in East Asia and Latin America, which totals 2.8 percent, more to physical and human capital growth (2.3 percent) than to TFP growth (0.8 percent). This result is consistent with the view that East Asia's high growth is the consequence of the very high savings rate in Asia.[31] However, the profession has not yet reached a consensus on the role of capital accumulation versus TFP as a result of the many problems in growth accounting methods, such as measurement issues.

The results of our growth regressions do not explicitly distinguish the role of factor accumulation and productivity in output growth. Fertility rates and investment in physical and human capital explain roughly half the difference in the growth performances of East Asia and Latin America, while the other half is explained by institutional and policy factors. Since

28. An earlier version of this paper examines the differences among individual Latin American economies relative to East Asian countries.

29. Easterly and Levine (2001).

30. Bosworth and Collins (2003).

31. See, for example, Young (1995).

we control for factor accumulation, we would expect that the institutional and policy factors influence growth through TFP differentials. Our results provide a fairly balanced answer that emphasizes both factor accumulation and productivity growth as important factors for output growth, especially given the very high investment rates in East Asia.

Growth Prospects for East Asia and Latin America

The results of cross-country regressions can provide the basis for constructing economic growth forecasts for individual countries. We obtain projected growth rates for 2001–10 by multiplying 2000 values (or the 1995–99 period average) of the explanatory variables by the estimated coefficients in the panel regression of column 2 in table 2. We assume that terms-of-trade shocks are equal to those of the 1990s and that no balance-of-payments crises occur. Table 4 presents the results of this growth projection for the East Asian and Latin American regional averages.

This exercise predicts an average growth rate of 2.3 percent for the twenty-one Latin American countries in 2001–10, which represents an increase from the 1.6 percent average of the 1990s.[32] The estimated average growth rate for the East Asian region is 3.8 percent; this is very close to the average of 4.0 percent in the last decade. The growth differential between two regions will thus shrink substantially to 1.4 percentage points, compared with 3.1 percentage points over the whole 1970–2000 period and 1.9 percentage points over the 1990–2000 period. This is basically explained by convergence, since the high initial income in East Asia slows growth vis-à-vis Latin America.

Overall, our predictions indicate that growth in Latin America will be higher than in any of the previous four decades, with the exception of the 1960s when it was equal. Although modest when compared with the East Asian performance, this rate of per capita income growth is almost twice that of 1960–2000. Improved institutions and policies help to explain why Latin America should do better.

The predicted difference in the average regional growth rates in 2001–10 can be broken down into the contributions from the twelve explanatory variables. As table 4 shows, the convergence effect becomes quite unfavorable

32. This projection is close to the one presented by Loayza, Fajnzylber, and Calderón (2004), who predict a growth rate of 2.5 percent based on realistic expectations.

TABLE 4. Growth Prospects for East Asia and Latin America and the Caribbean, 2001–10[a]
Percent

Variable	*Predicted value*
Predicted per capita GDP growth, 2001–10	
East Asia	3.78
Latin America and the Caribbean	2.34
Difference in predicted growth	1.44
Predicted per capita GDP in 2010 (in PPP U.S. dollars)[b]	
East Asia	19,092
Latin America and the Caribbean	7,073
Breakdown of difference in predicted growth	
Initial income	–1.66
Investment rate	0.67
Fertility	0.59
Human resources (total)	0.56
Schooling	0.40
Life expectancy	0.16
Institutions and policy (total)	1.26
Government consumption	0.26
Rule of law	0.34
Inflation rate	0.09
Democracy	–0.19
Openness	0.77
Terms of trade	0.02

Source: Authors' calculations, based on data from Summers and Heston (1991).

a. The projection assumes that all countries maintain the policies recorded in 2000. Per capita GDP levels and growth rates are based on 1996 international prices, based on the Penn World Table version 5.6 (Summers and Heston, 1991). The projected growth rates for 2001–10 are obtained by multiplying 2000 values (or the 1995–99 period average) of explanatory variables by the estimated coefficients in the panel regression of column 2 in table 3. Terms-of-trade shocks are assumed to be equal to those in the 1990s. We assume no balance-of-payments crisis.

b. Based on a ratio to per capita GDP in 2000 of 1.48 for East Asia and 1.24 for Latin America and the Caribbean.

to East Asia as a result of the region's higher income relative to that of Latin America in 2000. The predicted net convergence effect in 2001–10 results in an average growth rate in East Asia that is 1.7 percentage points a year lower than that of Latin America and the Caribbean. This means that the rest of the factors influencing growth still explain a large difference of about 3.0 percentage points.

The increasing gap between Latin America and East Asia in terms of human resources is likely to contribute to the slower growth in Latin America with a net effect of about 0.6 percentage point over the 2001–10 period. Although both regions have experienced improvements in human resources

(see table 2), the differences have widened. The human resources variables thus explain a larger difference than in the past. The difference in investment still explains about 0.7 percentage point in growth differentials.

The institutional and policy variables are expected to maintain strong effects on differences in growth rates. The combined effect of the differences in the five policy variables—government consumption, rule of law, inflation, democracy, and trade openness—is expected to account for 1.3 percentage points slower growth in Latin America than East Asia over the period 2001–10.

These estimates assume no crisis will occur in any region. A crash would make a big difference to our predictions. The estimation shows that a balance-of-payments crisis would lower the growth rate by 1.7 percentage points a year. This is equivalent to the predicted differential of growth rates between the two regions over the 1990–2000 period.

Extensions: Quality of Education and Income Distribution

Empirical studies of the determinants of economic growth suggest numerous additional explanatory variables. Our framework captures the most important growth determinants, but some missing variables could also have a bearing on performance, particularly in Latin America and East Asia. The regressions may not capture these potentially relevant growth determinants because lack of data or collinearity with the other independent variables reduce the possibility of finding sensible estimates.

One such variable is the quality of schooling.[33] The schooling variable generally considered in basic regressions refers to the quantity of education, as measured by years of schooling, rather than the quality. An alternative measure of the educational stock is based on student scores on internationally comparable tests in the subjects of science and mathematics. This measure should capture variations in educational quality among countries because the performance of students and graduates should reflect the quality of their education. One shortcoming of these data, however, is that the observations apply to different years and are most abundant for the 1990s. Based on the limited sample available, studies by Barro and by Hanushek and Kimko find

33. Barro and Sala-i-Martin (2003) show that some additional regressors—most notably schooling quality and geography—are statistically significant when they are added one at a time to the regression, similar to our framework in table 2.

that test scores are positively related to growth rates of real per capita GDP in cross-country regressions.[34]

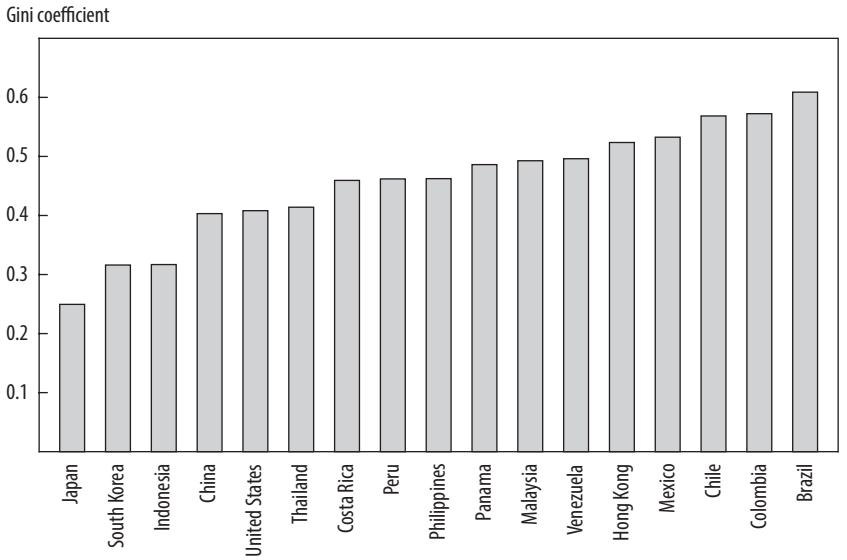
The test scores of Asian economies are superior to those of Latin American countries. For example, among the forty-four countries that participated in the 1991 International Assessment of Educational Progress (IAEP), China, Hong Kong, Japan, Korea, Singapore, and Taiwan showed the highest achievements in mathematics, while Brazil—the only participating Latin American country—came in last. In the Third International Mathematics and Science Study (TIMSS) in 1994 and 1995, Colombia, which was the only participating Latin American country, ranked thirty-eighth out of the thirty-nine countries included, while the East Asian economies placed among the top in mathematics and science. Although evidence on the quality of schooling is still scarce, there is a very clear gap between Latin America and East Asia, which accentuates the deficiencies in the quality of human resources we discussed earlier.

In our cross-country regression framework, we can further measure the quality of schooling by entering the human capital variable for different regions separately and then examining whether the returns to education vary by region. Our estimated coefficient for the whole sample is 0.0018 (with a standard error of 0.0017). When we interact the schooling variable with the regional dummies, the coefficient increases by 0.0035 (with a standard error of 0.0022) for East Asia and decreases by 0.0032 (with a standard error of 0.0025) for Latin America. These estimations confirm, albeit weakly, that the returns to education are higher in East Asia than in Latin America. However, the coefficients are statistically insignificant at the conventional level.

Income distribution is another area in which the differences between Latin America and East Asia are evident, although it is not included in the independent variables in our regressions. Figure 1 shows the Gini coefficients for Latin American and East Asian countries, as well as Japan and the United States for comparison. Data are the most recent available from the World Bank's *World Development Report,* which in most cases is between 1996 and 1998. Cross-country comparisons are difficult for several reasons. For example, differences depend on whether the unit of analysis is household or individual, whether income is measured before

34. Barro (1999); Hanushek and Kimko (2000).

FIGURE 1. Income Distribution in the 1990s



Source: World Bank, *World Development Report.*

or after tax, and whether the surveys refer to income or expenditure. The conclusion is undisputable, however: inequality is much greater in Latin America than in East Asia, and it could explain differences in human resources, policies, and institutions between the two regions.

Theoretical discussions often predict that inequality will have negative effects on growth.[35] Most cross-country empirical studies also find support for a negative relation between income inequality and growth.[36] However, some recent studies based on the panel-data estimation find a positive relation.[37] The main problem affecting cross-country empirical investigation is the quality and comparability of the data measured, with small differences in the data often resulting in large differences in the estimated relation between inequality and growth.

35. Alesina and Rodrik (1994); Persson and Tabellini (1994).
36. Alesina and Rodrik (1994); Perotti (1996).
37. Li and Zou (1998); Forbes (2000).

We investigated the effects of inequality on growth in our panel framework. Our measure of income inequality is the Gini index. The data are from the *World Income Inequality Database*, which extends the Deininger and Squire data set.[38]

The first regression of table 5 reports the estimated coefficient on the Gini index when it is added to the systems in row 2 of table 2. The overall sample size for the panel regressions falls from 464 to 277, because many fewer observations are available for Gini coefficients than for the full sample considered in table 2. In the system, the Gini value around 1970 appears in the equation for growth from 1970 to 1975, and so on. The five-year lagged values of the Gini coefficients are added to the list of instruments. The estimation results show that the Gini coefficient has no significant impact on economic growth. Thus, with the other explanatory variables considered in growth regressions held constant, differences in income distribution have no significant relation on subsequent economic growth.

Although income inequality has no direct impact on growth, additional effects can arise from the influence of inequality on the explanatory variables. One of the effects suggested by previous studies involves the impact of income distribution on fertility. Regression 2 of table 5 shows the estimation results for a panel system in which the log of the fertility rate is the dependent variable. In this system, the explanatory variables include the log of per capita GDP and the Gini index, and the lagged values of the log of per capita GDP and the Gini index are used as instruments. The results confirm that inequality has a strong positive impact on fertility.

Political economy theorists argue that inequality affects government expenditure and thereby affects growth. Unequal societies have more incentives for redistributive politics than relatively equal societies.[39] Regression 3 of table 5 shows the results of a panel system in which the government consumption ratio is the dependent variable. We find a significant influence from the Gini index.

Another channel through which income inequality influences growth is educational attainment. Poor families that are faced with borrowing constraints are not able to invest in their children even when the returns on education are very high. Poor families may have problems sending their

38. WIDER (2000); Deininger and Squire (1996).
39. Meltzer and Richard (1981).

TABLE 5. Effects of Gini Index on Growth and Determinants of Growth[a]

Regression	*Dependent variable*	*Gini index*	*No. observations*
(1)	Growth rate regression	–0.001	277
		(0.018)	
(2)	Fertility (log)	1.335	358
		(0.146)	
(3)	Government consumption/GDP	0.143	325
		(0.036)	
(4)	Secondary school enrollment	–0.800	321
		(0.098)	
(5)	Rule-of-law index	–0.869	321
		(0.126)	

Source: Authors' calculations.

a. In regression 1, the Gini index is added to the systems in column 2 of table 3; the Gini value around 1970 appears in the growth equation from 1970 to 1975 and so on, and the five-year lagged value is added to the list of instruments. The regressions for the other dependent variables come from systems of the six five-year periods from 1970 to 1999 for each variable. The log of per capita GDP and the Gini index are included as independent variables. Estimation is by three-stage least squares. Instruments are the lagged values of the log of per capita GDP and the Gini index. Standard errors are in parentheses.

children to school even under free schooling, since they often need income from their children's employment. This occurs less frequently in relatively equal societies than in unequal societies, for the same level of income, because parents in the former situation are able to pay the costs of education. A relatively equal distribution thus enables more households to send their children to school. Regression 4 of table 5 confirms that income inequality has a strong negative impact on secondary school enrollment. Low secondary school enrollment will reduce the secondary educational stock over time, which has an adverse impact on economic growth. Income distribution thus affects growth through the human capital channel.

Income inequality also has a strong negative impact on institutional quality. Regression 5 of table 5 shows our estimation results for a panel system in which the log of the rule-of-law index is the dependent variable. We find that the Gini index has a significant negative impact on the rule of law. Political economy considerations help explain why corruption, rule of law, and institutional quality in general are weaker in relatively unequal societies.

Overall, we find substantial evidence that inequality affects growth indirectly by influencing fertility, government consumption, education, and the rule of law. This evidence suggests that although income distribution does not have a significant direct effect on economic growth in our regressions (regression 1 in table 5), inequality may be detrimental to economic growth

by increasing distortions, weakening institutions, and lowering the quality of human resources.[40] More research is needed to establish the definite connections implied by these very suggestive correlations.

As we discussed previously, our accounting exercises show that although the gap in the growth rate between Latin America and East Asia will narrow in the next decade, it will remain substantial. This is basically due to regional differences in investment, fertility, schooling, and some policy variables such as government consumption, rule of law, and inflation. Improvements in public finance and educational investment are not easy to implement. High government expenditure and lower educational enrollments are to a certain extent an outcome of unequal income distribution. The income distribution is more unequal in Latin American countries than East Asian countries, and the evidence on the determinants of income distribution show that this gap cannot be closed in a short period.[41]

Crisis, Adjustment, and Sustained Growth

The previous section outlined how a balance-of-payments crisis reduces growth rates in the years close to the crisis. Such crises have contributed to a 0.25 percentage point difference a year in the growth performance of East Asia and Latin America over the 1970–2000 period. This is not minor: it is almost the same as the difference explained by human resources and about 40 percent of the difference explained by investment rates. Moreover, if East Asia could have reduced the severity of the 1997 collapse, a much

40. For instance, the positive impact of income inequality on fertility implies a negative, indirect effect from income inequality on economic growth. In terms of point estimates, if we multiply our estimated coefficient of 1.34 for the Gini index (regression 2 of table 5) by the corresponding coefficient for fertility in the growth regression (–0.015 in column 2 of table 2), we get an indirect estimate of the effect on the growth rate of 0.020. This estimate implies that an increase in the Gini index of 0.1 reduces the growth rate by about 0.20 percentage point. Similarly, the point estimates of income inequality on the rule-of-law index (–0.87 in table 5) and the corresponding coefficient for the rule-of-law index in the growth regression (0.018 in table 2) imply that an increase in the Gini index of 0.1 would reduce the growth rate by about 0.16 percentage point through a reduction in the rule-of-law index. The indirect effect of an increase in the Gini index of 0.1 through an increase in government consumption is also estimated to be about 0.10 percentage point reduction in the growth rate.

41. For example, improvements in education take time to pass through to a large share of the labor force (see De Gregorio and Lee, 2002).

larger part of regional growth differences would have been attributed to balance-of-payments crises.

A considerable literature, starting with Frankel and Rose, aims to identify the determinants of currency crises or at least search for good indicators that can help predict the occurrence of a crisis.[42] Our purpose is different, in that we are interested in determining the output costs after a balance-of payments crisis has occurred and the factors that could help alleviate these costs. In this section, therefore, we analyze the patterns of adjustment observed in previous crisis episodes, and we compare the experiences of adjusting from currency crises in East Asia and Latin America. We investigate the factors that help countries avoid severe output losses following the crises and return more quickly to the precrisis potential growth path.

Defining a Balance-of-Payment Crisis

To examine the nature of adjustments from a crisis, we first need to define what a crisis actually is. A balance-of-payments crisis is typically defined as an event in which an index of exchange market pressure exceeds a certain threshold. The literature offers several alternative indicators and methods for identifying the dates of currency crises. Studies by Frankel and Rose, Milesi-Ferretti and Razin, Barro, and Park and Lee use the nominal depreciation rate as the index and then date the start of each crisis as the point at which the index increased sharply over an exogenous threshold rate of depreciation common to all countries.[43]

Severe speculative pressure does not always lead to large depreciations, but rather the authorities may successfully defend the currency by intervening in the foreign exchange market. Eichengreen, Rose, and Wyplosz; Kaminsky and Reinhart; and Glick and Hutchison thus use an alternative indicator of currency pressure that combines depreciation rates with additional variables such as foreign reserve losses and domestic interest rate.[44] They consider a balance-of-payments crisis to have occurred if the composite indicator increases above a threshold level in terms of the country-specific

42. Frankel and Rose (1996).

43. Frankel and Rose (1996); Milesi-Ferretti and Razin (1998); Barro (2001); Park and Lee (2003).

44. Eichengreen, Rose, and Wyplosz (1995); Kaminsky and Reinhart (1999); Glick and Hutchison (2001).

moments. For example, Kaminsky and Reinhart construct their indicator of currency pressure based on a weighted average of the monthly nominal depreciation rate and the monthly percentage change in foreign reserves, with weights such that the two components of the indicator have an equal size in terms of sample volatilities.[45] They define a balance-of-payments crisis as having occurred in a given year when the change in the indicator of currency pressure for any month of that year exceeds three standard deviations above the mean of the indicator over the sample period for the country in question.[46] A potential problem with this procedure is that if the form of the distribution were equally normal while the mean and standard deviations varied across countries, then the expected number of crises would be the same for all countries.

Our currency crisis indicator combines two approaches, and we define a balance-of-payments crisis as an episode identified by either approach. In the first approach, we judge a country to have had a balance-of-payments crisis if it experienced a nominal currency depreciation of at least 25 percent in any quarter of a given year and the depreciation rate exceeded that of the previous quarter by a margin of at least 10 percent. In the second approach, we count the episodes in which the currency pressure indicator for any month of a given year exceeded three standard deviations above the mean of the indicator, provided that either the monthly nominal depreciation rate or the percentage change of reserve losses exceeded 10 percent.

We apply a window of three years to isolate independent crises. That is, a balance-of-payments crisis occurring in the same year as the initial crisis or in three years following is counted as a continuation of the initial crisis rather than a new episode. When we apply this procedure, we identify 260 independent currency crises in 130 countries over the period from 1970 to 1999. Of these, 221 currency crises occurred in developing countries. Latin American countries suffered more balance-of-payments crises than East Asia, with fifty-five versus fourteen in the period. Table 6 summarizes the patterns over time and across regions based on our definition of a balance-of-payment crisis.[47]

45. Kaminsky and Reinhart (1999).

46. Kaminsky and Reinhart (1999) try to exclude the orderly large-scale nominal depreciation in countries experiencing extreme inflation or hyperinflation by separating out sample observations in which inflation in the previous six months was above 150 percent.

47. Table A2 in the appendix lists the dates for crises in our sample of Latin American and Asian countries.

TABLE 6. Incidence of Balance-of-Payments Crises by Region and Period, 1970–99[a]

Period	*All countries*	*Developing countries*	*East Asia*	*Latin America*
1970–99	260	221	14	55
1970–75	26	15	2	6
1975–79	29	21	1	7
1980–84	46	39	4	12
1985–89	47	46	1	14
1990–94	72	62	1	13
1995–99	40	38	5	3

Source: Authors' calculations.

a. Based on a sample of 130 countries worldwide, including 106 developing countries of which nine are East Asian and twenty-one are Latin American and Caribbean. The start of a balance-of-payments crisis is defined by either of two criteria: (a) a quarter in which the nominal currency depreciated by at least 25 percent and this depreciation rate exceeded that of the previous quarter by a margin of at least 10 percent, or (b) a month in which an indicator of currency pressure (specifically, a weighted average of monthly nominal exchange depreciation and monthly foreign reserve loss) exceeded three standard deviations above the mean of the indicator over the sample period for each country, provided that either the monthly nominal depreciation rate or percentage change of reserve loss exceeded 10 percent. A crisis is considered to last three years; if the above events occur within three years of the start of a crisis, it is counted as a continuation of the initial crisis rather than an independent crisis.

Overview and the Stylized Patterns of GDP Adjustment during a Crisis

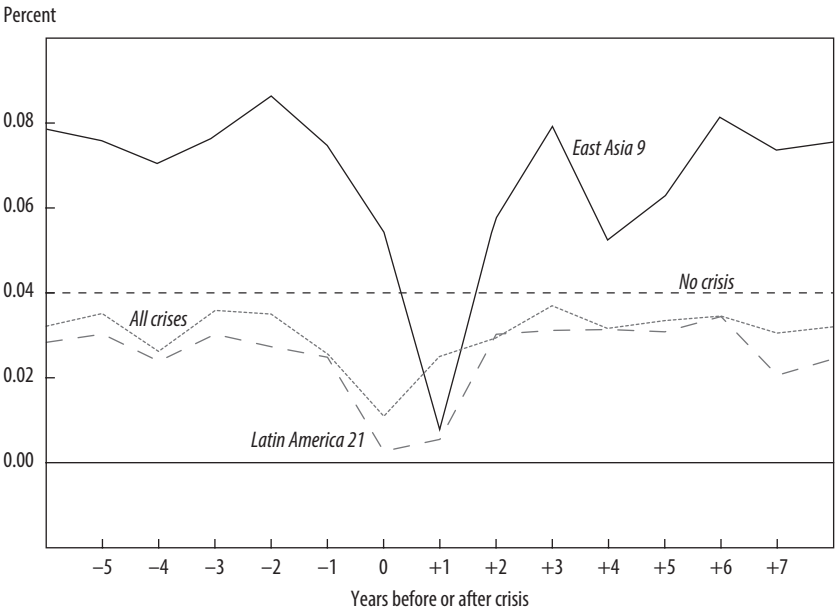
Figure 2 shows the movement of real GDP growth rates before and after the currency crises during the 1970–99 period for the sample of developing countries. We show the movement of the sample mean of the GDP growth rate at the onset of the balance-of-payments crisis, in each of the preceding six years, and in each of the following eight years. For comparison, we include a straight line in the figure, which indicates the average GDP growth rate during the noncrisis period.

In the figure, the growth rates show a clear V-shaped pattern during the period bordering the occurrence of a crisis. The growth rates over the two to six years preceding the crisis are comparable to rates in noncrisis periods, which average about 3.9 percent in the sample of developing countries.[48] Thereafter, the growth rate starts to decline sharply and reaches a trough in the crisis year. This V-shaped pattern of real GDP adjustment over the period before and after the crisis is broadly consistent with other findings in the literature.[49] The growth rate of all developing countries

48. To include data up to 2002 (and forecasts for 2003), we use GDP growth rates from IMF (2002), rather than per capita GDP from the Penn World Table (Summers and Heston, 1991; Heston, Summers, and Aten, 2002). The noncrisis average of per capita GDP growth rates is 2.1 percent over the sample period.

49. Gupta, Mishra, and Sahay (2002); Park and Lee (2003).

FIGURE 2. GDP Growth Rates during Currency Crises



Source: Authors' calculations.

undergoing a crisis is about 1.1 percent at the trough, but the GDP growth rate recovers its precrisis trend level two or three years after the outbreak of the crisis.

The quick recovery of GDP growth rates to their trend level in countries hit by crisis is consistent with the fact that balance-of-payments crises slow growth rates only temporarily, as we found in the previous section. When an economy is hit by a crisis, it tends to recover its potential trend growth rate quickly. Therefore, the level of the trend growth rates seems to play a critical role for the adjustment pattern. The recessions caused by balance-of-payments crises must incur permanent output loss, however, because the postcrisis growth rates do not exceed the precrisis averages. We therefore do not think of such events as output movements around a long-term trend, but as periods with permanent costs in terms of output and welfare.

Figure 2 shows that the adjustment process that can be inferred for East Asia and Latin America based on growth rate movements is broadly

consistent with the stylized V-shaped pattern we observe using all the crisis episodes. The mean growth rates hit bottom at the time of the crisis or one year later, and they then show a quick recovery over the following two years. This finding of a similar V-shaped pattern of adjustment to crisis episodes in both East Asia and Latin America and the Caribbean suggests that the pattern of crisis adjustment is similar everywhere, despite structural differences.

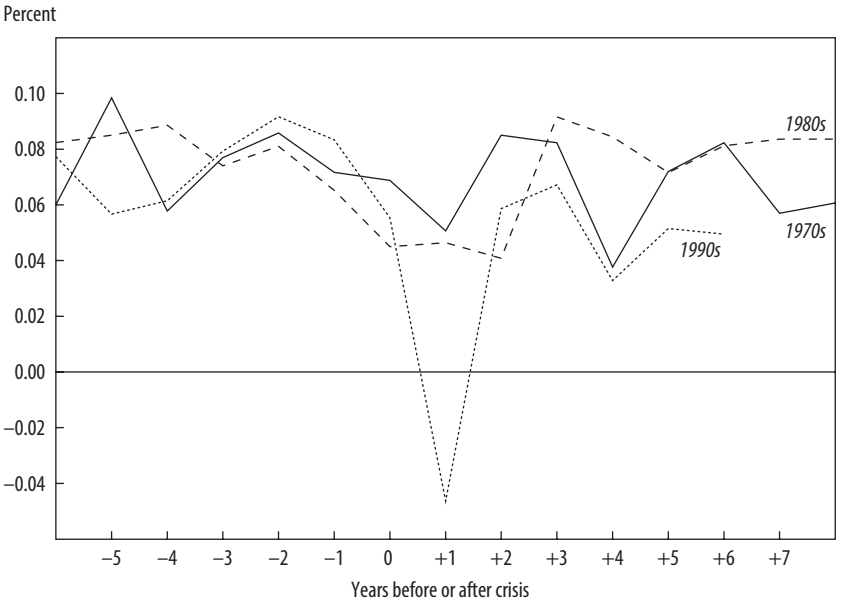
The adjustment is much sharper, however, in East Asian crises than in Latin American crises. The deeper initial contraction following a crisis in the East Asian countries must be attributed to the severity of the 1997 East Asian crisis. Figure 3 exhibits the crisis adjustment patterns in East Asian economies. It confirms that the contraction of real income in the East Asian countries that suffered the crisis in the 1990s was a lot larger than in the preceding decades. The five countries that were most affected by crisis—namely, Indonesia, Korea, Malaysia, the Philippines, and Thailand—suffered a sharp decline in real income. In 1998, the GDP growth rates of the five crisis-hit Asian economies plunged sharply from the precrisis average of 7.0 percent to negative rates ranging from −13.1 percent in Indonesia to −0.8 percent in the Philippines (see figure 4).[50]

The Asian countries display interesting similarities during the crisis. As figure 4 shows, they all qualitatively followed the same pattern, and even the figures are broadly alike, which indicates that this was a regional phenomenon. It is beyond the scope of this paper to measure fundamental versus self-fulfilling crisis or the impact of contagion, but the similarity suggests that in addition to the presence of similar fundamental domestic problems, common external shocks (such as the deterioration of business confidence or the frantic behavior of financial markets) explain the high correlation in the evolution of GDP.

The Latin American experience has been very different from that of East Asia. In the last twenty-five years, Latin America and the Caribbean suffered two crisis periods. The first was the debt crisis of the early 1980s, which hit most of the region at about the same time. The second comprised a sequence of crises in the 1990s that started with Mexico in 1994. The evolution of growth for the four largest countries hit by the crisis in each

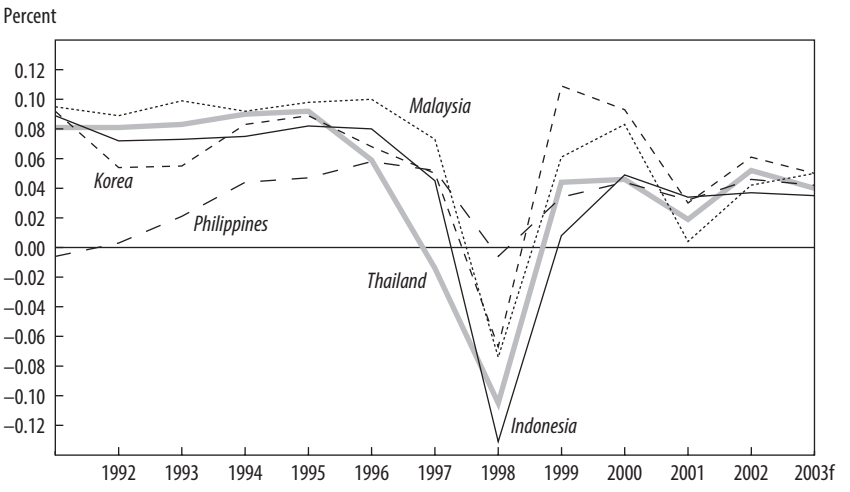
50. See Borensztein and Lee (2002), Lee and Rhee (2002), Park (2001), Park and Lee (2003), and World Bank (2000) for a detailed discussion of macroeconomic adjustment and recovery and financial restructuring in the 1997 East Asian crisis.

FIGURE 3. Adjustments of GDP Growth Rates in East Asian Crises



Source: Authors' calculations.

FIGURE 4. Adjustment of GDP Growth Rates during the 1997 East Asian Crisis



Source: Authors' calculations.

episode are presented in figures 5 and 6. The Mexican crisis triggered aftershocks in the whole region—especially in Argentina, which was able to maintain convertibility as it faced a deep financial crisis. A few years later, the Asian and Russian crises dragged Brazil into a currency crisis at the end of 1999, and growth declined throughout the region. The Brazilian depreciation was one of the main ingredients in the collapse of Argentina's convertibility in 2001.

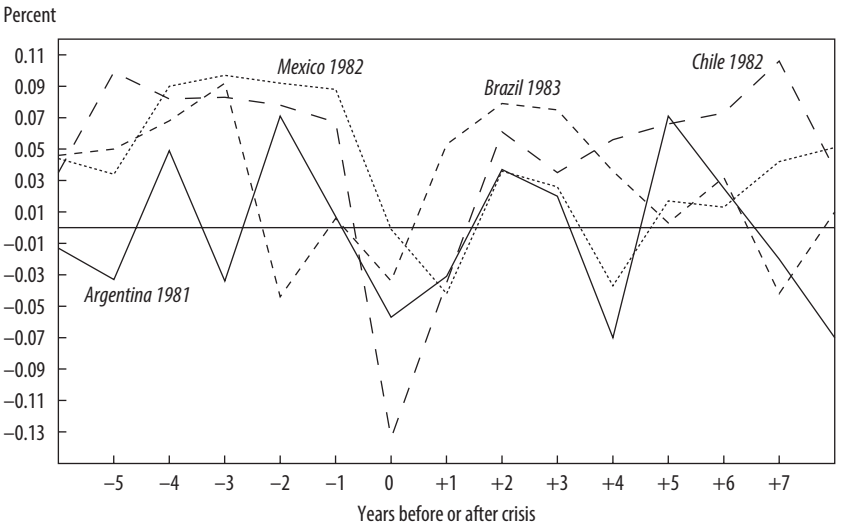
Of the two episodes in Latin America, the debt crisis is the most similar to the Asian crisis in terms of its timing. Although the initial shock was different in each case, the causes, consequences, and outcome exhibit some similarities. The Asian crisis started with Thailand's currency crash, whereas the Latin American debt crisis can be traced to August 1982, when Mexico announced that it could not meet its foreign obligations following the sharp increase in world interest rates caused by the tightening of monetary policy by the U.S. Federal Reserve Board under the chairmanship of Paul Volcker.[51] It is possible to find many similarities between the two crises episodes, especially since they were both regional episodes. The Latin American economies, however, evolved quite heterogeneously in terms of the extent of the collapse, the previous evolution of output, and the postcrisis recovery, as shown in figure 6 for the four largest countries.

One important difference between the Asian crisis and the debt crisis is that in the latter, a large fiscal imbalance in most of the countries caused the large foreign indebtedness and further collapse. What has been highlighted in the Asian crisis, as well as in the Chilean crash of 1982 and the Mexican crisis in 1994, was that its origin was not a fiscal imbalance. Indeed, of all the experiences shown in figure 5, only Chile (1982) and Mexico (1994) posted a fiscal surplus the year before the crisis. The expanding current account deficit and the resulting increase in net foreign liabilities were mainly due to decisions by the private sector, which was unable to pay foreign creditors when faced with a liquidity squeeze. As Burnside, Eichenbaum, and Rebelo argue, however, the implicit bailout of failing banks, which actually took place, should be considered a fiscal imbalance.[52] This fiscal imbalance was not included in the official accounts, but it existed in the form of a contingent liability.

51. This was clearly a major shock, but countries like Chile, for example, were already suffering an Asian-type currency crisis that started in June 1982. For details on the debt crisis, see Edwards (1995, chap. 2).

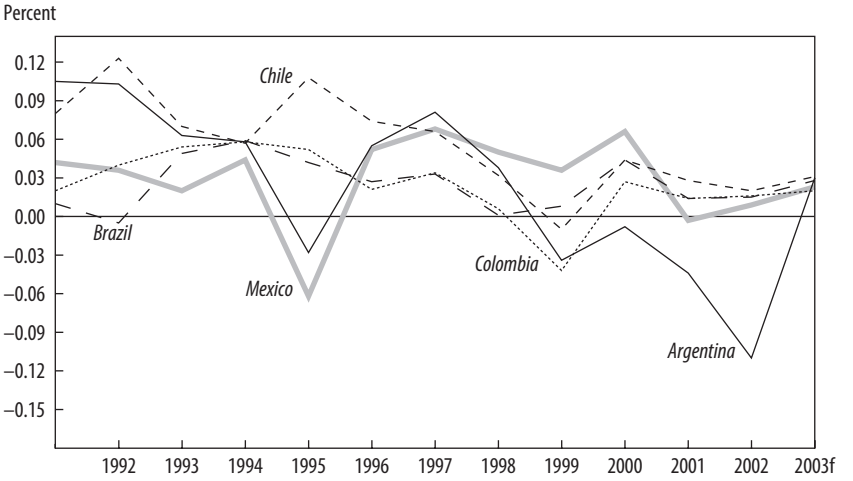
52. Burnside, Eichenbaum, and Rebelo (2001).

FIGURE 5. Adjustment of GDP Growth Rates during the Latin American Crises



Source: Authors' calculations.

FIGURE 6. Adjustment of GDP Growth Rates in Latin American Countries in the 1990s



Source: Authors' calculations.

Chile in 1982 and Mexico in 1994 are two Latin American countries with a V-shaped adjustment pattern most similar to those of Asia and to those of the broad evolution of GDP shown in figure 2. In these cases, the private origin of a massive crisis in an economy with a strong initial fiscal position may have allowed for an orderly, although costly, resolution of the financial crisis.

Determinants of the Output Cost of a Crisis

This section formally investigates the factors that determine the magnitude of output losses accompanying a crisis. We examine which kind of initial conditions, policy reactions, and external conditions help to reduce the costs of a crisis.

The Empirical Framework

We measure the output cost as the cumulative loss in output growth in the period from the year the crisis began until output growth returned to its trend.[53] We define the crisis period as three years—the crisis year and the following two years. We thus calculate the output cost of each crisis episode as follows:

$$\text{OUTPUTCOST} = \sum_{i=0}^{2} (\text{TREND} - \text{GDPGROWTH}_{t+i}),$$

where t indicates the year in which the crisis occurred. The TREND variable represents the trend GDP growth rate; it is calculated using the average

53. This measure must be viewed as an indicator of output losses associated with a crisis, but not necessarily caused by the crisis. Reduced output growth during a recession may trigger a balance-of-payments crisis, which in turn aggravates the recession. IMF (1998) and Eichengreen and Bordo (2002) use the same output cost to measure the cost of crises. In the latter paper, the output loss is measured until output returns to trend, whereas we fix a three-year period. The figures, however, yield similar results for the output cost of a crisis, since the recovery time is two to four years. Alternatively, the output cost of a crisis can be measured by the cumulative loss in output during the crisis years. To construct this measure, we need a measure of potential output. If we assume that each country's potential output increases from the precrisis equilibrium at the noncrisis trend growth rate, we can construct the potential output over the three years following a crisis and then measure the output cost of a crisis by the sum of log differences between potential output and potential output over the three years. The estimation results based on this cost measure, which are available on request, are very similar to those reported in this section.

GDP growth rate during the noncrisis period (that is, a year in which the country was not subject to a crisis and the preceding two years). TREND is thus the average growth rate of a given country in a noncrisis year, where a crisis consists of a three-year period.[54]

This definition yields an average output cost per crisis of about 5.8 percentage points for an average developing country in 1970–99. This figure is consistent with our earlier estimation that a crisis reduces growth by 1.7 percent per year over a five-year period. Applying that figure to the present definition of a crisis as lasting for three years generates a drop in output of 5.1 percent. However, the standard deviation of the output cost of a crisis as defined here is large, at 11 percentage points. This implies that each crisis episode had different characteristics in terms of its origin, evolution, and policy responses. In fact, not every crisis episode was associated with an output loss: output was expansionary in about 30 percent of all crisis episodes. A well-known case is the European Monetary System's 1992 crisis, in which most countries hit grew strongly afterward.

A large number of factors could contribute to the differences in output costs among countries hit by a crisis. The nature of the shock, initial conditions, the external environment, and policy responses must influence the behavior of output following a crisis. For the purpose of our empirical investigation, we classify these factors into two broad categories: precrisis factors and postcrisis factors. Our group of precrisis factors includes the precrisis GDP growth rate; international liquidity, measured by an indicator of reserve adequacy; and the soundness of the banking sector. The real GDP growth rate prior to the crisis can provide information about the degree of imbalances in an economy. We focus on GDP growth relative to its trend growth rate. For example, an economy whose GDP growth rate is higher than its trend prior to a crisis is likely to be in an overexpansion, and the crisis will not only have traditional disruptive effects on economic activities, but will also help to bring output closer to normal levels. Previous studies show that lending booms and excessive credit expansion during the precrisis periods tend to deepen the postcrisis recession and reduce growth.[55]

54. For an alternative measure of the trend growth rate, we consider the predicted growth rate from the specification 1 of table 2. The estimation results based on this measure are broadly similar to those reported in this section, but the sample size is much smaller.

55. De Gregorio and Guidotti (1995); Sachs, Tornell, and Velasco (1996).

In addition, high-growth countries may be particularly vulnerable to a severe shock and may thus experience a steep output loss following a crisis.

Adequate international liquidity helps an economy dampen the shock of a currency crash. Lack of foreign reserves has often resulted in a sharp liquidity crisis and a deep contraction of real output. We measure international liquidity based on the size of foreign reserves relative to the broad money supply (M2). We also consider the ratio of foreign reserves to short-term foreign debt as an alternative measure.

Finally, a sound banking sector is also important for preventing illiquidity. The vulnerability of the banking sector often magnifies a shock. In particular, when a currency crisis is associated with a systemic banking crisis (a phenomenon known as the twin crises), the costs of the currency crisis are exacerbated. One mechanism through which a currency crisis harms the economy is the balance sheet effects on the corporate and the banking sectors stemming from maturity and currency mismatches. Such mismatches were very common in the East Asian crisis of 1997, as well as in many of the Latin American experiences. Hence, we include a banking crisis variable as an important factor that affects the severity of a balance-of-payments crisis.[56] Our dummy variable for a banking crisis accounts for episodes in which a currency crisis was accompanied by a banking crisis in the two years preceding or following the currency crisis.

With regard to postcrisis factors, a number of characteristics can affect the costs of a crisis. We consider the most important factors to include world GDP growth, real exchange rate depreciation, and macroeconomic policies, as described in our earlier discussion of the East Asian and Latin American experiences. First, the global economic environment is important for an economy's postcrisis adjustment because strong world growth has a positive effect on export growth. Any improvements in the crisis-hit economy's terms of trade or increased market access for its exports helps the country recover quickly. Second, the size of the initial real exchange rate depreciation following a crisis influences exports and output growth in the postcrisis period. It is important to distinguish between nominal and real depreciation, and letting the currency weaken will not necessarily result in a real depreciation. Evidence suggests, however, that the pass-through from the exchange

56. The data on banking crises are compiled from Caprio and Klingebiel (1996), Demirgüç-Kunt and Detragiache (1998), and Glick and Hutchison (2001), who document episodes of bank insolvencies based on both quantitative and qualitative criteria.

rate to inflation is relatively small after a currency crisis, provided domestic conditions are suitable.[57]

Finally, macroeconomic adjustment policies implemented by the government for crisis management are critical for fostering the postcrisis recovery of real output. Fiscal and monetary policies lie at the center of many discussions on the appropriate policy mix for adjusting efficiently to a currency crisis. For example, a major issue of debate during the Asian crisis was the role of expansionary fiscal policy and the need to tighten monetary policy at the beginning of the crisis in order to establish credibility and avoid excessive currency depreciation.[58] It is beyond the scope of this paper to analyze the very short-term policy reaction to a crisis, since this framework allows us to shed light on the overall policy stance during the period and its impact on recovery.

To the extent that the relevant data are available, we carry out an empirical assessment of the factors determining the output cost of balance-of-payments crises. Using the complete data from 1975 to 1998, we set up a basic equation as follows:

$$
\begin{aligned}
\text{OUTPUTCOST}_{t\sim t+2} = {} & \beta_0 + \beta_1 \bullet \text{PRECRISISGROWTH}_{t-2\sim t-4} \\
& + \beta_2 \bullet (\text{FOREIGNRESERVES/M2})_{t\sim 1} \\
& + \beta_3 \bullet \text{BANKINGCRISIS}_{t-2\sim t+2} \\
& + \beta_4 \bullet \text{TRADEPARTNERGROWTH}_{t\sim t+2} \\
& + \beta_5 \bullet \text{REALDEPRECIATION}_{t} \\
& + \beta_6 \bullet \text{MONEYGROWTH}_{t\sim t+2} \\
& + \beta_7 \bullet \text{BUDGETBALANCE}_{t\sim t+2} + e_t,
\end{aligned}
\tag{2}
$$

where a subscript $s \sim v$ indicates the average for the period from s to v and where e is the random disturbance term.

57. Borensztein and De Gregorio (1999) show that the pass-through is smaller in countries that had low inflation before the currency crisis than in countries that had high inflation.

58. See Fischer (1998) and Stiglitz (2002) for contrasting views.

Regression Results

Table 7 provides the estimation results, which include dummies for the decades of the 1980s and 1990s to control for unobserved period-specific shocks. Column 1 shows that all explanatory variables enter with the expected signs. We find a strong and statistically significant positive relation between precrisis GDP growth and the output cost of a crisis. This may imply that a country with high growth relative to its trend prior to a crisis—that is, an economy that is overheating—tends to have a larger decline in GDP growth over the three years following the crisis than does a country that is growing near its trend. The estimated coefficient (0.668, with a standard error of 0.225) implies that a one-percentage-point increase in the growth rate in the precrisis period would increase the accumulated output cost by about 0.7 percentage point in the crisis-hit economy. As expected, the crisis tends to eliminate this excess growth, although not completely.

When international liquidity, which is measured as the ratio of foreign reserves to the money supply, is adequate prior to a crisis, it decreases the output cost of the crisis. The estimated coefficient is negative and statistically significant at the 5 percent level (–0.143, with a standard error of 0.043). This implies that a 25 percentage point increase (one standard deviation) in the ratio of foreign reserves to M2 lowers the output cost of a crisis by about 3.6 percentage points.

The dummy variable for the occurrence of a banking crisis is positive and statistically significant. The estimated coefficient (0.076, with a standard error of 0.020) implies that when a balance-of-payments crisis is accompanied by a banking crisis, the output loss increases substantially by 7.6 percentage points. The output costs of a twin crisis are thus roughly twice the costs of a currency crisis alone.

The results also show that several factors in the postcrisis period have strong effects on output costs. The world growth variable (TRADEPARTNER-GROWTH), which is an average of the GDP growth rates of a crisis-hit country's trading partners weighted by their trade share, turns out to have a significant effect on crisis cost. The estimated coefficient (–2.64, with a standard error of 0.97) implies that a one-percentage-point increase in the world GDP growth rate per year is associated with a decline in the output cost of a crisis of about 2.7 percentage points over the three years following the crisis. The size of the coefficient in terms of the annual growth rate is

TABLE 7. Determinants of Real Output Costs of Balance-of-Payments Crises[a]

Explanatory variable	*(1)*	*(2)*	*(3)*
Precrisis GDP growth (average t – 2 ~ t – 5)	0.668	0.809	0.600
	(0.255)	(0.299)	(0.264)
Foreign reserves/M2 (t – 1)	–0.143		–0.151
	(0.043)		(0.044)
Foreign reserves/short-term debt (t – 1)		–0.0024	
		(0.0014)	
Banking crisis (t – 2 ~ t + 2)	0.076	0.066	0.081
	(0.020)	(0.023)	(0.021)
Trade partners' GDP growth (t ~ t + 2)	–2.640	–2.481	–2.821
	(0.970)	(1.064)	(0.999)
Real exchange rate depreciation (t)	–0.029	–0.023	–0.031
	(0.016)	(0.017)	(0.016)
Real money supply growth (t ~ t + 2)	–0.129	–0.156	
	(0.066)	(0.072)	
Growth of ratio of real money supply to GDP (t ~ t + 2)			–0.046
			(0.072)
Budget/GDP (t ~ t + 2)	0.289	0.115	0.191
	(0.299)	(0.329)	(0.309)
Dummy for 1980s	0.010	0.001	0.015
	(0.027)	(0.034)	(0.028)
Dummy for 1990s	–0.035	–0.040	–0.029
	(0.031)	(0.039)	(0.032)
No. crisis episodes	81	73	81

Source: Authors' calculations.

a. The dependent variable is a measure of output cost from a crisis, which is calculated by summing the differences between the trend GDP growth rate and GDP growth rates over the three-year period of the crisis year plus the following two years. Robust standard errors are in parentheses.

closer to one, since a one-percentage-point rise in world growth reduces output costs by 2.7 percentage points over three years.

The results also confirm that real exchange rate depreciation helps to reduce the output cost.[59] The estimated coefficient on the real exchange rate depreciation variable is negative and statistically significant at the 5 percent level (–0.029, with a standard error of 0.016). Thus a real exchange depreciation of 70 percentage points (its standard deviation) lessens the decline of the GDP growth rate by about 2.1 percentage points over the three years following the crisis.

59. The variable is the real depreciation rate in the first year of the crisis, which generally is not subject to the problem of reverse causality.

Column 1 includes the average growth rate of the real money supply as the macroeconomic policy variable. The monetary policy variable has significant effects on the output cost of crisis. The estimated coefficient (–0.129, with a standard error of 0.066) implies that a 10 percentage point increase in the real money supply over the postcrisis period leads to a 1.3 percentage point drop in the output cost. An expansionary postcrisis monetary policy can thus alleviate the output cost of a crisis.

In contrast to the positive and significant contribution of monetary policy, fiscal policy has a negligible effect on the cost of currency crisis. In column 1, we add the budget balance variable as a measure of the fiscal policy stance. The estimated coefficient for the budget balance variable is positive, suggesting that a fiscal deficit tends to lower the output cost, but it is statistically insignificant.

The dummy variables, although significant, confirm the presumption that the crises of the 1980s were more costly than those of the 1990s. A comparison of the parameter estimates indicates that the cost of a crisis in the 1980s was higher by about half a percent of GDP.

Column 2 uses the ratio of foreign reserves to short-term debt as an alternative measure of international liquidity. This measure also has a negative relation to the output cost of the crisis, and the estimated coefficient is marginally statistically significant at the 10 percent level.

Column 3 addresses the possible endogeneity problem of monetary growth. The negative correlation between growth in the real money supply and output costs may stem from the positive effect of output growth on money demand, with an accommodation from the supply side, rather than the reverse. To avoid this problem, we use the growth of the ratio of real money to GDP (M/PY), the inverse of velocity, as a measure of expansionary monetary policy. We still find that expansionary monetary policy tends to lower the output cost of a crisis, although the estimated coefficient (–0.046, with a standard error of 0.072) is not statistically significant.[60]

60. Fiscal balance can also be procyclical and thus is subject to the possible endogeneity problem, but the positive estimated coefficient on fiscal balance implies that this endogeneity problem is of little concern. We also used the ratio of real government consumption to GDP as a measure of the fiscal policy stance: since government expenditure is less elastic to the cycle than are revenues, the potential endogeneity problem would be smaller with this measure than with the fiscal balance measure. The government consumption variable is also statistically insignificant.

In sum, the results suggest that adequate international liquidity, real exchange rate depreciation, and a sound banking system play a critical role in staving off severe shocks from a crisis. A good external environment also speeds recovery. An expansionary monetary policy can dampen the crisis cost, but fiscal policy has no significant effect.

These results, however, do not have straightforward implications for macroeconomic policies. In many cases, countries attempting expansionary macroeconomic policies may not be successful. The procyclical nature of fiscal policy in Latin America and the Caribbean often reflects the inability of governments to borrow during bad times.[61] A central bank that lacks credibility may not be able to conduct an expansionary, noninflationary monetary policy. Consequently, our result indicating that monetary policy has been effective in alleviating the output costs of past currency crises may reflect the countries' institutional ability to implement countercyclical macroeconomic policies.

Crises in a Comparative Perspective

We can use the regression results to analyze the differences in the output costs of a crisis in East Asia versus Latin America and the Caribbean. In the period from 1970 to 1999, the average output cost was about 8.9 percentage points for Latin American crises and about 10.4 percentage points for East Asian crises. The average cost of a crisis declined in Latin America from 11.0 percent in the 1980s to 5.0 percent in the 1990s, while it increased in East Asia from 7.7 percent in the 1980s to 13.8 percent in the 1990s. The crises of the 1990s were thus more costly in East Asia than in Latin America. This is consistent with the evidence that the average decline in output is similar for all countries worldwide (figure 1), but East Asia had a much larger trend growth than Latin America.

We decomposed the sources of these regional differences in the output costs of a crisis in the 1990s in an exercise similar to the one described earlier in the paper. The results are shown in table 8. The predicted average costs for the decade, based on regression 1 from table 7, were 8.7 percent for six East Asian crises and 4.5 percent for sixteen Latin American crises. We then broke down the predicted difference between the two regions of 4.2 percent into the contributions from each of the explanatory variables.

61. Gavin and Perotti (1997).

TABLE 8. Contributions to the Regional Difference in Real Output Costs of a Balance-of-Payments Crisis in the 1990s[a]

	Average for 1990s		
Variable	*East Asia*	*Latin America and the Caribbean*	*Contribution to the difference in cost of East Asian relative to Latin American crises*
Output cost of crisis			*Total cost difference*
Actual cost	0.138	0.050	0.089
Predicted cost	0.087	0.045	0.042
Explanatory variable			*Explained by each factor*
Pre-crisis GDP growth	0.078	0.022	0.037
Foreign reserve/M2	0.195	0.269	0.011
Banking crisis	0.833	0.563	0.021
Trade partners' GDP growth	0.020	0.015	−0.012
Exchange rate depreciation	0.170	0.081	−0.003
Real money supply growth	0.100	0.049	−0.007
Budget/GDP	−0.029	−0.008	−0.006

Source: Authors' calculations.

a. The predicted output cost is based on the estimation results of column 1 in table 7. Average values of the variables are calculated for the sample of the episodes of six East Asian crises and sixteen Latin American crises in the 1990s that are used in that regression. See table A2 for the identification of each crisis.

The majority of the cost difference, about 3.7 percentage points, is due to East Asia's higher output growth relative to Latin America and the Caribbean in the precrisis period. The transitory fall in economic growth was thus more significant, and aggravated the output costs more dramatically, in the faster growing East Asian economies vis-à-vis Latin America. In addition, the East Asian crises of the 1990s were characterized by low international reserves and concurrent banking crises, which contributed to the higher crisis costs in East Asia by about 1.1 and 2.1 percentage points, respectively, relative to Latin America. At the same time, a more favorable external environment, measured by trading partners' output growth, and greater real exchange rate depreciation and monetary expansion helped, to some degree, to lessen East Asia's crisis costs relative to Latin America.

Conclusions

We have compared growth performance and macroeconomic adjustment in East Asia and Latin America and the Caribbean. We focused our analysis on nine East Asian and twenty-one Latin American economies. The cross-country

regression highlights the role of investment, human resources, fertility, and institutional and policy factors in raising the potential growth rate of East Asia above that of Latin America over the 1970–2000 period.

We find that convergence effects stemming from the difference in initial income or an external shock to the terms of trade do not play a quantitatively important role in explaining lower growth in the Latin American region than in East Asia. This finding refutes the rationale for the inward-looking trade strategy followed in Latin America from the 1960s through the 1980s, which was based on the belief that Latin America would suffer from deteriorating terms of trade. Instead, the most important policy factor contributing to the regional differences is the greater degree of openness in East Asia versus Latin America and the Caribbean. Balance-of-payments shocks contributed to the differences in growth performance across regions, but this difference shrank in the 1990s as a result of the East Asian crisis of 1997.

Low investment rates in Latin America are also important in explaining the differences with East Asia. Additional contributing factors include high fertility rates, the low quality of human resources (mainly in terms of schooling), high government consumption, and low indices for the rule of law. The quality of education, measured by student scores on international tests, also places Latin America substantially behind East Asia. We cannot estimate its quantitative impact, however, owing to the lack of a long time series; this issue deserves further examination.

Another important difference across regions is income distribution. We report some preliminary evidence that suggests that some of the differences in institutions and policies are the results of differences in income distribution. This is the case with fertility, government consumption, secondary school enrollment, and the rule of law.

We use the regression results to estimate growth prospects for the two regions. We found that the differences should decrease, largely as the result of an unfavorable convergence effect for East Asia, but also in response to Latin America's progress in improving institutions and policies. A significant gap remains for investment, fertility, schooling, and openness. Our predictions indicate that per capita growth in Latin America should increase at an average rate of 2.3 percent during this decade, while East Asia could grow by 3.8 percent.

Our analysis of the patterns of recession and recovery from balance-of-payment crises reveals that the adjustment process in both East Asia and Latin America is broadly consistent with the stylized V-shaped pattern

we observe for all crisis episodes around the world. However, one characteristic differentiates some Latin American countries from East Asia: namely, the tendency to climb out of one crisis only to fall into another. This recurrence of balance-of-payment crises in Latin America needs further explanation. One exception in the region is Chile, which suffered a crisis in the 1980s that was very similar to the experiences of the East Asian economies in 1997. Although the origins were different, both crises occurred in conjunction with a severe banking crisis and were characterized by sound fiscal policy and a sharp decline in the exchange rate. In addition, the Chilean economy in the 1980s—like the East Asian economies in 1997—was sufficiently open to recover through export expansion.

We examined a sample of eighty-one episodes to identify factors that could reduce the output costs of a crisis. A key external factor for reducing the costs is a good international environment. Internally, a sound banking system is critical, since the output costs of twin crises (in both the balance of payments and banking) is about twice the cost of a balance-of-payments crisis alone. In addition, international liquidity before the crisis, measured by the ratio of international reserves to M2, reduces the costs of the crisis. In terms of policy responses, our results indicate that a real exchange rate depreciation and expansionary monetary policy help in the recovery, while fiscal policy has no effect. Further work should aim at uncovering the conditions that generate effective expansionary macroeconomic policies to increase resilience in a bad external environment and improve the quality of the adjustment. For example, real wages must generally fall for an economy to achieve real exchange rate and relative price adjustment; the wage agreements brokered in Korea were important for achieving this goal. Regional differences in income inequality probably affect the likelihood of reaching such agreements. This factor could help explain the lack of full adjustment in Latin America, which leaves the region vulnerable to another crisis.

Appendix

TABLE A1. Summary of Key Variables Used in Growth Regressions, by Region, 1970–75 and 1995–2000[a]

Unweighted average

Period and variable	*All countries*	*East Asia*	*Latin America and the Caribbean*
1970–75			
Per capita GDP growth	0.025	0.048	0.021
Per capita GDP in 1970 (PPP U.S.$)	5,472	2,922	4,273
Investment/GDP	0.190	0.216	0.145
Fertility rate in 1970	4.9	4.8	5.5
Schooling in 1970	1.21	1.37	0.83
Life expectancy in 1970	64.0	64.8	65.1
Government consumption/GDP	0.094	0.050	0.102
Rule-of-law index	0.56	0.61	0.38
Inflation	0.127	0.105	0.202
Democracy index	0.52	0.35	0.48
Openness	–0.006	0.324	–0.147
Terms of trade	–0.021	0.003	–0.009
Balance-of-payments crisis	0.26	0.22	0.29
1995–2000			
Per capita GDP growth	0.018	0.025	0.011
Per capita GDP in 1995 (PPP U.S.$)	9,205	11,291	5,301
Investment/GDP	0.168	0.270	0.150
Fertility rate in 1995	3.2	2.2	3.2
Schooling in 1995	2.43	3.17	1.81
Life expectancy in 1995	68.9	71.8	70.7
Government consumption/GDP	0.077	0.071	0.106
Rule-of-law index	0.71	0.78	0.56
Inflation	0.080	0.044	0.114
Democracy index	0.68	0.50	0.73
Openness	–0.022	0.689	–0.207
Terms of trade	–0.012	0.006	–0.012
Balance-of-payments crisis	0.24	0.56	0.14

Source: Authors' calculations.

a. The full sample consists of the eighty-five countries that are used in the regressions in table 3; the East Asian sample includes nine countries (see table 1 for list); and the Latin American and Caribbean sample includes twenty-one countries (see table 1). Per capita GDP levels and growth rates are based on 1996 international prices (adjusted for purchasing power parity), based on the Penn World Table 6.1, as described in Summers and Heston (1991) and Heston, Summers, and Aten (2002). Schooling data are the average years of male secondary and higher schooling from Barro and Lee (2001). The investment ratio is the ratio of real investment (private plus public) to real GDP, based on the Penn World Table 6.1, averaged over the period. The government consumption measure is the ratio of real government consumption (excluding spending on education and defense) to GDP, based on the Penn World Table 6.1. The rule-of-law index, expressed on a zero-to-one scale (with one being the most favorable), is based on the *International Country Risk Guide*'s rule-of-law index. The inflation rate is the growth rate over each period of a consumer price index. The democracy index, expressed on a zero-to-one scale (with one being the most favorable), is based on the indicator of political rights compiled by Freedom House. The openness variable is the ratio of exports plus imports to GDP, filtered for the estimated effects on this measure from the logs of population and area. The growth rate of the terms of trade is the change in export over import prices over the period. The balance-of-payments crisis variable is described in the notes to table 7.

TABLE A2. Balance-of-Payments Crises in Latin America and East Asia, 1970–99

Region and country	*No. episodes*	*Date of episode*
East Asia		
China	3	Jan 1984; Dec 1989; Jan 1994
Indonesia	3	Nov 1978; Apr 1983; Sep 1997
Korea	3	Dec 1971; Jan 1980; Nov 1997
Malaysia	1	Aug 1997
Philippines	3	Feb 1970; Oct 1983; Sep 1997
Thailand	1	Jul 1997
Latin America		
Argentina	4	Mar 1975; Apr 1981; Feb 1987; Jan 1991
Bolivia	3	Oct 1972; Jan 1980; Sep 1985
Brazil	5	Dec 1979; Feb 1983; Jan 1987; Jan 1991; Jan 1999
Chile	3	Jul 1971; Jan 1975; Aug 1982
Colombia	1	Sep 1998
Costa Rica	2	Apr 1974; Jan 1981
Dominican Republic	2	Jan 1985; Aug 1990
Ecuador	5	Aug 1970; May 1982; Aug 1986; Sep 1992; Oct 1998
El Salvador	2	Jan 1986; May 1990
Guatemala	2	Jun 1986; Aug 1990
Haiti	1	Sep 1991
Honduras	1	Apr 1990
Jamaica	3	May 1978; Nov 1983; Sep 1991
Mexico	4	Sep 1976; Feb 1982; Jan 1986; Dec 1994
Nicaragua	2	Apr 1979; Feb 1985
Panama	1	Feb 1973
Paraguay	2	Mar 1984; Mar 1989
Peru	4	Jun 1976; Dec 1982; Oct 1987; Jun 1992
Trinidad and Tobago	2	Dec 1985; Apr 1993
Uruguay	2	Mar 1972; Nov 1982; Dec 1987
Venezuela	2	Feb 1984; Mar 1989; May 1994