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INDUSTRY PERFORMANCE IN
THE EAST ASIAN CRISIS

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A SYMPOSIUM ON FIRM AND INDUSTRY PERFORMANCE IN THE EAST ASIAN CRISIS

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Crisis, Adjustment, and Reform in Thailand's Industrial Firms

David Dollar • Mary Hallward-Driemeier

New data on Thailand's industrial firms shed light on the origins of the East Asian financial crisis and on the response of the manufacturing sector to the structural adjustment program supported by the international financial institutions. Before the crisis, Thai firms had declining profitability, but they nevertheless maintained high levels of investment, often in domestically oriented areas (notably the auto sector). Thai firms financed these investments with short-term borrowing from financial institutions, which in turn borrowed short term on foreign markets. That only 40 percent of firms provided audited financial statements to their banks meant that the financial sector had poor information for assessing the true riskiness of these investments. The financial structure was thus vulnerable even to small shocks.

How well did the adjustment program deal with the crisis? Thai firms had difficulty increasing their exports quickly because of investment in the wrong sectors, a decline in regional demand, and bottlenecks that included red tape and poor customs administration. Because of the poor export response, the brunt of adjustment had to come through compression of demand and of imports. In retrospect, the macroeconomic program—which assumed quick export recovery—was too tight.

Devaluation is not the policy of the Thai government.
— Japanese auto parts producer, May 1997

The anonymous entrepreneur quoted above borrowed \$40 million—short term—in Singapore to finance a factory in Thailand that produced auto parts for a Japanese assembler selling in the Thai market. Taking on the debt seemed like a good idea to the Japanese producer in late 1996 and early 1997. But by October 1997, with the Thai baht devalued and the region in recession, the entrepreneur had halted production and was waiting for the ax to fall.

The currency and financial crises in East Asia were touched off when Thailand devalued the baht on July 2, 1997. Within weeks Malaysia and Indonesia devalued their currencies, and the Philippine and Korean currencies also began to weaken. Stock markets across the region fell as investors pulled out their capital. Thailand quickly reached an agreement with the International Monetary Fund (IMF) for a bailout package and in return initiated the recommended reform measures, tightening monetary and fiscal policies. Although the aim was to bolster the exchange rate and to restore investor confidence, the rise in interest rates, the fall in government spending, and sharp declines in consumer and investment demand led to a recession. With similar policies enacted by Thailand's neighbors, the downturn soon spread across the region.

The speed and severity of the East Asian currency and financial crises took both investors and economists by surprise. Even economists who were not bullish about Asia in the long term, such as Paul Krugman (1998), admit that the crises caught them off guard. Debate is heated about the origins of the crises and about the best policy response by individual governments and the international community.

The possible causes of any financial crisis fall into three categories:

- Exogenous shocks or developments in international markets
- Economic mismanagement on the part of the crisis countries
- Intrinsic instability in international financial flows, which presumably results from failures in the international financial architecture governing those flows.

Because no single element is likely to have caused the East Asian crisis, the issue is the degree to which each of these different factors contributed to its onset and severity.

One of the interesting things about the East Asian crisis is that it was not precipitated by an exogenous shock. The global economy had been growing reasonably well, with stable commodity prices and low interest rates. Several specific developments, however, did affect the East Asian countries now in crisis. China had emerged as a major export competitor, and in the wake of the North American Free Trade Agreement (NAFTA), Mexico had become a formidable competitor as well. Furthermore, in the run-up to the crisis, the U.S. dollar gradually appreciated against the yen, which disrupted the exchange rates of countries, such as Indonesia and Thailand, that were de facto pegged to the dollar. But none of these developments can qualify as a major shock, a fact that shifts the focus to the other two potential causes.

With some risk of caricature, we can refer to these as the “bad policy” and “bad luck” hypotheses. The “bad policy” view is that countries such as Thailand made major mistakes in macroeconomic management and—more important—in the governance of the financial and corporate sectors. The policy regime encouraged borrowing abroad to invest in what we call the “wrong capital stock”; this borrowing was bound to lead to major problems sooner or later.

The “bad luck” view holds that the East Asian countries were the victims of a shift in investor expectations that became self-fulfilling but that did not have to happen. As Steven Radelet and Jeffrey Sachs (1998: 3) put it:

To be sure, there were significant underlying problems besetting the Asian economies, at both a macroeconomic and microeconomic level (especially within the financial sector). But these imbalances were not severe enough to warrant a financial crisis of the magnitude that took place in the second half of 1997. . . . A combination of panic on the part of the international investment community, policy mistakes at the outset of the crisis, and poorly designed international rescue programs have led to a much deeper fall in (otherwise viable) output than was either necessary or inevitable.

This view emphasizes weaknesses in international financial architecture (no lender of last resort or bankruptcy proceedings to bring about orderly workouts). It also suggests that for individual countries such as Thailand, it was chance or bad luck that led to a financial run and brought them down.

Although the origins of the crisis have been hotly debated, analysis of the microeconomic foundations of the crisis has been hampered by the lack of systematic, high-quality data at the level of the firms or industries involved. From October 1997 to March 1998, working with the Ministry of Industry in Thailand, we conducted a survey of 1,200 randomly chosen plants in five tradable goods industries—auto parts, electronics, food products, garments, and textiles—to gather relevant production and financial information for the preceding three years. A range of questions about the existing situation, borrowing practices, major bottlenecks to increased competitiveness, human resources, and so on was also included. (Details of the sample are provided in the appendix.) These data can be used to examine some of the specific hypotheses that have been offered to explain the onset of the crisis, including

- The withdrawal of credit from viable firms (because of developments in the international capital market or other exogenous changes)
- A mismatch of short-term borrowing and the maturation of real investments financed by credit
- Failure of manufacturing firms that borrowed abroad to hedge their risk
- Continuing high levels of investment by firms despite declining profits.

Our findings support the view that poor policy is an important factor explaining the crisis. Specifically, policy incentives induced firms to take risky financial positions, financing long-term investment with large amounts of short-term debt. Firms that borrowed in foreign currency did not hedge their positions. Even before devaluation and the start of the recession in mid-1997, financial profitability had dropped sharply in these tradable goods industries. Thai firms were earning poor returns from their investments before international investors lost confidence in Thailand, even though

investment continued at a high level. Because only 40 percent of firms provided audited statements to their banks, the financial system—which had borrowed unhedged abroad—was slow to understand and respond to the problem of inefficient investment.

We also look at long-term structural issues of concern to firms. The interrelated issues of customs administration, red tape, and corruption are perceived as major bottlenecks to increased production and exports, more important than weaknesses in the financial system. Thailand also has well-known human resource problems—a shortage of technical and engineering skills and the high relative pay of production workers—and these are confirmed by this survey.

The data also show that the initial adjustment process undertaken in the fall of 1997 did not work smoothly. The five tradable goods industries that we surveyed should benefit from the standard adjustment package of fiscal and monetary austerity plus devaluation. In fact, capacity utilization and employment fell in all five sectors between the first half of 1997 and the second half. Domestic demand dropped sharply—a critical development for the textile and auto parts industries, which are domestically oriented. Auto parts manufacturing is the classic example of investing in the wrong capital stock: domestic demand is likely to be depressed for years, and shifting to exports will be difficult, given the cartelized nature of the industry and worldwide overcapacity. Even large export firms in electronics, food products, and garments were in trouble in Thailand because of a drop in foreign demand. Interestingly, the survey uncovered little evidence of a classic credit crunch—firms with orders but unable to obtain working capital.

Thus, the main story is that the combination of investment in tradable goods sectors oriented primarily to the domestic economy, the drop in regional demand, and bureaucratic bottlenecks (such as inefficient customs administration) made it difficult for Thailand to increase exports quickly. Hence the brunt of adjustment had to fall on the compression of domestic demand and imports. In light of this weak export potential, the initial adjustment program was probably too tight and caused an unnecessarily deep recession. Once the severity of the decline (as measured in part by these data) was evident, the austerity policies were moderated. In the spring of 1998 the Thai government started to relax its previous goal of achieving a 2 percent budget surplus.

In summary, there is ample evidence that Thailand made policy mistakes and that these mistakes created a vulnerable environment in which even mild changes in the international market could set off a serious downturn. At the same time, it is hard to understand the severity of the crisis without appealing to failures in the international architecture governing capital flows. In other words, bad policy ignited Thailand's crisis, but it was bad luck to have to face a world economy that was ill equipped to limit investor panic or to provide a framework for orderly workouts between international creditors and debtors. Looking to the future, the combination of a more

stimulative macroeconomic stance and a credible program for addressing structural weaknesses is the best hope for restoring confidence in Thailand, although the country will find it difficult to prosper as long as the region is suffering.

Macroeconomic Context

Although no one predicted the depth of the East Asian crisis, an examination of the macroeconomic variables points to several signs, evident before July 1997, that the existing situation was unsustainable. A correction was in order, even if not of the magnitude that has since unfolded. This is particularly true of Thailand, the country held responsible for setting off the regional crisis by devaluing the baht. The case for self-fulfilling panics is strongest for Indonesia, but even for that country, the evidence clearly shows that poor policy management and weak supervision and regulation contributed to the fragile position of the corporate and financial sectors.

Relative prices and interest rates affect the decisions firms make, particularly about investment allocation, financial structure, and the markets to target. The effect is clear in the aggregate data and is reinforced by findings from the newly available microdata.

As in neighboring countries, the Thai government was committed to a monetary policy that was inconsistent with domestic developments and the state of the financial sector. Officially, the baht was fixed to a basket of currencies, but in practice it was pegged to the U.S. dollar. Despite a burgeoning current account deficit, the Bank of Thailand repeatedly stated its commitment to the official rate of exchange. This exchange rate policy had two primary effects. The first was a loss in international competitiveness that stemmed from the choice of peg. The second was heightened borrowing from abroad that was encouraged by the implicit guarantee of an exchange rate parity.

Pegging the baht to the dollar had proved beneficial in earlier years because the dollar had depreciated relative to the yen and the deutsche mark, which made Thai exports attractive. But between 1994 and 1996 the dollar appreciated almost 40 percent relative to the yen. With Japan as one of the primary destinations for their goods, Thai firms found their exports declining sharply—not only to Japan, but also to third markets in which they competed with Japanese producers. A further effect was that direct investments from Japan slowed down, depriving countries of the long-term investments that are crucial sources of innovation and productivity growth.

With the exchange rate assumed to be fixed, firms took advantage of the lower interest rates on offshore loans and significantly increased their borrowing from such sources. This option was greatly helped in 1993 by the establishment of Bangkok International Banking Facilities (BIBFs), which loosened regulations on foreign borrowing by Thai banks. Believing that the exchange rate regime would be maintained, firms undertook large, unhedged positions.

With the nominal exchange rate fixed and domestic prices climbing, the rise in the price of tradables relative to nontradables, while not unprecedented, was still considerable. Between 1994 and mid-1997, according to IMF statistics, the real appreciation was about 20 percent; as a result, export growth, which had been close to 20 percent, turned mildly negative in 1996 and fell in the first half of 1997. The current account deficit reached 8 percent in 1996.

The monetary authorities made some attempt to sterilize capital inflows as a means of limiting the growth of domestic credit, but the rise in domestic interest rates, together with the commitment to the baht-dollar exchange rate, made offshore borrowing even more attractive. In 1996 almost two-thirds of all private capital flows to developing countries went to East Asia. As a share of the receiving country's gross domestic product (GDP), those inflows were by far the largest for Thailand, equaling 15 percent of GDP between 1994 and 1996. Private capital flows accounted for 5 percent of GDP in the Republic of Korea and in Indonesia and approximately 8–10 percent in Malaysia and the Philippines. In Thailand the net foreign liabilities of the financial institutions rose from 6 percent of deposits to one-third of deposits by 1996 (World Bank 1998).

The increase literally swamped domestic financial institutions with funds. The quality of the intermediation of these funds was critical. With banks providing the bulk of all financial services, the ability to supervise and regulate the banks was the key to determining how the funds were allocated. In practice, neither Thai firms nor Thai banks had much experience with such volumes of capital, and there was scant supervision. Consequently, much of this money was channeled into risky projects and highly cyclical sectors. Nonproductive investment in sectors such as real estate expanded dramatically. In Bangkok the amount of new office space quadrupled between 1994 and 1997. The boom in domestic assets reinforced an optimistic investment cycle, particularly since real estate was often used as collateral for further borrowing. The growth rate of loans is striking: close to 25 percent in 1996, the second-highest rate in Asia and more than double the growth rate of nominal GDP (World Bank 1998).

Thailand's experience demonstrates that high rates of investment are not sufficient to sustain a large current account deficit and an expansion of domestic credit. Although most of the new funds were invested rather than consumed, the investment was often misdirected. The concentration of resources in real estate has received considerable attention, but in fact, large amounts of investment went to industry. Here, too, many of these funds appear to have been allocated inefficiently. Few investments were directed to activities that would earn foreign exchange; rather, they were used to update facilities for domestic production or to buy low-return assets. These choices, along with real exchange rate appreciation, were associated with the sharp decline in financial profitability. The accumulation of the wrong capital stock still has consequences for the ability of firms to increase exports now that the asset bubble has burst and the baht has depreciated so drastically.

Microeconomic Foundations of the Crisis

At the microeconomic level, the two main points to emerge from the survey data are, first, that industrial firms continued to invest at a high level in 1996 and the first half of 1997 despite a sharp drop in sales, exports, and profitability, and, second, that much of this investment was financed by short-term borrowing that was not backed by collateral or by audited financial statements. This pattern of corporate and financial management left the country vulnerable to even small external shocks.

The five sectors covered by the survey differ in the extent of their export orientation, as seen in table 1. With the exception of the textile sector, 1995 was a growth year for both exporters and nonexporters. This was the heyday of the Thai boom. In sharp contrast, 1996 was a year of small increases in output (electronics, garments, and textiles) or decline (auto parts and food products). Hardest hit were medium-size exporters (those that shipped between 5 and 50 percent of their total output abroad), which declined more than 10 percent from their 1995 levels. Exports of domestic firms fell more than 20 percent, a sharp erosion of the competitiveness of firms without foreign linkages.

The survey also provides information on primary export markets, which differ considerably from sector to sector (table 2). The garment industry is focused on Europe and the United States (whose economies have continued to hum along fairly well), whereas the electronics industry exports to Japan and other Asian economies. Although the auto parts industry is not an overwhelming exporter, it is linked almost exclusively to Asian countries.

In this kind of survey, the information on profits is likely to be among the most problematic, but it should be possible to pick up broad trends. The most striking feature is the decline in profits for four of the five sectors in 1996; food processing was the exception, with its losses declining (table 3). Most of the downturn was concentrated in domestic firms and in firms that export less than half their output. These findings are consistent with the story that emerged from the output data—that domestic firms had lost international competitiveness.

While output and profitability were declining, firms continued to expand employment and—most strikingly—investment. Employment in firms with direct foreign investment surged between 1994 and 1995, then leveled off to a steady 3–5 percent increase in 1995 and 1996 (table 4). The growth of the capital stock was much more rapid. Such growth can be measured either as changes in total reported assets or as reported investment relative to the previous year's capital stock (and, fortunately, the two approaches provide a consistent story). The growth rate of assets of domestic firms did slow, from 22.5 percent between 1994 and 1995 to 14.9 percent between 1995 and 1996. Even so, this latter figure is particularly striking because it shows a high rate of growth of the capital stock during a year in which output and exports declined and profits were negative. The measure of investment

Table 1. Output and Growth Performance, Thailand

(percent, unless otherwise noted)

<i>Sector</i>	<i>Fiscal year</i>	<i>Output (babi)</i>	<i>Growth</i>	<i>Growth of domestic sales</i>	<i>Exports</i>	<i>Share of output exported</i>
Garments	1994	28,363,202	—	—	—	73.3
	1995	32,985,333	16.3	-1.2	22.7	77.3
	1996	34,385,143	4.2	7.2	3.4	76.7
Textiles	1994	48,784,260	—	—	—	33.4
	1995	43,865,237	-10.1	-8.3	-13.7	32.1
	1996	44,637,853	1.8	-3.7	13.4	35.8
Electronics	1994	155,699,056	—	—	—	72.6
	1995	204,569,102	31.4	31.0	31.5	72.7
	1996	210,347,504	2.8	6.0	1.6	71.9
Food processing	1994	42,072,321	—	—	—	62.6
	1995	63,820,112	51.7	31.5	63.8	67.5
	1996	50,032,865	-21.6	29.8	-46.3	46.2
Auto parts	1994	27,340,674	—	—	—	13.3
	1995	34,584,003	26.5	29.4	7.6	11.3
	1996	34,004,553	-1.7	-3.4	11.6	12.8
<i>FDI status</i>						
Domestic firms	1994	121,279,849	—	—	—	47.9
	1995	153,585,235	26.6	11.3	43.3	54.2
	1996	137,995,920	-10.2	3.9	-22.0	47.0
Foreign invested	1994	180,956,784	—	—	—	67.5
	1995	226,213,890	25.0	25.8	24.6	67.3
	1996	235,380,778	4.1	7.0	2.6	66.3
<i>Export status</i>						
Nonexporters	1994	60,385,825	—	—	—	0.4
	1995	70,198,695	16.3	16.1	n.a.	0.6
	1996	72,637,061	3.5	2.8	n.a.	1.2
Median exporters	1994	65,005,821	—	—	—	25.5
	1995	92,621,358	42.5	19.1	110.8	37.7
	1996	82,158,800	-11.3	2.4	-33.9	28.1
Large exporters	1994	176,867,866	—	—	—	92.3
	1995	217,003,733	22.7	25.3	22.5	92.2
	1996	218,612,058	0.7	27.0	-1.5	90.1
<i>Total (942 firms)</i>	1994	302,259,512	—	—	—	59.6
	1995	379,823,786	25.7	18.3	30.7	62.0
	1996	373,407,918	-1.7	5.5	-6.1	59.2

— Not available.

n.a. Not applicable.

Source: Thai Competitiveness Survey.

Table 2. Largest Export Markets, Selected Sectors, Thailand
(percent)

<i>Sector</i>	<i>Asia</i>	<i>United States</i>	<i>Europe</i>	<i>Latin America</i>	<i>Africa</i>	<i>Other</i>	<i>Total firms</i>
Auto parts	64.0	16.0	11.0	1.0	4.0	4.0	96.0
Electronics	64.0	21.0	11.0	0.0	3.0	1.0	142.0
Food processing	74.0	16.0	5.0	0.0	4.0	1.0	80.0
Garments	23.0	35.0	35.0	0.0	5.0	1.0	202.0
Textiles	41.0	28.0	22.0	1.0	6.0	2.0	108.0
Total number of firms	301.0	158.0	125.0	3.0	29.0	12.0	628.0
Percent	48.0	25.0	20.0	0.0	5.0	2.0	100.0

Source: Thai Competitiveness Survey.

Table 3. Net Profit as Share of Total Output, Selected Sectors, Thailand
(percent)

<i>Sector (number of firms)</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>
Auto parts (89)	6.17	5.69	5.13
Electronics (134)	4.26	3.78	2.45
Food processing (46)	0.46	-1.02	-0.45
Garments (208)	1.55	2.37	1.04
Textiles (157)	1.91	1.64	-0.43
<i>FDI status</i>			
Domestic (490)	1.67	1.63	-2.38
Foreign invested (144)	3.99	3.53	3.10
<i>Export status</i>			
Nonexporters (363)	3.57	3.12	-2.39
Median exporters (79)	6.15	5.62	4.25
Large exporters (192)	1.50	1.72	1.41
<i>Total (634)</i>	3.24	2.96	1.44

Source: Thai Competitiveness Survey.

relative to assets was even higher—a change of 18.5 percent between 1995 and 1996 for domestically owned firms and a similar 18.4 percent for those with foreign investors. About two-thirds of the total investment was in machinery and equipment, and one-third was in plants and land (unfortunately we cannot determine the share that was devoted to real estate investment). However, even non-real estate investments—including those financed by borrowing abroad—are not necessarily profitable. Although the data show clear signs of trouble by 1996, investment continued to expand at a high rate.

Table 4. Measures of Expansion, Thailand

<i>Sector</i>	<i>Change in employment</i>	<i>Change in total assets</i>	<i>Total investment as a percentage of total assets</i>	<i>Investment in machinery as a percentage of total assets</i>
<i>Domestic</i>				
1995	5.4	22.5	24.0	16.7
1996	3.5	14.9	18.5	11.3
<i>Foreign invested</i>				
1995	27.8	21.1	21.8	15.7
1996	3.7	17.7	18.4	13.6
<i>Total</i>				
1995	11.0	22.1	23.3	16.4
1996	3.6	15.7	18.5	12.0

Source: Thai Competitiveness Study.

How Did Firms Finance This Investment?

The figures confirm that the financial positions of Thai firms were particularly vulnerable. Firms were highly leveraged and extremely reliant on short-term financing. The mismatch of the maturity of their liabilities and their investments meant that changes in interest rates and the availability of credit were likely to have powerful effects.

At the end of 1996 debt-equity ratios were close to 2.5, on average, and in some cases above 5 (table 5).¹ About 35 percent of the firms had debt-equity ratios above 3—substantially lower than in Korea or Japan, but still much higher than emerging-market standards. Thus the Bank of Thailand's decision to raise interest rates to try to contain the depreciation of the baht had serious implications. The debt-equity ratios show that many firms had indeed borrowed heavily but since the onset of the crisis were acting to reduce the extent of their liabilities.

Among the five sectors, the textile industry had the highest debt-equity ratios and food processing the lowest. Setting aside the currency effect, the auto parts industry was the only sector that increased its debt-equity ratio after the crisis. Because this sector had the largest number of firms with long-run financing, shielding them from the fluctuations in interest rates, auto parts firms were more reluctant than other sectors to lower their debt positions, and it is likely that the value of their equity has fallen the most dramatically due to the utter collapse in their domestic demand.

Not surprisingly, large firms and exporting firms had higher debt-equity ratios than small firms and nonexporters (see table 5). Joint ventures, however, had lower ratios than local firms, a fact that is consistent with their ability to gain access to

Table 5. Profile of Manufacturing Firms, Thailand

Firm characteristics	Size			Export orientation			Firms receiving foreign direct investment			Total
	Small	Medium	Large	None	Some	Major	Local	Some	Major	
Financial indicators										
Short-term debt/total financing (percent)	84.0	81.0	80.0	83.0	79.0	82.0	8.0	85.0	77.0	81.0
Median debt-equity ratio	1.2	1.9	2.1	1.7	1.7	2.0	2.0	1.4	1.7	1.8
Mean debt-equity ratio	2.0	2.5	2.7	2.4	2.2	2.5	2.6	1.9	2.3	2.4
Share with audited statements (percent)	22.0	36.0	62.0	32.0	57.0	48.0	35.0	54.0	48.0	39.0
Share offering collateral (percent)	52.0	65.0	59.0	57.0	58.0	63.0	36.0	47.0	70.0	59.0
Firm composition										
Number of employees	43.0	123.0	796.0	132.0	491.0	538.0	202.0	435.0	643.0	288.0
Share that export (percent)	30.0	58.0	86.0				47.0	78.0	96.0	57.0
Share foreign invested (percent)	13.0	25.0	48.0	14.0	45.0	48.0	n.a.	n.a.	n.a.	28.0
Response to the crisis (percent)										
Current capacity utilization	56.0	65.0	71.0	59.0	65.0	73.0	62.0	66.0	76.0	64.0
Share with few workers	60.0	51.0	52.0	62.0	59.0	42.0	57.0	58.0	39.0	55.0
Optimistic about future growth	13.0	24.0	29.0	15.0	22.0	35.0	19.0	25.0	35.0	22.0
Total	390.0	396.0	362.0	648.0	141.0	342.0	882.0	223.0	122.0	1,227.0
n.a. Not applicable.										
Source: Thai Competitiveness Survey.										

equity finance through their foreign parent or partner firms. Firms in the provinces had mildly higher debt-equity ratios than those in Bangkok.

With the onset of the crisis, debt-equity ratios fell across all types of firm. Large firms experienced the greatest decline; currently the degree of leverage differs little by firm size. Of course, the exchange rate effect significantly increases the ratios of firms with foreign currency liabilities, but as discussed below, at the time of the survey it was not readily apparent that these firms were reducing their foreign liabilities.

The more recent the information on debt-equity positions, the stronger the trend in the decline in the ratio. This could be consistent with a credit crunch, as loans are not being rolled over and the firms are carrying less debt. But it is also consistent with firms cutting back on their use of credit in the face of falling domestic demand. (It may also be due to some sample selection bias; that is, the most indebted firms were already bankrupt or were reluctant to participate in the study.)

Borrowing in Foreign Currency

With the dramatic depreciation of the baht, the costs of debt servicing for firms with extensive debt denominated in foreign currencies soared. The results of our survey, however, suggest that the problem is not as extensive in the manufacturing sector as might be feared. The large majority of firms borrowed only in baht, and those that did borrow in foreign currency were generally the more efficient firms. The issue is more severe in the private banking sector, particularly in the case of financial institutions that borrowed offshore and then lent domestically, assuming the exchange rate risk themselves. Of the 1,200 firms surveyed, only 140—predominantly large exporting firms with ties to foreign companies—reported that their liabilities were denominated in foreign currencies. Three-fourths of these reported that their foreign currency debt was less than the value of their baht-denominated debt at the end of 1996; half of the 140 said their foreign currency liabilities were less than 50 percent of the value of their baht liabilities in 1996. Interestingly, the maturities of the different liabilities are not highly correlated. Firms with foreign currency liabilities were less reliant on short-term loans, and their short- and longer-term liabilities tended to be in different currencies. It is true that firms with foreign currency debt were generally more leveraged; firms with low debt-equity ratios rarely had any foreign currency liabilities.

Debt denominated in foreign currency does not need to be an issue unless firms do not hedge their positions. Because they assumed that the pegged exchange rate would remain in effect, however, only 19 percent of Thai firms with substantial foreign-currency-denominated debt had hedged some of their debt, and only 12 firms had fully hedged their positions. There is some natural hedging if firms export their goods, but most of the firms that borrowed in foreign currency did not export the majority of their goods. These statistics do not change when comparing firms' positions at the end of 1996 and at the time of the interviews in late 1997 or early 1998.

Equally worrying is that most firms had not altered their exposure to currency fluctuations in the months after the initial depreciation of the baht. Since most of the foreign currency debt was due within a year, these firms faced substantially higher financing costs in baht. Although a heavy reliance on short-term finance compounds the difficulties for firms with foreign liabilities, the relative lack of long-term finance is a more pervasive problem.

Reliance on Short-Term Financing

Leveraged debt or exposure to exchange rate fluctuations is less of a problem if the changes are likely to be temporary and if most of the debt matures over a period of several years. Thai firms, however, were not only highly indebted but also had borrowed in predominantly short-term instruments. Thus, the effects of the depreciation and the rise in interest rates were felt all the more keenly. This problem is not unique to the East Asian crisis, nor is Thailand's heavy reliance on short-term financing unusual for the region. But compared with other middle- and high-income countries, its firms have some of the lowest ratios of long-term debt to total assets. On average, almost 80 percent of liabilities are short term. In 1996, 56 percent of survey respondents said that they relied exclusively on short-term financing; by 1997 the number had risen to 59 percent. No clear patterns of characteristics identify firms with greater access to longer-term financing. What can be said is that before the crisis, there was little difference in the reliance on short-term financing across firm size or export status (although large exporting firms were slightly more likely to depend exclusively on short-term finance), but after July 1997 only large firms reduced their share of short-term debt.

An examination of debt-equity ratios together with the maturity of liabilities shows that before the crisis, firms with low debt-equity ratios tended to rely on short-term financing. One explanation is that these firms would not qualify for much financing. Conversely, firms with less reliance on short-term financing tend to have high debt-equity ratios and greater access to capital on more favorable terms.

The crisis has reinforced the case for improved access to longer-run finance. A better matching of liabilities and asset maturities would shield firms from much of the impact of monetary shocks. Another lesson is that while longer-term finance is desirable, firms must demonstrate that they qualify for it. Thus, improvement in issues of corporate governance and transparency must go hand in hand with financial reform.

Transparency and Disclosure

A main criticism of the East Asian financial systems is that there is insufficient transparency and disclosure of financial information, making it difficult to assess the risk

for potential borrowers. This is true not only for the financial sector but also for the manufacturing sector. To get at the issue of transparency and disclosure, the survey asked firms whether they had to provide audited statements to qualify for a bank loan and whether the loan required collateral. Only 40 percent said they were required to provide audited account statements to receive bank credit. There is little correlation between the need for audited statements and reliance on short-term credit, so many longer-run loans were offered with little objective disclosure of the firm's position. At the same time, those without audited statements were much more likely to have very low debt-equity ratios, and vice versa, which would be consistent with the disbursement of only small loans to firms whose books are not audited.

Sixty percent of respondents, most of them foreign-owned firms, said that their loans were backed by collateral. Many firms with short-term debt used collateral; firms with little short-term debt did not. Sixty-five percent of firms with high debt-equity ratios provided collateral, as did 72 percent of those providing audited statements but only half of those without audited statements.

Collateral offers some insurance to the lenders, but many firms with viable business plans have insufficient collateral to qualify for the necessary financing. Increasing the use of audited statements would give financial institutions a better view of the creditworthiness of an operation and a more reliable way to assess the true risks involved.

Response to the Adjustment Program

Thailand got into trouble because it had an incentive regime that encouraged firms to take out short-term loans in foreign currency to finance long-term investments—many of which were aimed at the domestic market. This system was inherently risky, and weak accounting and transparency rules made it even more difficult for financial institutions to assess the true risks involved. When foreign lenders began to lose confidence in the economy and devaluation became necessary, Thai financial institutions and firms sustained large losses.

The withdrawal of foreign capital required an adjustment of the current account, and Thai authorities adopted a standard structural adjustment program with support from the IMF. The objective of the program was to compress domestic demand while limiting any fall in output; that is, to reduce imports and increase exports. The data show how well the adjustment process worked in its initial phase. The sectors covered by the survey—including the major export industries—are the sectors that should have benefited from real devaluation and increased their exports. If they did not, it is important to understand what bottlenecks were holding them back.

Capacity Utilization

Almost three-fifths of firms reported that they operated at a lower capacity at the time of the survey (six to nine months after the adjustment was implemented in July 1997) than they had at the end of 1996. More than 60 percent had already reduced production in the first half of 1997 relative to 1996. This general pattern holds for all sectors and is consistent with the evidence that export growth fell substantially after 1995.

Some areas of the economy managed better than others. Large firms were operating at a higher capacity than small firms and experienced significantly less of a drop-off. The same was true for firms with links to foreign companies relative to wholly domestic firms, and for exporters versus those that produced solely for the local market. In the second half of 1997, there was a 17 percent gap in capacity utilization between nonexporters and exporters, a 15 percent gap between small and large firms, and a 12 percent gap between local and foreign-linked firms.

Although before July 1997 more than 40 percent of firms had planned to expand, almost half of them had abandoned this path by the first quarter of 1998. Only 8 percent of the firms that in 1997 were not planning to expand decided to do so in 1998. Only 17 percent of firms reported increased capacity utilization after July 1997; one-fourth also expanded in the first half of 1997. The large majority of these firms were exporters, but their increase was modest, averaging about 13 percent. Fewer than a third of them expected to increase their capacity utilization by the end of 1998.

Auto parts makers were the hardest hit, largely because of the domestic orientation of the industry, and were the most pessimistic about their prospects. A factory visit gives a vivid picture of new plants full of machinery to produce for the local market—standing idle. By the beginning of November 1997, most large auto assemblers had announced that they were suspending operations (or severely cutting back production) for three to six months. One ray of hope came with the announcement in 1998 that Toyota would be shifting some production to Thailand (to export to Japan) to take advantage of lower costs of production. The tariff and nontariff barriers in the auto industry, however, suggest that exports from this sector hold little promise of increased growth for the sector overall.

Employment

The human dimension of the decline in capacity utilization is reflected in the reduction in employment levels. Eighty percent of firms with lower capacity utilization had cut back on the number of employees. Thus, close to 60 percent of firms employed fewer workers at the time of the survey in early 1998 than they did in July 1997. Very few firms reported firing workers; almost all the reduction came from attrition.

Exporters were only slightly less likely than nonexporters to reduce their employee rolls. Auto parts manufacturers, which tend to have small work forces, suffered the most; only one in four had the same number of employees at the time of the survey as before the onset of the crisis. The reduction in other sectors was less dramatic. In textiles and electronics, slightly more than 50 percent of firms had fewer workers than they did in July 1997, while the figure in garments and food was about 45 percent.

Looking at the capacity utilization and employment results together, it appears that export firms were only slightly better positioned than domestically oriented firms. Large exporters did not experience falls in capacity utilization, but neither did they increase production, and half of them employed fewer workers at the time of the survey than they did before July 1997. Finally, both small and large producers for the domestic market cut back on capacity utilization and employment.

Perceived Causes of the Slowdown

The causes for the slowdown, as reported by the firms, call into question the common explanation of a credit crunch. Sixty percent of firms said that a substantial decline in domestic demand and higher input costs as a result of a depreciated baht were the primary sources of difficulty. In fact, only a third of the firms cited access to capital as a major problem, although substantially more said the cost of capital was a problem. The cost of capital was brought up by two-thirds of the food and textile companies and by about half of the auto parts, electronics, and garment firms. The cost of capital was particularly hard on small firms and nonexporters, and it affected domestic firms more than foreign firms. Small firms, nonexporters, and firms without foreign ties put greater emphasis on the decline in domestic demand than did large firms, exporters, and foreign-owned firms. These results are entirely consistent with the responses regarding changes in capacity utilization and employment.

There is substantial variation across sectors in the perceived causes of the slowdown. Textile firms stressed the effects of the depreciation of the baht, and auto parts makers were most worried about the drop in domestic demand. Firms in the food processing industry were least concerned about the fall in demand, but a third still reported it to be a significant problem. Access to capital was virtually unmentioned in the electronics sector, but more than 40 percent of textile firms cited it as a problem.

Nonexporters were encountering greater difficulties from the crisis than were exporters—one piece of evidence supporting the potential for exporters to expand and lead the way out of the current hardships. Yet more than 40 percent of exporters, particularly in the electronics and garment industries, saw a drop in foreign demand as a significant difficulty. With half of firms' exports traditionally targeted within the region and with the surge in the supply of electronic components, the fall in foreign

demand was not unexpected, but it makes the traditional path to recovery a more illusory one.

Firms were also asked to rank the difficulties of access to finance—particularly in the longer run—on a scale of 1 to 5 (with 1 meaning no problem and 5 a severe problem). About 20 percent said it was a major problem, and 24 percent reported that it was no obstacle at all. Interestingly, it was more of an issue for large firms, particularly large food processors.

Comparing the results in the short run with those over a longer period of time, it appears that the immediate impact of the crisis on manufacturers did not primarily concern finance. As a longer-term development goal, however, particularly in an environment where firms are trying to expand, finance is still an issue that needs to be addressed. Certainly there is a heavy reliance on short-term borrowing. The average bank debt-to-equity ratio in the sample is more than 200 percent, and almost all of the debt is short term. The fact that interest rates have not risen too drastically may explain why access to finance is not identified as a first-order problem.

Financial Characteristics and Impact of the Crisis

Linking the information on the financial characteristics of firms to their responses to the crisis suggests that the firms that might have been considered vulnerable are in fact some of the sounder ones. That is, at the time of the survey, firms with high debt-equity ratios or foreign currency liabilities had maintained higher rates of capacity utilization and remained relatively more optimistic about the future. This underlines the importance of looking at characteristics such as size, export orientation, and links to foreign firms when assessing firms' overall vulnerability. It should also be noted, however, that these data come from responses gathered in the first six months of the crisis, and sustaining high levels of debt or foreign liabilities becomes increasingly difficult as time goes by.

At the same time, businesses with higher debt-equity ratios were more likely to find access to capital an issue (43 percent, compared with 21 percent of those with low debt-equity ratios), suggesting that financial institutions were reluctant to continue lending to highly indebted firms. Interestingly, access to capital was more likely to be an issue for firms that were required to put up collateral than for those with unsecured loans. This is consistent with the banks' increasing demand for collateral to back loans.

Not surprisingly, the more leveraged firms were almost twice as likely to see the cost of capital as a bottleneck. Despite the depreciation of the baht, the cost of and access to capital were less problematic for those firms borrowing in foreign currency. The fall in domestic demand was also less of an issue for those firms, in part because many of the firms borrowing in foreign currency were large exporting firms with foreign partners.

Companies that were highly leveraged at the onset of the crisis were the most pessimistic about the prospects of increasing their level of output. Strikingly, firms that borrowed in foreign currency (generally, large joint ventures that export) were significantly more optimistic about the likelihood that their output would rise. Firms that relied purely on short-term financing were significantly more pessimistic: 45 percent said their output would decline, and only 11 percent thought it would rise. Concerns that were less reliant on short-term financing were more evenly split; close to a third said output would rise, and the same percentage thought it would decline.

An accurate measure of the degree to which there is a credit crunch in Thailand is difficult to obtain. It is not sufficient to show that interest rates are rising or that the amount of new lending is lower. Rather, one needs to show the extent to which profitable investments are not being financed that otherwise would have been. Falling debt-equity ratios and canceled plans for expansion are consistent with a credit crunch but do not prove that viable projects are not being funded. These responses are also entirely consistent with a fall in domestic demand for credit. And, except for large firms, the share of short-term debt went up in 1997 compared with 1996.

Some additional evidence does support a credit crunch. For one thing, the cost and reported difficulty of obtaining capital were rising during the time in which the interviews were held. Another potentially worrying sign was the increasing reliance on short-term finance by many of the firms one would expect to be well positioned to recover quickly from the impact of the crisis—exporters and joint ventures. This reinforces the point that one of the most important areas in which financial reform will aid firms is in increasing access of profitable firms to longer-run finance.

Bottlenecks to Long-Term Productivity Growth

In addition to assessing the impact of the crisis, the survey gathered information on the determinants of firms' competitiveness. That portion of the survey covered a range of questions about long-term productivity growth and competitiveness, including quantitative data on inputs, outputs, and value added, as well as qualitative information about various problems and bottlenecks. Although the input and output data are beyond the scope of this article, it is important to record firms' perceptions of the bottlenecks that retard their long-term development.

The survey asked respondents to rank the bottlenecks to production and productivity growth on a scale of 1 (no problem) to 5 (a severe problem). The exporting firms in the sample had three clear reactions. First, they expressed a serious concern about the interrelated issues of corruption, customs administration, and red tape. Second, they voiced a similarly large concern about labor market issues: labor costs in general, and the availability of technical labor in particular. Third, they raised no great concern about access to finance (not surprising for these international firms) or

infrastructure (moderately surprising, given the visible problems). As noted earlier, nonexporting firms said that finance was an issue, but overall they were less concerned about it than were exporters—a worrying sign for the prospects of an export-led recovery. There were some differences in perceived bottlenecks between foreign and domestic firms. Both groups worried about corruption, customs administration, red tape, and labor costs, but access to finance was more of a concern for domestic firms.

By sector, the electronics industry cited red tape, corruption, and the lack of technical workers as serious bottlenecks. Garment and textile firms were also troubled by labor costs, although garment firms were more concerned about customs administration and red tape. The electronics and garment industries were the strongest exporters. Auto parts and food products ranked labor costs and red tape as the two greatest problems. High labor costs were the common thread in all of the sectors. Considering that the survey was taken shortly after a major devaluation, this problem is a bit of a surprise.

Concerns about corruption are echoed in international surveys covering a wide range of countries. Compared with countries at the same level of income, corruption is high in Thailand. Firms also report a large degree of regulatory discretion, a characteristic that is highly associated with corruption (World Economic Forum 1998). Corruption in the customs administration is a particularly severe problem for exporters and other businesses that need imported machinery and inputs in order to participate in the international division of labor.

A smooth adjustment to the shock of the East Asian financial crisis required Thailand to compress demand while limiting the decline in output, something that could be accomplished only if exports increased. The real devaluation—which raised the relative price of tradables—should have spurred such an increase. Indeed, the structural adjustment program supported by the international financial institutions assumed a good export response.

What went wrong? In sectors burdened with worldwide overcapacity (notably auto parts), there was little scope to use the vast capital stock that had been put in place. More generally, since half of all external sales go to other Asian economies, the regional recession made any increase in exports unlikely.

It is noteworthy that the survey found little evidence that lack of credit hampered firms, either in production or in exports. In fact, it found that red tape and poor customs administration were larger issues than the availability of finance. Nonetheless, reforms to raise accounting standards, require financial disclosure, and impose prudential regulation of financial institutions remain important so that firms can gain greater access to longer-run finance and improve the match of maturities between available loans and investment projects.

In retrospect, given the weak potential for increasing exports quickly, the macroeconomic program was too tight. Fiscal and monetary contraction led to a sharp

Table A-1. *Characteristics of the Sample of Firms, Thailand*

	<i>Total</i>	<i>Average number of employees</i>	<i>Size</i>			<i>Volume of exports</i>			<i>Foreign direct investment</i>	
			<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Small</i>	<i>Medium</i>	<i>High</i>	<i>Yes</i>	<i>No</i>
<i>Sector</i>										
Garments	334	232	125	130	72	151	26	138	56	278
Textiles	306	275	102	98	83	189	41	47	60	246
Electronics	229	543	49	64	104	96	36	83	130	99
Food	122	465	26	32	51	56	8	47	35	87
Auto parts	236	233	88	72	52	156	30	27	64	172
<i>Export status</i>										
Small	648	132	304	220	106	648	n.a.	n.a.	93	555
Medium	141	491	19	39	72	n.a.	141	n.a.	63	78
Large	342	538	38	115	172	n.a.	n.a.	342	163	179
Total	1,227	288	390	396	362	648	141	342	345	882

n.a. Not applicable.

Source: Thai Competitiveness Survey.

decline in domestic demand. Because this drop in demand was not mitigated by an increase in exports, the decline in output was unnecessarily large. Once the extent of the decline was evident, fiscal and monetary policies were eased to provide more stimulus to the economy.

Appendix: Overview of the Competitiveness Study

The findings presented here are based on responses from more than 1,200 firms that were interviewed in the last quarter of 1997 and the first quarter of 1998. The detailed survey was designed to learn about firms' production, labor force training and turnover, technology acquisition, and financial structure. Questions sought information from 1994, 1995, and 1996, as well as from the period immediately following the onset of the crisis. These firms (employing a total of more than 350,000 workers) were drawn from five of the major tradable goods sectors, which should have been relatively well positioned to take advantage of the large depreciation of the baht. The five sectors selected, based on their shares in exports and GDP, were auto parts, electronics, food processing, garments, and textiles.

Each sector is well represented. The inclusion of fewer food processing firms reflects the smaller number of establishments in this sector (table A-1). More than half the firms surveyed export at least some of their output, although the share of firms that export varies from sector to sector. Electronics and garments have the most exporters: two-thirds of the firms export, while only 50 percent of auto parts and textile firms do. In this regard, the sample is representative of the industries more generally: electronics and garment firms are more export oriented, while auto parts and textile firms are more geared to the domestic market. This distinction is important in understanding the differences across sectors in the reaction to the crisis.

There is a good dispersion in the size of firms. Care was taken to include small and medium-size enterprises because they represent the bulk of firms and were most likely to have trouble coping with the recession. In this analysis, firms were divided into three categories based on total employment: small (under 50 employees), medium-size (50 to 150 employees), and large (more than 150 employees). The thresholds were chosen so that each category accounted for about a third of the total. Electronics and food processing have a noticeably higher proportion of large firms than do the other three sectors.

About 30 percent of the firms have a significant relationship with a foreign firm, either as a joint venture or as a wholly owned subsidiary of a foreign parent. Such relationships are most common among electronics firms and least common in garment firms. The tie to a foreign firm could be an important factor in giving firms access to capital or to markets overseas. Therefore it is not surprising that in the sample, close to 84 percent of firms with foreign ties export, compared with 51

percent of local firms. Part of the difference is also due to the fact that foreign firms tend to be larger. The average number of workers in a foreign exporting firm is 700, compared with 347 for local exporters; it is 185 for foreign nonexporters, compared with 83 for local nonexporters.

Notes

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1. The survey gathered information on firms' balance sheets from before the crisis as well as after its onset. The date of collection of the post-July 1997 data varies from the end of the third quarter of 1997 (when less impact might be expected) to the end of the first quarter of 1998. During this period, the baht-dollar exchange rate moved considerably, from 35 baht to the dollar, to 52, and back to nearly 40. This fluctuation raises the issue of the appropriate exchange rate to use in calculating the debt-equity ratios for firms with foreign liabilities. In the analysis for 1997, the exchange rate of 36.5 prevalent at the end of the third quarter of 1997 is used.

Another solution would be to maintain the use of the pegged value of the baht before devaluation (25 baht per dollar). This would allow for a measure of the change in the "real" debt-equity position. Clearly, the actual ratios are considerably higher for firms with foreign currency liabilities, but using an exchange rate of 25 does not alter the averages by very much because the number of firms with a significant share of their liabilities in foreign currency is small.

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Corporate Performance in the East Asian Financial Crisis

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The sharp decline in the once-stellar performance of East Asian corporations following the 1997 financial crisis has sparked an intense debate. Some observers argue that external shocks, including a drop in aggregate demand and a shortage of working capital, explain the corporate sector's poor performance. Others assert that the difficulties were apparent well before the crisis and that the risky financial policies pursued by these firms left them vulnerable. A survey of the literature shows little microeconomic evidence to support either view.

This article compares the growth and financing patterns of East Asian corporations in the years before the crisis with those in other countries. It finds little microeconomic evidence that corporate growth was weakening but some support for the argument that many firms had a weak financial structure that left them vulnerable to an economic downturn. Based on a sample of more than 850 publicly listed firms in the four crisis countries—Indonesia, Malaysia, the Republic of Korea, and Thailand—and two comparators, Hong Kong (China) and Singapore, it appears that firm-specific weaknesses already in existence before the crisis were important factors in the deteriorating performance of the corporate sector.

The East Asian crisis has sparked a large body of literature seeking to explain its causes, onset, and evolution. Whether sudden shifts in market expectations and confidence were the primary source of the financial turmoil has been hotly debated. Proponents of this view argue that although some macroeconomic and other fundamentals may have worsened in the mid-1990s, the extent and depth of the crisis can be attributed not to a deterioration in fundamentals but rather to the panicky reaction of anxious domestic and foreign investors (Furman and Stiglitz 1998; Radelet and Sachs 1998). Others argue that the crisis reflected structural and policy distortions in the region, including weak macroeconomic policies, and that fundamental imbalances triggered the crisis (Corsetti, Pesenti, and Roubini 1998).

The contributions of macroeconomic weaknesses, moral hazard, regulatory deficiencies, and the inherent instability of financial markets have all been investigated in depth (see Kaminsky and Reinhart 1999 for a review of recent work). Only more recently have variables in the corporate sector itself—performance, financial structure, and corporate governance—been included as explanatory factors. Some observers have gone so far as to attribute the East Asian debacle to these factors (Harvey and Roper 1999; Johnson and others forthcoming; Krugman 1999). In hindsight, it has become apparent that the corporate financial structure of many companies was too weak to withstand the combined shocks of increased interest rates, devalued currencies, and sharp declines in domestic demand. Yet poor performance and risky financial policies were not notable features of East Asia's economic ascent before the financial crisis—quite the opposite. Considered by observers to be an important contributor to the East Asian miracle, the corporate sector was generally viewed as being very competitive and adept at exploiting new market opportunities. As a consequence it attracted considerable amounts of foreign capital. Hence, it is unclear whether the corporate structure compounded the financial crisis or whether corporations were the innocent victims of a financial crisis brought on by other factors.

In this article, we review the performance and financing patterns of East Asian corporations in the years immediately before the crisis. We analyze the return on assets, in real local currency and in dollars, and the debt burden of 5,500 firms in nine economies in the region and two comparator countries, the United States and Germany. We find that while performance was perhaps weakening in some East Asian countries, returns on assets were generally high; in many of the nine economies, returns averaged twice as high as those recorded in Germany and the United States. The high levels of investment dictated a heavy reliance on external financing, and because outside equity was used sparingly, debt levels were high in most of these economies and in fact were increasing in Malaysia, the Republic of Korea, and Thailand. Short-term borrowing became increasingly important, especially in Malaysia, Taiwan (China), and Thailand. Some of the vulnerabilities in corporate financial structures that are now seen as factors in triggering and aggravating the crisis were thus already in existence in the early 1990s.

We survey the nascent literature on the role of the corporate sector before and during the crisis as well as the interaction between characteristics of the corporate sector and developments in the general economy. One way to assess the relative importance of external financial shocks and underlying weaknesses would be to compare the operational performances of firms that had different exposures to these financial shocks. A dearth of data and the elapse of time since the crisis, however, make it difficult to separate out the causes and consequences. Much of the literature has been qualitative in nature, and very little of it has involved analyzing individual performance of corporations during or following the crisis.

We therefore provide a preliminary empirical assessment of the importance of various factors by reviewing the performance of a sample of publicly traded firms in four crisis economies, Indonesia, Korea, Malaysia, and Thailand, and two comparators, Hong Kong (China) and Singapore, before and during the East Asian crisis. We find that little can be explained by a firm's financial and other characteristics or by the institutional environment of the particular country. Idiosyncratic shocks appear to have been the most important factors in the sharp deterioration in corporate performance. Nevertheless, of the variance that can be explained, we find that firm-specific, nonfinancial characteristics were most important. Industry-specific shocks and the institutional environment also contributed to the decline in profitability, and financing patterns had a strong influence on operational performance.

Corporate Performance and Financing

The data used here are based on annual reports of the companies listed on the major stock exchanges and come from the *Worldscope* database (see Claessens, Djankov, and Lang forthcoming a). This data set is unbalanced; that is, the number of observations varies from year to year. We have excluded companies that reported fewer than three times between 1988 and 1996, financial and banking institutions, and companies that did not report all of the following variables: net sales, net income after taxes, total assets, and the value of common equity.

Our first measure of performance is the real rate of return on assets (ROA), in local currency, calculated as the earnings of a firm before interest and taxes divided by total assets, minus the annual inflation rate in the country. The advantage of this measure is that it is not influenced by the liability structure of the firm because it excludes interest payments, financial income, and other income and expenses. At the same time it is not a complete measure of firm productivity (unlike total factor productivity) because it does not control for inputs other than capital.

East Asian corporations have had quite different ROAs, ranging from relatively low profitability in Hong Kong, Japan, Korea, and Singapore to high real ROAs averaging 9 to 10 percent in Indonesia, the Philippines, and Thailand (table 1). Returns in Malaysia and Taiwan fell between these two groups, but at about 7 percent, they were close to the high performers. All these ROAs were high compared with the returns of corporations listed on the DAX in Germany and on the New York Stock Exchange in the United States, which were about 5 percent. The comparison indicates that the corporate sector's contribution to the East Asian miracle was significant during most of this period.

A further comparison of corporate performance in all the countries that report to *Worldscope* reveals that Thailand, the Philippines, and Indonesia posted the highest returns in this sample of 46 economies, followed by Taiwan and Malaysia (figure 1).

Table 1. Return on Assets in Real Local Currency, Selected Economies, 1988–96

(percent, medians)

<i>Economy</i>	1988	1989	1990	1991	1992	1993	1994	1995	1996	1988–96
Hong Kong (China)	5.1	5.3	4.9	4.8	4.5	3.8	3.9	3.9	4.1	4.6
Indonesia	—	—	9.4	9.1	8.6	7.9	7.4	6.2	6.5	7.1
Japan	5.7	5.4	4.6	4.7	4.8	4.5	4.1	3.8	3.6	4.1
Korea, Rep. of	4.4	3.9	4.1	4.0	3.9	3.6	3.4	3.6	3.1	3.7
Malaysia	5.4	5.6	5.4	6.2	6.0	6.5	6.3	6.1	5.6	6.3
Philippines	—	—	—	7.1	6.4	8.1	8.5	6.8	8.4	7.9
Singapore	4.9	4.5	4.2	3.9	5.2	4.6	4.5	3.9	4.0	4.4
Taiwan (China)	—	—	—	5.1	6.2	6.5	6.8	6.5	6.6	6.7
Thailand	10.8	11.0	11.7	11.2	10.2	9.8	9.3	7.8	7.4	9.8
Germany	5.3	5.5	5.5	5.7	5.6	5.2	5.1	4.9	5.0	4.7
United States	4.7	4.8	5.1	4.9	5.2	5.4	5.3	5.2	5.2	5.3

— Not available.

Source: Worldscope database.

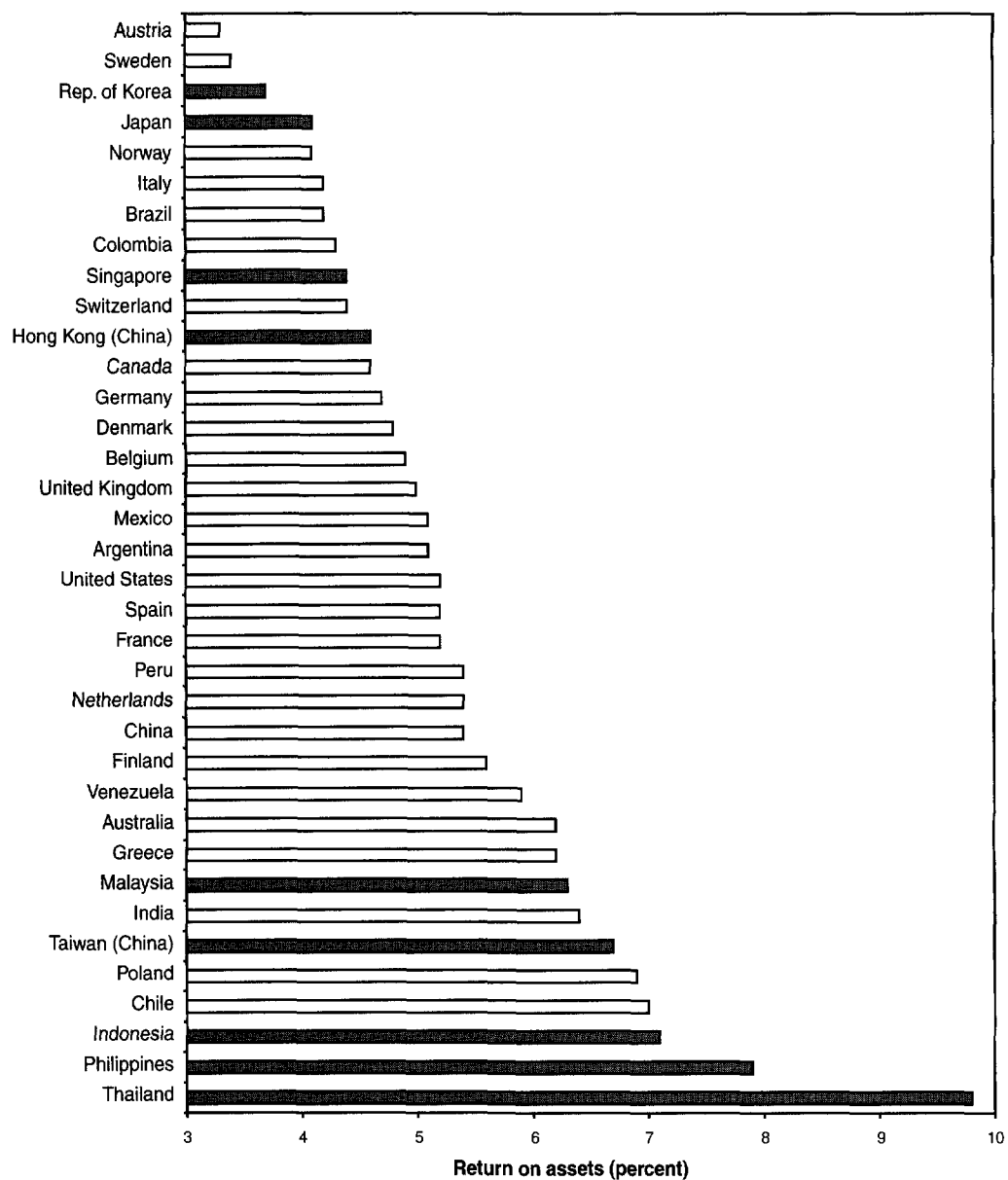
At the other end were Korea and Japan; Singapore and Hong Kong also had relatively low ROAs in real local currency.

Table 2 shows ROAs in U.S. dollars, adjusted for the effects of currency movements. This measure of performance represents the point of view of an international investor who can allocate resources across several countries. With the exceptions of Japan (6.6 percent) and Taiwan (8.4 percent), ROAs in all the East Asian countries were higher than the U.S. median (8.7 percent). The Philippines (18.7 percent), Thailand (14.7 percent), and Indonesia (13.0 percent) posted the highest average returns over the 1988–96 period.

An examination of the data shows the degree of risk inherent in the liability structures of East Asian corporations. High rates of investment meant that companies had to turn to external financing to make up for the lack of capital from retained earnings. In fact, firms in these countries have always relied on high levels of external financing, primarily from the banking system. Leverage, measured by the ratio of total debt divided by equity, remained well above that in industrial countries (table 3). The most highly leveraged economy over this period was Korea; the lowest was Taiwan. Malaysia and Singapore were also low; leverage in the Philippines, while rising, was well below that of Indonesia and Thailand.

In the few years just before the crisis, leverage increased in Japan, Korea, Malaysia, and Thailand. Japan had reduced its leverage in the early 1990s, possibly in the course of a financial retrenchment, but when faced with a shortage of equity and other sectoral difficulties, companies there subsequently rolled over these loans. The rise in leverage in the Philippines probably resulted from reforms in the mid-1980s that revived the country's corporate and financial sectors and resulted in better financing possibilities.

Figure 1. *Return on Assets in Local Currency, Selected Economies, 1988–96*



Source: Worldscope database; authors' calculations.

Table 2. Return on Assets in Nominal U.S. Dollars, Selected Economies, 1988–96

(percent, medians)

<i>Economy</i>	1988	1989	1990	1991	1992	1993	1994	1995	1996	1988–96
Hong Kong (China)	8.0	8.4	7.2	12.9	14.3	12.5	11.5	8.0	10.3	10.3
Indonesia	—	—	16.0	13.7	12.6	15.3	11.7	10.7	11.2	13.0
Japan	6.5	–6.0	13.3	14.8	7.0	16.2	15.6	1.0	–9.2	6.6
Korea, Rep. of	25.1	10.3	7.3	7.2	6.4	5.9	12.1	9.9	–1.0	9.2
Malaysia	–0.8	8.8	7.2	9.9	14.8	6.1	15.5	12.2	9.5	9.2
Philippines	—	—	—	23.2	21.2	5.4	29.4	7.5	16.5	17.2
Singapore	8.9	9.4	15.6	13.6	6.9	9.3	16.4	9.0	6.8	10.7
Taiwan (China)	—	—	—	6.2	12.0	4.6	12.4	6.3	8.9	8.4
Thailand	13.9	14.6	19.3	16.9	13.4	13.1	16.6	13.2	11.5	14.7
United States	8.7	9.6	10.5	9.1	8.3	8.4	7.9	8.0	8.1	8.7

— Not available.

Source: Worldscope database.

A comparison by country of the average leverage ratios of East Asian corporations from 1988 to 1996 shows that firms in Korea were the most highly leveraged, followed, in order, by companies in Japan, Thailand, Indonesia, and Hong Kong. At the opposite extreme, firms in Taiwan were the least leveraged, followed by Malaysia, Singapore, and the Philippines. The pattern across other regions is also interesting. Western European countries typically displayed high ratios of debt to assets, reflecting the bank-based nature of their financial systems, with Swiss firms almost as highly leveraged as Japanese firms. In contrast, corporations in Latin American coun-

Table 3. Ratio of Debt to Equity, Selected Economies, 1988–96

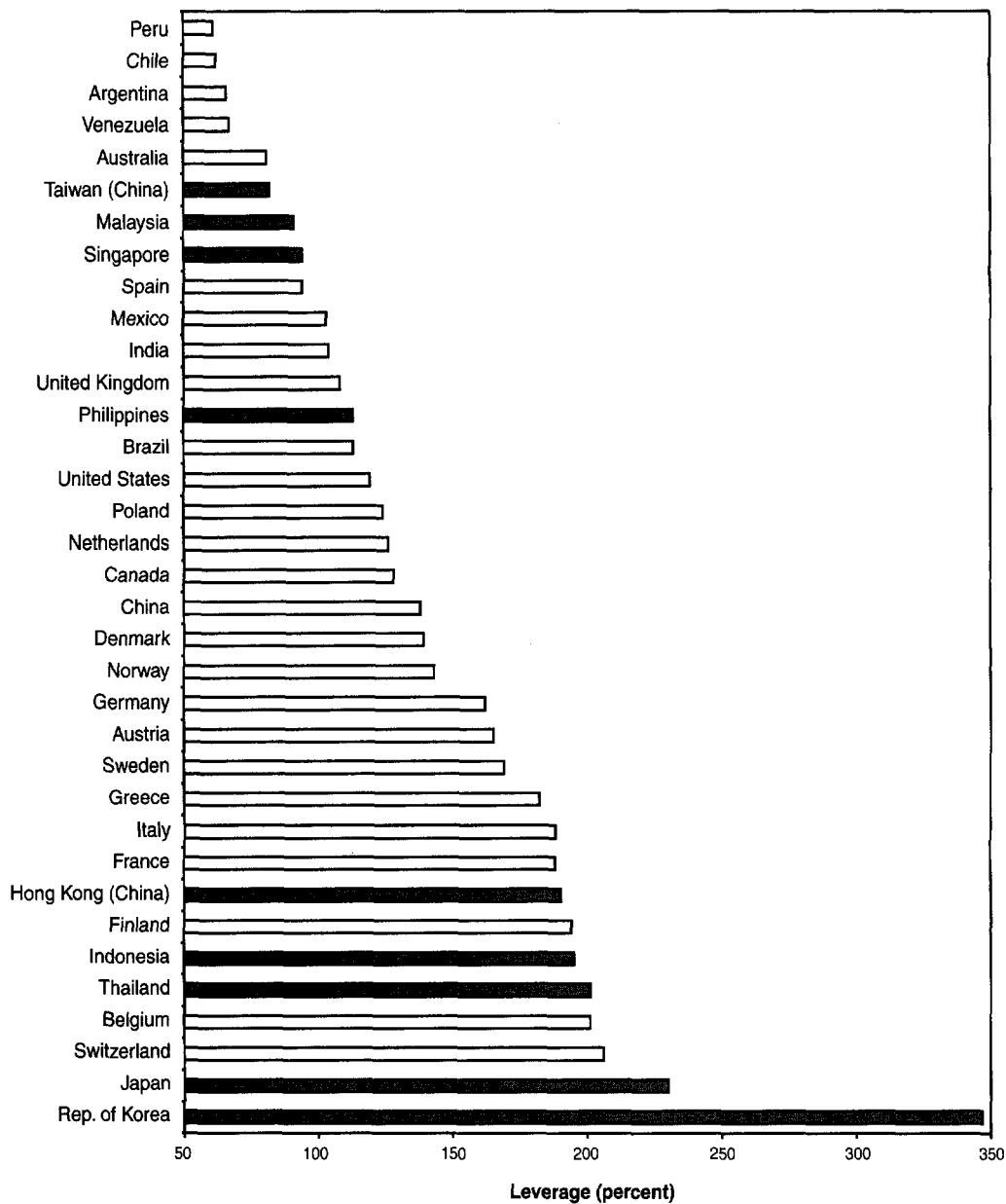
(percent, medians)

<i>Economy</i>	1988	1989	1990	1991	1992	1993	1994	1995	1996	1988–96
Hong Kong (China)	1.832	2.311	1.783	2.047	1.835	1.758	2.273	1.980	1.559	1.902
Indonesia	—	—	—	1.943	2.097	2.054	1.661	2.115	1.878	1.951
Japan	2.994	2.843	2.871	2.029	2.042	2.057	2.193	2.367	2.374	2.302
Korea, Rep. of	2.820	2.644	3.105	3.221	3.373	3.636	3.530	3.776	3.545	3.467
Malaysia	0.727	0.810	1.010	0.610	0.627	0.704	0.991	1.103	1.176	0.908
Philippines	—	—	—	0.830	1.186	1.175	1.148	1.150	1.285	1.129
Singapore	0.765	0.922	0.939	0.887	0.856	1.102	0.862	1.037	1.049	0.936
Taiwan (China)	—	—	—	0.679	0.883	0.866	0.894	0.796	0.802	0.820
Thailand	1.602	1.905	2.159	2.010	1.837	1.914	2.126	2.224	2.361	2.008
Germany	1.535	1.552	1.582	1.594	1.507	1.534	1.512	1.485	1.472	1.514
United States	0.798	0.848	0.904	0.972	1.059	1.051	1.066	1.099	1.125	1.034

— Not available.

Source: Worldscope database.

Figure 2. *International Comparison of Leverage, Selected Economies, 1988–96*



Source: Worldscope database; authors' calculations.

tries (Argentina, Chile, Colombia, Peru, and Venezuela) carried low debt ratios, reflecting the less-developed banking systems of these countries (figure 2).

Long-term debt as a share of total debt was low in East Asia during the entire period (1988–96), accounting for less than a third of all loans in Malaysia, Taiwan, and Thailand (table 4). Japan and the Philippines had the highest shares, at 48 and 52 percent, respectively, while the other economies in the region hovered around 43 percent. In contrast, long-term debt accounted for about three-quarters of total corporate debt in the United States and about 55 percent in Germany. Despite the close attention paid to the role of short-term debt in precipitating the financial crisis, the data do not suggest a massive buildup in such debt, at least up to the end of 1996. In fact, only Japan's share of long-term debt decreased during this period.

An international comparison of the maturity of debt structures shows that most companies in East Asian countries ranked below those in European and Latin American countries in their share of long-term debt.¹ Only in the Philippines was the average share of long-term debt more than 50 percent. In general, businesses in richer countries tend to have more long-term debt (Demirguc-Kunt and Maksimovic 1998). But many companies in higher-income East Asian countries rely less on long-term debt than would be expected on the basis of their per capita income level. Japan, for example, ranks below many other members of the Organisation for Economic Co-operation and Development (OECD). Whether this pattern of debt set the stage for the East Asian financial crisis is addressed in the next section.

The Role of the Corporate Sector in Financial Crises

Four hypotheses have been proposed to explain the role of corporate performance and financing patterns in triggering and aggravating the East Asian financial crisis. We look at each in turn.

Hypothesis 1

The first view asserts that the weak corporate performance after the crisis was due largely to the aggregate shocks experienced by the East Asian economies, including declines in domestic and external demand, a withdrawal of (short-term) capital flows, a devaluation of currencies, and an increase in domestic interest rates (Furman and Stiglitz 1998).

Empirical work on the importance of aggregate shocks has been limited, although Dollar and Hallward-Driemeier, in an accompanying article in this issue, suggest that it played an important, yet not an exclusive, role in the deterioration of the corporate sector. Respondents to a survey of about 4,000 small and medium-size firms in late 1998 and early 1999, for example, said that the four most important

Table 4. Long-Term Debt, Selected Economies, 1988–96
(percent, medians)

<i>Economy</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1988–96</i>
Hong Kong (China)	59.7	59.5	53.8	56.5	44.7	44.7	40.7	37.3	36.4	44.9
Indonesia	—	—	—	52.4	40.8	39.6	41.6	41.8	43.3	43.1
Japan	49.9	54.1	53.8	49.9	49.4	51.7	47.7	44.4	40.8	48.4
Korea, Rep. of	55.7	47.2	49.8	49.8	44.2	43.7	41.4	40.4	41.5	43.7
Malaysia	35.8	35.5	32.5	27.1	26.9	26.6	27.2	27.8	29.9	29.2
Philippines	—	—	—	57.2	53.1	50.3	50.2	49.8	51.4	52.2
Singapore	57.2	55.4	54.1	33.8	33.8	33.9	40.2	38.6	41.1	43.3
Taiwan (China)	—	—	—	53.9	44.4	32.8	34.6	34.3	38.9	35.9
Thailand	58.1	49.8	38.8	34.3	25.2	26.4	27.6	32.9	32.8	30.9
Germany	56.8	55.4	54.5	53.9	55.2	55.4	55.4	55.3	54.7	55.3
United States	77.7	77.2	76.3	76.7	75.8	76.2	75.2	74.6	74.1	75.9

— Not available.

Source: Worldscope database.

causes of the decline in performance were a fall in domestic demand, an increase in the cost of inputs (caused by the currency depreciation), and a rise in interest rates and labor costs (Colaço, Hallward-Driemeier, and Dwor-Frecaut 1999). The surveys do not provide a quantitative measure of the importance of these shocks, however, nor do they permit an assessment of the degree to which they were aggregate exogenous shocks or episodes that were exogenous to the firm or to the country. It is possible, for example, that the most vulnerable countries were those whose firms were most exposed to international trade or were already highly leveraged at the outset of the crisis. It is also possible that the corporations in these countries took on riskier projects to cover the higher costs of borrowing.

One way to disentangle the relative importance of various shocks would be to explore the possibility that although the effects of these shocks are likely to differ by industry, they need not differ across firms in the same industry. In countries open to international trade, firms in the same industry producing tradable goods, for example, are likely to have been similarly affected by a decline in aggregate external demand. Because each country has a different industrial structure, these differences could explain some of the variation in countries' performance. So far, this type of analysis has not been conducted.

Hypothesis 2

The second view argues that the poor corporate performance after the crisis reflected prior fundamental weaknesses (Corsetti, Pesenti, and Roubini 1998). As noted, however, there was very little indication of declining profitability before the crisis. Ac-

counting measures do not adjust for risk, however, and the relatively high rates of return posted by firms in the region may have been inadequate for the degree of risk undertaken by East Asian corporations. Harvey and Roper (1999) find supporting evidence for this view. Using rates of return on stocks, they find that although capital markets in the region mobilized substantial amounts of new funds and enhanced their liquidity, risk-adjusted returns on the shares of the companies concerned were well below those generated in other equity markets in the 1990s, especially in industrial countries.

This line of reasoning assumes that before the crisis, weak firms operating with a high degree of risk were not being disciplined sufficiently through competition and monitoring by shareholders or creditors (foreign as well as domestic). Poor performers were not forced to adjust and raise their rates of return sufficiently to compensate investors for the risks taken. Instead, distressed firms were allowed to operate while their losses continued to grow. Anecdotally, there are many examples of firms that continued to function even though they were technically insolvent. For example, Alphatec, a Thai semiconductor maker, was declared bankrupt in 1996 but did not close down until 1999. In general, very few enterprises declared bankruptcy, suggesting that firms continued to borrow and that banks continued to overlook the rise in bad loans. Of course, there were many successful corporations as well, as the generally high rates of corporate growth attest, so the presence of some weaker corporations does not fully explain the systemic nature of the financial crisis.

This argument may also presume that profitability was overstated, in part because of the need to attract external financing. The lack of transparency may thus have postponed the crisis. A cross-country comparison by La Porta, Lopez-de-Silanes, and Shleifer (1998) suggests that relatively weak accounting standards in East Asian countries may have allowed firms in crisis-affected countries to shelter their actual financial position and continue in business even after they were no longer financially viable. Furthermore, creditors' rights were weakly enforced because the judicial systems in these countries were often inefficient. And some evidence supports the view that weak corporations relied excessively on new financing. In a cross-sectional sample of publicly listed corporations in Thailand, for example, an increase in leverage in 1996 over 1995 was correlated with declines in profitability—evidence that struggling firms relied on increased external financing to overcome declining earnings (Alba, Claessens, and Djankov 1998).

Several studies have shown that ownership structure may encourage a lack of discipline and induce risky behavior. In many East Asian countries, shared ownership and other links between banks and corporations were extensive and could have skewed the market's allocation of resources toward influential borrowers, introducing excessive risk. Claessens, Djankov, and Lang (forthcoming b) show that about two-thirds of the publicly listed corporations in East Asian countries belong to larger groups, many of which include one or more financial institutions. Such links reduce the disciplining

role that would otherwise be played by external financiers, who have an incentive to monitor their investments carefully. In Korea, for example, many conglomerates (called *chaebols*) had ownership links with nonbank financial institutions; the larger conglomerates were often linked with a main bank. Kim (1999) shows that Korean firms with ownership links to financial institutions were more highly leveraged and had more short-term debt than other firms. Ownership links also played a role in Indonesia, where many banks belonged to business groups, and in Thailand, where a small number of families owned both banks and corporations (Laeven 1999).

Governments also influenced the financial sector by owning banks directly and by granting preferential access to resources; government influence in turn injected a political dimension into lending decisions. In Indonesia, for example, about 50 percent of the banks were state-owned; in Korea, the government had traditionally been influential in the banking sector (Cho and Kim 1995). This influence may be associated with increased risk-taking and poor allocation of assets, weakening the financial sector in the process. Claessens and Glaessner (1997) note that an inadequate regulatory and supervisory framework allowed well-connected borrowers to become even more highly leveraged. Moreover, the process of financial liberalization, including capital account liberalization, may have made credit more readily available to the largest—but not necessarily the most efficient—firms.

Weak corporate governance may also have affected firms' behavior. Although a lack of shareholder rights is often cited as one cause of the crisis, the region was not out of step with other emerging economies in this respect. But equity protection was less effective than that in OECD countries; although creditors had the same protections in both sets of countries, what was missing in the East Asian economies was the enforcement of these rights (La Porta and others 1999). Moreover, measures commonly used to assess transparency and evaluate the environment for private business transactions show a high incidence of corruption in East Asian countries (Kaufmann, Kraay, and Zoido-Lobaton 1999).

Lack of transparency and weak governance bear major responsibility for the East Asian crisis, according to Johnson and others (forthcoming). Their model identifies a channel through which weak corporate governance results in more stealing by managers, which in turn leads to a sharp currency depreciation and ultimately to a recession. They find empirical support for their model in a sample of 25 developing countries. Other economists, however, reject this notion. Stiglitz and Bhattacharya (2000), for example, argue that increased transparency in the form of disclosure requirements is unnecessary because markets can and do provide optimal incentives for disclosure. Under certain circumstances, they note, disclosure of the information could actually exacerbate fluctuations in financial markets and precipitate a financial crisis. Furman and Stiglitz (1998) point to the fact that even countries with solid legal and regulatory systems and no transparency problems, such as Sweden, have had financial crises.

Hypothesis 3

A third strand of the literature relates to imperfections in financial markets. Aggregate and financial shocks affecting financial institutions can affect the corporate sector by curtailing credit, including working capital and trade financing, to borrowers with valuable trading and investment opportunities (see Kashyap and Stein 1994 for a review). Shocks, whether real (changes in the terms of trade), financial (increases in world interest rates and declines in external financing), or regulatory (increased capital adequacy requirements or tighter loan classifications), can cause a real or perceived shortage of capital for banks. As a result, banks may become unwilling to lend even to viable corporations and instead may prefer to invest excess liquidity in safe assets, such as government bonds. Such a decision will curtail the amount of financing available for investment (or even for working capital), which can impair firms' performance.

A credit crunch can originate from weak financial institutions or from tightened regulation and supervision. The latter has been analyzed extensively in the context of the Basle Accord of 1989, which tightened capital adequacy rules for some classes of internationally active banks. A review of the data (BIS 1999) suggests that the effects of these tighter rules on aggregate credit provision have been minimal, although there is some evidence that borrowers from weaker banks have been affected. Most of this work applies to industrial countries, however, where shocks have been small and where many alternative financing instruments have been available. Given East Asia's unbalanced financial systems, which are dominated by banks (Greenspan 1999), and the fragile state of some banking institutions even before the crisis, it is likely that, at least initially, East Asian corporations suffered a credit crunch induced by weaknesses in the banking sector and a tighter regulatory framework (Domaç and Ferri 1999).

Increased uncertainty about whether and at what price loans will be available can also result in a shortage of loanable funds (Stiglitz and Weiss 1981). These effects can be particularly severe for bank lending because banks are more likely than other financial intermediaries or markets to lend to firms that suffer from a greater degree of informational asymmetries. Thus small and medium-size firms are likely to be harder hit by shocks to the banking system or by a tightening of regulations and supervision. Furthermore, a so-called balance-sheet effect can further amplify the effect of shocks on corporations (see Bernanke and Gertler 1995 for a review). In the presence of informational asymmetries and principal-agent relationships (in which managers run firms for the benefit of owners and creditors), a borrower's net worth becomes an important determinant of the amount of credit available, even though it is the economic prospects of the project being financed that should determine the availability of financing. When the net worth of a firm deteriorates, its supply of credit may be curtailed quite sharply, even when it has viable new investments. Again,

the generally high leverage of East Asian corporations could have exacerbated the impact of a credit crunch. Because interest payments account for a large share of the cash flow of such firms, small shocks would have had a large effect on borrowers' net worth.

Several papers have tried to model these relationships in a domestic context (Agénor and Aizenman 1999; Chan-Lau and Chen 1998; Kim and Stone 1999) and in an international context (Greenwald 1999). Generally, weaknesses in the financial sector along with tighter regulation and supervision appear to have contributed to corporate distress. There has been a presumption, with some supporting empirical evidence, that the tighter rules for financial institutions affected the supply of loanable funds in several countries (Ding, Domaç, and Ferri 1998; Ghosh and Ghosh 1999). This credit contraction, in turn, was likely to have led to a decline in output. In some countries and over time, the importance of credit contraction may have been diminished by the reduced demand for funds as the financial situation deteriorated and the prospects for returns on new investment worsened. Indeed, Ghosh and Ghosh (1999) find that in Korea and Thailand (but not in Indonesia), the binding constraint was the slowing demand for funds rather than an inadequate supply of credit. Although survey results confirm the importance of access to credit (see Dollar and Hallward-Driemeier in this issue), it is not clear to what extent the lack of access to credit reflected the poor prospects of the firms and the state of the financial sector.²

Although all corporations were affected to some degree, those with riskier financing patterns were more likely to be denied credit. Dollar and Hallward-Driemeier provide some support for this argument, showing that smaller firms that did not rely as much on foreign exchange financing faced a less severe credit crunch. But the degree of informational asymmetries, as reflected in the type of financing firms obtained, probably mattered for continued access to external financing. Domaç and Ferri (1999) find that in Korea, small businesses were particularly vulnerable to shocks that affected smaller regional banks, which normally provided them with most of their funding.

Changes in net worth were also likely to have been important in reducing the supply of financing. East Asian corporations had relatively high levels of debt before the crisis and were thus at risk of easily depleting their net worth. Even relatively small shocks could have lowered net worth significantly and thereby led to a sharp cut in external financing. Harvey and Roper (1999), who analyze the effects of risky financial structures on subsequent East Asian corporate performance, argue that corporate managers bet their companies by trying to offset declining profitability with ever-increasing amounts of borrowing in foreign currencies. Those bets turned sour when local currencies plunged and companies could not generate enough funds to pay their debts. Claessens, Djankov, and Ferri (1999) estimate that about 30 percent of corporations in crisis-affected East Asian countries were insolvent in the fall of 1998. More than twice as many corporations in these countries suffered illiquidity.

With banks mired in bad debts and external financing scarce, firms had to cut back on production and sales, including exports.

Even operationally viable firms were overburdened with debt, and banks were unwilling to provide capital to these firms until their debts had been resolved. This process can take a considerable amount of time where there are multiple creditors and weak frameworks for restructuring failed entities. Meanwhile, corporate value may be lost. The rapid rise in the share of nonperforming loans in bank portfolios also suggests the importance of financial shocks in precipitating the crisis, although the numbers do not allow one to differentiate the causes of the nonperforming loans (aggregate versus idiosyncratic shocks). More generally, a systemic financial crisis can exacerbate the effects of market imperfections (Greenwald 1999; Stiglitz 1999). As a result, firms that are operationally viable but financially distressed may suffer from a lack of working capital and other financing and be unable to maintain ongoing operations.

These explanations do not contradict the fact that many firms confronted problems arising from high leverage and low (risk-adjusted) rates of return and were thus very much at risk. One explanation of the preference for high levels of debt—apart from the need for external financing to maintain high growth rates—may be that it enabled large shareholders to retain control over firms' operations and thus to continue to benefit from a disproportional share of firms' cash flows. Had firms instead relied on equity financing, the bondholders would have controlled the decision to expand into new businesses, based on clear, objective criteria. Claessens, Djankov, and Lang (2000; forthcoming b) find that many firms in East Asia were controlled by a few large shareholders. Two-thirds of those controlling owners also held senior management positions and thus had ample opportunity to divert profits and indulge in high levels of risk. In cases where only a few owners held all or substantially all control, greed was a strong incentive. Empirical evidence reveals that minority rights were often violated in firms controlled by inside shareholders. Valuations of such companies were far below those of comparable firms, suggesting large-scale expropriation (Claessens and others 1999b).

Ownership structures may also have mitigated or exacerbated the impact of the shocks. Claessens and others (1999a) show that ownership structures can explain excessive diversification, which lowered firms' market valuation before the crisis. Group affiliation may also have been a factor because it could have allowed for more diversification of risk. Indeed, Claessens and others (1999a) find that the market valuation of companies associated with groups was 3 percent higher after the crisis than that of nonaffiliated firms, suggesting that there were some benefits from diversification within the group. It appears that group affiliation gives rise to tradeoffs: lower performance in normal times, but some risk diversification in turbulent periods. At the same time, group affiliation was found to be associated with expropriation.

Hypothesis 4

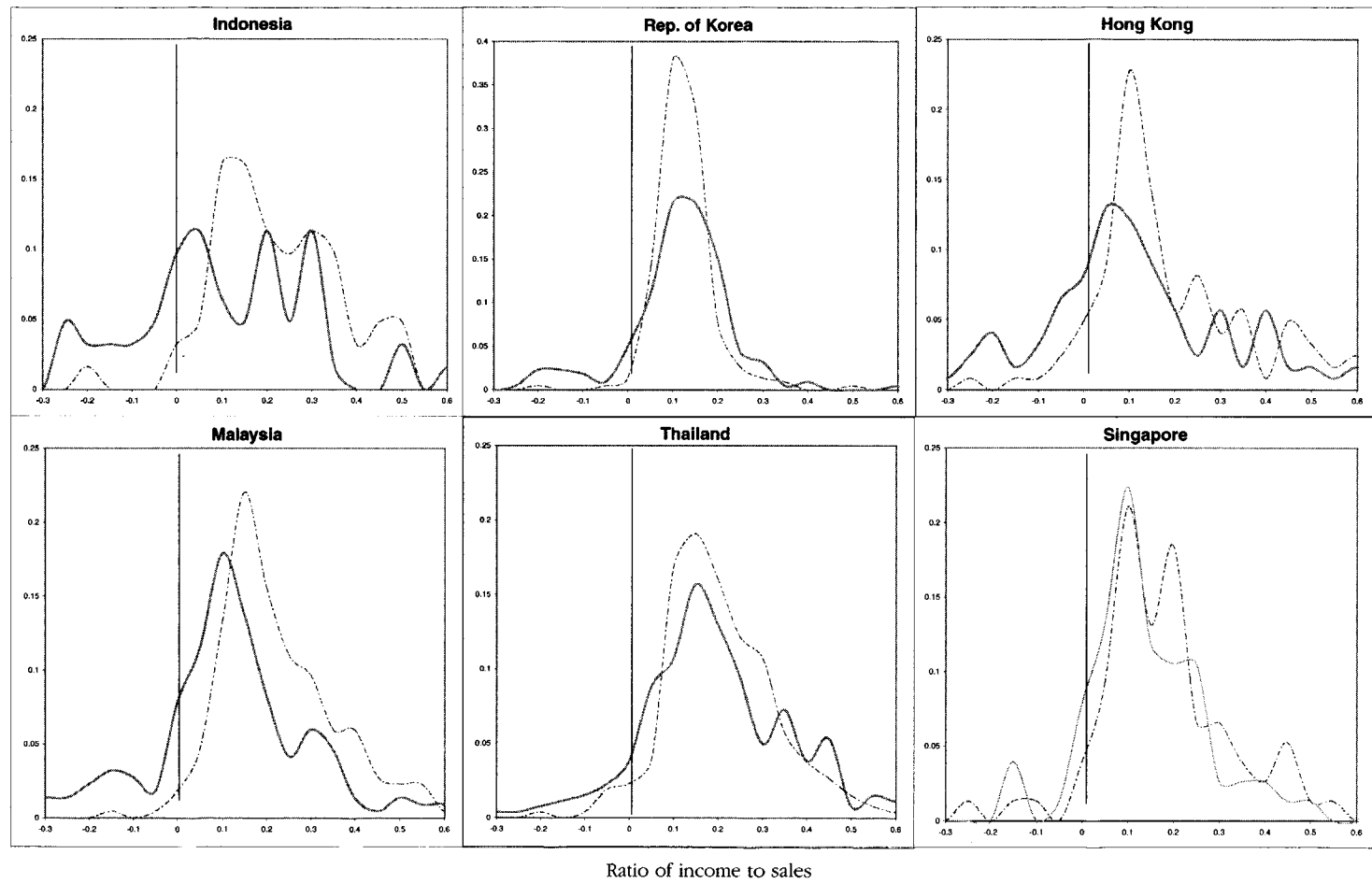
The final hypothesis states that the real effects of financial and other shocks depend in part on the efficiency of debt resolution mechanisms. Hart (1999) highlights the importance of the institutional framework in preventing and resolving systemic financial distress and discusses the possible need for extraordinary mechanisms during periods of systemic crisis. Stiglitz (1999) specifically argues that the optimal mechanism in such circumstances may be a bankruptcy or reorganization system that temporarily favors debtors and allows them to reorganize their operations. This literature also includes studies on the importance of creditors' rights to enforce claims and recover collateral as a means of facilitating financing in times of distress. More general work has focused on the importance of creditors' rights in determining whether firms have access to external financing (see La Porta and others 1999 for a review).

Frameworks for resolving financial distress differed considerably across countries, and these differences could have influenced the ability of firms to maintain operations and profitability. Differences in the institutional framework also appear to have influenced the actual use of bankruptcy procedures. Except for Korea and Malaysia, large corporations in the East Asian economies have made little use of formal bankruptcy procedures; more use has been made by all firms of the out-of-court systems that countries adopted after the crisis began. Indeed, Claessens, Djankov, and Klapper (1999) find that the strength of creditors' rights and the enforcement of these rights influenced firms' decisions to file for bankruptcy as a means of resolving financial distress.

The Performance of Publicly Traded Corporations

To provide some quantitative insight into the impact of the various factors in the financial crisis, we analyzed the performance of a subset of corporations before and after the crises in Indonesia, Korea, Malaysia, and Thailand and in two comparator countries, Hong Kong and Singapore. The data are from the *Worldscope* database, but in this analysis, the data set is balanced (that is, the same number of observations is used in 1996, 1997, and 1998). Because we include data for 1998 and need a balanced data set, we have to rely on a smaller set of firms for each country. As a measure of performance, we use firms' profit margin on sales, calculated as the earnings before interest and taxes plus depreciation and amortization, divided by total sales. The advantage of this calculation is that, as a cash-flow measure, it excludes interest payments, financial incomes, and other income and expenses and is therefore not influenced by the liability structure of the corpora-

Figure 3. *Ratio of Operating Income to Sales, Selected Economies, 1996 and 1998*



--- 1996

— 1998

Source: Worldscope database; authors' calculations.

tion. This makes it possible to study the effects of real and financial shocks on operational performance.

The data set consists of 857 firms, of which 104 are in Hong Kong, 50 in Indonesia, 219 in Korea, 191 in Malaysia, 71 in Singapore, and 222 in Thailand. The data cover firms of different sizes; the median size is 1,099 employees, with the largest company employing almost 40,000 people and the smallest only 38. Sales volumes range from slightly less than \$1 million in 1996 U.S. dollars to about \$6.6 billion; the mean sales volume is \$68 million. Overall, the data set covers primarily large firms, mainly because they have to be listed on a stock exchange to be included in the database and publicly traded companies tend to be large.

The postcrisis deterioration in performance across countries and firms can be illustrated by plotting the margins by country for all firms both before and after the crisis (figure 3). Note that the distributions shift to the left as margins deteriorate for all countries and that the number of firms with negative margins increases sharply in all countries. For the median firm, the margin on sales falls by 6.7 percentage points. The most seriously affected firms were in Indonesia, where median margins fell by 11.4 percentage points. The variability of margins across firms in each country also increased significantly, as shown by the distributions in 1998, which are wider (more fat-tailed) than the bell-shaped curves of 1996. The larger variability highlights the importance of analyzing the contribution of various groups of factors to individual firm performance.

To illustrate the importance of the various factors in explaining changes in performance, we run regressions using the firms' margin in 1998 as the dependent variable. The control variables are divided into four groups, corresponding to the roles of aggregate shocks, the nonfinancial characteristics of firms, the financial characteristics of firms, and country characteristics. The first group consists of industry and country dummy variables and aims to capture the country- and industry-specific shocks to which a firm may be exposed.³ The dummies also capture some of the differences in market structures across industries, differences in foreign exchange depreciations, and other changes in the degree of relative competitiveness.⁴ The second group includes the firms' nonfinancial characteristics before the crisis, including sales margin, real sales growth, and logarithm of sales (in U.S. dollars as a measure of size), all measured in 1996. The third group captures the firms' financial structure and ownership variables before the crisis, including the leverage ratio (defined as total debt divided by the market value of equity), the share of short-term debt in total debt, and ownership concentration (as measured by the percentage of control rights held by the two largest shareholders). The fourth group depicts the institutional environment of the country in which the firm operates. It includes indexes of the protection of shareholders' rights and creditors' rights and of the country's judicial efficiency in enforcing these rights.

We include these independent variables in a cross-sectional, pooled regression to try to explain the 1998 margins on sales. Specifically we estimate the following regression:

$$\begin{aligned} \text{margin}_{i,98} = & \alpha_0 + \sum_c \alpha_c D_c + \sum_j \alpha_j D_j \\ & + \beta_1 \text{size} + \beta_2 \text{margin}_{i,96} + \beta_3 \text{sales growth}_{i,96} \\ & + \gamma_1 \text{ownership concentration} + \gamma_2 \text{leverage}_{i,96} + \gamma_3 \text{short-term debt ratio}_{i,96} \\ & + \delta_1 \text{judicial efficiency index}_c \times \text{equity rights index}_c \\ & + \delta_2 \text{judicial efficiency index}_c \times \text{creditors' rights index} + \epsilon_{it} \end{aligned}$$

where i indicates firm I , j refers to the industry, and c is a country index. Greek letters indicate coefficients to be estimated. To facilitate interpretation, we also standardize the firm- and country-specific variables to obtain a normal distribution with a mean of 0 and a variance of 1.5.⁵ The results for different specifications are contained in table 5.

The first specification (column 1) controls for country and industry characteristics. Differences in 1998 margins across countries and industries are reflected in the coefficients. For countries, and controlling for other factors, the regression shows that firms in Thailand had significantly higher margins, 1.5 percentage points higher, than did firms in Hong Kong, the base economy. Among industry classifications, the commerce and construction industries had statistically significant lower margins compared with manufacturing, the base category, while the service industry had statistically significant higher margins. These cross-industry differentials in margins suggest that some of the causes of firms' financial distress were sector-specific shocks.

The next specification (column 2) includes firm characteristics before the crisis to help explain postcrisis margins. We examine both nonfinancial and financial characteristics of firms. Not surprisingly, firms with higher margins and sales growth before the crisis also had higher margins afterward; that is, firms that were performing relatively better before the crisis were also less affected by the crisis. Put differently, underlying prior weaknesses may have been a factor in firms' weak performance in 1998. This finding extends even to larger firms, which might have been expected to fare better than smaller ones because of greater diversity of products or preferential access to financing. However, postcrisis performance is not consistently affected by firm size (measured by the logarithm of total sales in dollars in 1996), suggesting that larger firms were not necessarily better able than smaller ones to weather the crisis.

In this specification, ownership concentration, as measured by the share held by the top two owners, has no significant relationship to postcrisis performance. Although insider control and connected lending have often been blamed for the problems of East Asian corporations, firms with concentrated ownership structures appeared to be no less able than other firms to manage the crisis. Other financial

characteristics did play a role, however. In particular, firms with higher leverage and a higher proportion of short-term debt tended to perform more poorly (and the coefficients are statistically significant in the median regression) than did firms without those characteristics. This finding is consistent with the view that the financial structures of East Asian firms before the crisis contributed to their poor performance afterward, suggesting that financial market imperfections and the credit crunch were important factors leading to lower operational performance.

The last specification (column 3) relates the postcrisis performance of a company to its country's institutional environment. These regressions drop the country dummies to focus on institutional differences only. Most of the coefficients found to be statistically significant in earlier regression results retain their significance here. We

Table 5. Empirical Results

(dependent variable: 1998 profit margin divided by sales)

	(1)	(2)	(3)
Constant	0.048 (0.016)**	0.089 (0.010)**	0.134 (0.006)**
<i>Country</i>			
Singapore	0.039 (0.024)	0.040 (0.015)**	
Malaysia	0.026 (0.019)	0.007 (0.013)	
Korea, Rep. of	0.049 (0.018)**	0.059 (0.014)**	
Indonesia	-0.007 (0.026)	-0.033 (0.018)	
Thailand	0.118 (0.018)**	0.085 (0.015)**	
<i>Sector</i>			
Diversified	0.014 (0.024)	-0.009 (0.016)	-0.018 (0.019)
Commerce	-0.057 (0.017)**	-0.059 (0.011)**	-0.071 (0.013)**
Utilities	0.027 (0.021)	-0.040 (0.014)**	-0.030 (0.017)
Services	0.127 (0.022)**	0.002 (0.015)	0.011 (0.017)
Agricultural goods	-0.043 (0.025)	-0.004 (0.017)	0.003 (0.020)
Mining	0.023 (0.054)	0.028 (0.035)	0.030 (0.042)
Construction	-0.048 (0.022)*	-0.052 (0.014)**	-0.043 (0.017)*

(Table continues on the following page.)

Table 5 (continued)

	(1)	(2)	(3)
<i>Organizational factors</i>			
A. Log (sales 96)		0.003 (0.004)	0.002 (0.005)
Margin 96		0.099 (0.004)**	0.098 (0.004)**
Sales growth 96		0.009 (0.002)**	0.008 (0.002)**
<i>Financial structure</i>			
B. Ownership concentration (top two owners)		0.005 (0.006)	0.002 (0.005)
Leverage 96		-0.015 (0.003)**	-0.014 (0.003)**
Short-term debt 96		-0.011 (0.004)**	-0.013 (0.004)**
<i>Institutional environment</i>			
C. Equity rights × judicial efficiency			0.004 (0.014)
Creditors' rights × judicial efficiency			-0.029 (0.014)*
Observations	857	857	857
R-squared	0.04	0.13	0.12

* Significant at 5 percent.

** Significant at 1 percent.

Note: The *R* squares reported for the median regressions are pseudo *R* squares.

All firm- and country-specific variables (except the industry dummies) are standardized to variables with means of 0 and variance of 1.

A constant (not reported) is included in all regressions.

Definitions of variables: labor is the total number of employees; sales is sales revenues in US\$1,000; ownership concentration is the sum of ownership stakes of the largest two shareholders; margin 96 is EBITDA (earnings before interest and taxes, depreciation added) sales in 1996; sales growth 96 is the real sales growth rate in 1996; leverage 96 is the sum of short-term and long-term debt over the market value of equity in 1996; diversified is a dummy variable indicating whether the firm operates in more than one 2-digit SIC industry; creditors' rights is an index measuring the protection of creditors, which ranges from 0 to 4 and is taken from La Porta and others (1999); shareholders should have "equity" rights; judicial efficiency is an index of the quality of judicial enforcement, which ranges from 0 to 10 and is taken from La Porta and others (1999).

Source: Worldscope database.

interact the judicial efficiency index with indexes of equity rights and creditor rights to account for the combined effect of the strength of the laws and the quality of their enforcement. The results suggest that firms in countries with better protection of equity rights had better postcrisis performance. An increase in the equity rights index is associated with higher margins, although the coefficient is not statistically significant at conventional levels. This suggests that in countries with better equity rights, firms might have been better disciplined by owners and thus might have had structures and operations better able to withstand the shock of the crisis. A higher level of the effective creditors' rights index in the country is associated with poorer firm performance. The negative and significant coefficient for the interaction term between creditors' rights and the judicial efficiency index suggests that a stronger protection of creditor rights coupled with an efficient judicial system contributed to lower postcrisis margins. This finding may be consistent with the notion that when firms' financial distress is caused by exogenous external shocks, an overly vigorous protection of creditor rights might result in too many bankruptcies and losses in output.

We analyzed the contribution of each set of variables in explaining the percentage of variations in firm performance after the crisis. Firm-specific nonfinancial characteristics are the most important in explaining the variations in margins in 1998, accounting for roughly 5.7 to 6.3 percent of total variation, or about one-half to two-thirds of all variation that was explained. A firm's financial structure and industry affiliation were roughly equally important, each accounting for between 1.1 and 2.3 percentage points of total variation. The least important factor was the country's institutional environment, which contributed between 0.5 and 1.6 percentage points of total variations in margins in 1998.

In sum, the regressions were unable to explain nearly nine-tenths of the total variations, suggesting that the effects of idiosyncratic shocks, rather than aggregate shocks, were very large. Of the variance that could be explained, the results suggest that firm-specific characteristics, both financial and nonfinancial, were the most important in explaining postcrisis performance.

Although the financial fragility of the corporate sector may not have triggered the crisis, it did contribute to its depth and severity. This suggests that countries and the international financial community need to pay more attention to the status of the corporate sector and its links with the financial sector and the rest of the economy. One option would be to use balance sheet and other financial information to monitor financial risks in the corporate sector, but such surveillance will be limited by the paucity of data, the potentially rapid changes in corporate financial structures, and the analytical difficulties in identifying risk factors and linkages. The East Asian financial crisis showed that risks arising from the corporate sector typically occurred because of institutional weaknesses, including weak property rights, poor bankruptcy and accounting procedures, lack of transparency, and weak or perverse incentives.

Corporate sector vulnerabilities thus might be more successfully limited by assessing and remedying these deficiencies and the resulting weak risk management practices.

Notes

At the World Bank, Stijn Claessens is lead economist in the Financial Sector Policy Group, Simeon Djankov is a financial economist in the Financial Sector Policy Group, and Lixin Colin Xu is an economist in the Development Research Group. The authors would like to thank Ying Lin for able research assistance and the reviewers for helpful comments.

1. We present the share of long-term, rather than short-term, debt because the latter can underestimate the amount of liabilities with a short maturity; short-term debt excludes, for example, trade credits.

2. Krugman (1999) argues that the corporate balance sheets may have been at fault, apart from macroeconomic or other weaknesses. In particular, a depreciation of the domestic currency causes an increase in the currency value of foreign-denominated firm debt, at the same time that firms face declining sales and higher interest rates. The resulting balance-sheet problems and reversal of capital flows weaken the corporate sector and, in turn, the financial system. This triggers a further currency depreciation with a current account surplus to accommodate the capital reversal deficit and financial system weakness. Krugman ascertains that the risks of such an event occurring are higher when corporate profitability is low relative to the cost of funds to financial institutions.

3. We classify firms into the following industry groups: commerce, utilities (including communications, electric, gas, transport, and water and sanitation services), services, mining, construction, agriculture and manufacturing. When a firm is in more than one industry, we classify it as diversified.

4. They do not, however, correct for differences in market structures and (potential) competition across countries. To the extent that firms produce traded goods, these country differences should not be important; but they will be important for other goods. Also, the regressions do not try to control for the effects of exchange rate changes, which differed by country, on firm's performance measures.

5. Because the margin and some right-hand-side variables have outliers, we conduct median regressions, which provide more robust estimates than ordinary least squares.

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Industrial Policy: Growth Elixir or Poison?

Howard Pack

The debate about industrial policy occasioned by the East Asian financial crisis is the latest chapter in an ongoing discussion about the effectiveness of selective government intervention in fostering rapid industrial growth. The crisis that began in the Republic of Korea in 1997 and the weak growth in Japan over much of the 1990s have prompted a reexamination of the effectiveness of the government actions in the two countries that pursued sectoral selectivity most intensively. If indeed industrial policies were important in accelerating growth, there may be lessons for other countries still in the early stages of industrialization. Conversely, if the magnitude of the contribution was small, more conventional policies should be pursued unless it is assumed that governments can improve on the efforts of Japan and Korea.

The East Asian financial crisis that erupted in July 1997 renewed interest in the East Asian miracle, a term that had only recently entered the development vocabulary. Many causes were identified quickly, ranging from the excessively rapid opening of capital markets to the decline in the extent of prudential regulation of the banking system that had characterized the countries through the early 1990s. Some analysts argued that the financial vulnerabilities revealed during the crisis stemmed in part from earlier efforts to implement an industrial policy that required commercial banks to lend to sectors and firms selected by the government. Banks, in this view, had inherited weak balance sheets as a consequence of the low profitability of these preferred sectors (see Claessens, Djankov, and Lang 1998). Moreover, the banks had lost (or failed to acquire) the ability to select, evaluate, and monitor individual loans (Fry 1995). The huge capital inflows that began in the mid-1990s into countries such as the Republic of Korea thus were channeled through institutions that had suffered a serious erosion of skills and discipline. Industrial policy, in this view, had been a slow-acting poison for the countries pursuing it, one that necessitated emergency measures in 1997 and 1998. Others argued that, on the contrary, industrial policy had been a growth elixir that led to more rapid growth than would have been

obtained from simply following good macroeconomic policies combined with supportive efforts such as encouraging the rapid growth of education (Amsden 1989; Lall 1997).

The debate about industrial policy occasioned by the financial crisis was only the latest installment in an ongoing debate about the efficacy of government intervention in fostering more rapid economic growth. Some of the earliest literature in development economics, based on a preliminary understanding of Soviet growth, argued that sectors such as heavy metals and machinery were particularly important and that these sectors generated externalities whose benefits were so desirable that they warranted government support. Other analysts argued that there were important market failures such as real external economies stemming from research and development and important imperfections in the market for information (Chenery 1959; Scitovsky 1954). Partly in response to such views and partly because of the perception that agriculture was inferior to industry, many governments initiated import substitution policies in the 1950s.

By the 1970s import-substituting industrialization was widely viewed as a failure. Several rounds of empirical research showed that it led to static misallocation of labor and capital across industries and did not improve long-run growth in total factor productivity (Balassa and associates 1982; Bhagwati 1978; Krueger 1978; Little, Scitovsky, and Scott 1970). These interpretations were based on careful empirical research in a large number of countries, from Argentina to India. The rapid growth for three decades or more of a number of East Asian economies, including Japan, Korea, Singapore, and Taiwan (China), all of which pursued government-led industrial policies, gave rise to an optimism that such policies, if executed correctly, could have beneficial effects (Pack and Westphal 1986; Rodrik 1995; Stiglitz 1996). But the crisis that began in Korea in October 1997 and the weak growth in Japan over much of the 1990s have prompted a reexamination of the impact of industrial policy in those two countries. If indeed industrial policies were important in this process, there may be lessons for other countries still at early stages of industrialization. Conversely, if the magnitude of the contribution was small, more conventional policies should be pursued unless other countries assume that their governments can outperform those of Japan and Korea.

Industrial policies comprise a variety of actions designed to target specific sectors to increase their productivity and their relative importance within the manufacturing sector. Proponents of an active industrial policy place considerable emphasis on the potential of such activity for encouraging a shift to newer and more modern sectors—sectors that are characterized by industrywide external economies and by learning-by-doing on the part of individual firms. Industrial policy is viewed as likely to lead to growth in total factor productivity (TFP) in the targeted sectors. Such arguments were used to rationalize import-substituting industrialization policies, but the evidence suggests that policymakers' hopes for success were not realized. The

question is whether the undoubtedly better policies pursued by Japan and Korea constitute a basis for optimism about the potential gains from a well-designed set of industrial policies.

In both countries, government actions that contributed to rapid economic growth extended well beyond industrial intervention: promoting education, building a large and efficient social infrastructure, encouraging international technology transfers, and fostering research and development. Macroeconomic policies that promoted growth included the encouragement of private saving, the maintenance of stable real exchange rates, the prevention of speculation in financial markets for a considerable part of the period (Stiglitz 1994), and a fiscal-monetary stance that limited inflation.

Interpretations of the Sources of Success

A market-oriented interpretation of the success of Japan and Korea had gained ascendance by about 1980 and contrasted the experience of the two East Asian countries favorably with that of Latin America and Southeast Asia (Little 1982). The core of this view was that after brief interludes of intensive import-substituting industrialization, Japan and Korea switched to increasingly liberal trade policies. Macroeconomic policy controlled inflation relative to the experience of many developing countries, and the real effective exchange rate rarely appreciated. When it did, such episodes were quickly corrected. Manufacturers were thus able to concentrate on improving productivity rather than coping with rapidly changing relative prices of inputs and outputs. In contrast, Latin American countries experienced considerable macroeconomic dislocations, from high rates of inflation to periodic balance of payments crises. These countries protected their industries for several decades and did not attempt to offset the adverse effects of such policies on exporters. Moreover, for much of the period, exchange rates were volatile and overvalued. Thus attempts to foster specific industries occurred in a context that did not favor the learning necessary for manufacturers to become internationally competitive.

After a consensus had formed on the role of markets in fostering growth in Japan and Korea, additional research uncovered significant amounts of discriminatory policies in the two countries in both product and factor markets, although less than in other countries (for Korea, see Amsden 1989; Jones and Sakong 1980; Pack and Westphal 1986; for Japan, see Johnson 1982; Yamamura 1986; Yamamura and Yasuba 1985). For example, the extent of selective trade protection in individual sectors is now documented to have been quite substantial in Korea and Japan, although less than in other developing countries (for a survey on protection in various developing countries, see Erzan and others 1989). This has led to support for the view that selective government intervention, if well executed, could be a major contributor to growth. This article tests that hypothesis.

Japan targeted a number of industries in the 15 years after the end of World War II, in an effort to restore them to their previous levels of capacity and efficiency, and relied on tariff protection and subsidized interest rates to encourage the introduction of more advanced technology. At the same time, rationalization cartels facilitated the exit of higher-cost firms (Mutoh 1988; Tanaka 1988; Yamawaki 1988; Yamazawa 1988; Yonezawa 1988). These efforts to rebuild industries that were previously highly productive differed from the attempts that were launched in the 1960s to encourage new product areas. These later policies, which attempted to “pick winners,” were pursued with a variety of policy instruments (Johnson 1982; Yamamura 1986). Evidence of varying levels of protection for Japan is shown in table 1.

In the 1960s Korea encouraged the development of industries such as textiles by protecting the domestic market and by offering export subsidies and access to low-cost credit to firms that reached export targets. These efforts were limited in extent and may have had some effect on growth (Westphal 1978). An entirely different order of magnitude characterized Korea’s interventions in the 1970s, which encouraged the growth of basic metals, machinery, and chemical sectors (typically described as the heavy and chemical industry—HCI—drive). Table 2 shows that in 1978, at the height of the promotion effort, tariffs and quotas provided very high levels of protection to domestic manufacturers of consumer durables, electrical and nonelectrical

Table 1. *Effective Protection in Japan, 1963, 1968, and 1972*

<i>Sector</i>	<i>1963</i>	<i>1968</i>	<i>1972</i>
All manufacturing	32.3	24.2	14.4
Textiles	54.3	28.2	18.6
Clothing	72.8	32.8	22.4
Wood products	14.0	25.6	16.1
Pulp, paper	9.7	18.0	11.0
Publishing	-16.7	1.0	-0.9
Leather and rubber products	30.9	21.8	12.3
Chemicals	33.4	17.7	8.8
Petroleum and coal products	19.5	14.5	7.1
Nonmetallic minerals	22.2	15.7	8.1
Iron and steel	30.1	30.0	17.1
Nonferrous metals	30.4	34.1	22.1
Metal products	13.8	19.9	9.9
Machinery	36.7	20.0	7.7
General	23.0	14.5	8.7
Electrical	30.9	16.5	5.4
Transport equipment	61.5	31.0	9.2
Precision instruments	34.9	22.9	10.4

Note: These are minimum estimates insofar as the calculations of effective rates of protection are based on tariff data, not on implicit price estimates of nominal levels of protection.

Source: Shouda (1982) as cited in Itoh and Kiyono (1988).

Table 2. Effective Rates of Protection and Subsidy, Korea, 1978

<i>Sector</i>	<i>Subsidy rate for exports</i>	<i>Effective rate of protection for domestic sales</i>	<i>Average incentive effect for domestic and foreign sales</i>
Processed food	31.7	-29.4	-23.0
Beverages, tobacco	13.2	28.0	27.8
Construction materials	19.1	-15.0	-10.5
Intermediate products 1	23.6	-37.9	-31.4
Intermediate products 2	26.3	7.9	12.0
Nondurable consumer goods	17.3	31.5	24.0
Consumer durables	38.0	131.2	83.2
Machinery	24.4	47.4	43.2
Transport equipment	26.1	135.4	87.2
All manufacturing	22.8	5.3	9.7

Note: The two categories of intermediate products represent different levels of manufacturing complexity. For precise industry definitions, see Nam (1990).

Source: Nam (1990).

machinery, and transport equipment. Simultaneously, substantial loans were directed to the targeted sectors, with interest rate subsidies for the HCI sectors ranging from 2 to 6 percent (Sakong 1993: table A.19).

Were these attempts at promoting specific sectors essential to the success of the two East Asian countries, or were they a marginal gloss on the governments' nonselective macroeconomic policies? (See Stiglitz 1996 for an account of the nontraditional policy interventions and how they may have stimulated growth in Japan and Korea.) If the rapid growth of these countries was attributable to selective policies, other poor countries might learn from them. Skeptics argue, however, that Japan and Korea would have grown even faster had it not been for selective intervention. In this view, given macroeconomic stability, a realistic and stable real exchange rate, the availability of traded inputs at international prices, relatively competitive labor markets, very high saving and investment rates, high and growing levels of education, and considerable numbers of capable entrepreneurs, the contribution of intervention was negligible or harmful (Saxonhouse 1983; Trezise 1983; Wolf 1988).

Testing the Effects of Intervention

Economic analysts employ a variety of strategies to assess the quantitative impact of import substitution policies on individual economies. To establish the magnitude of static losses in output, researchers estimate effective rates of protection and derive a cost for misallocation of resources of 3–6 percent of gross domestic product (Pack 1988). Another approach calculates the growth rate of TFP during alternating periods of import restrictions and free trade (Krueger and Tuncer 1982). Using an elabora-

tion of the second approach, I calculate the combined impact of industrial policies on the sectoral structure of manufacturing and the TFP growth rate of individual sectors. If the calculated effect is large and positive, there may be a basis for least-developed countries, such as those in Africa, embarking on more-intensive industrialization, to weigh the benefits and costs of some elements of industrial policy. If, however, even Japan and Korea, where general policies were well designed and bureaucracies were very capable, were unable to extract major benefits from selective intervention to foster individual sectors, this would seem an unpromising path to industrialization.

To calculate the effects of industrial policy on the growth rate of total factor productivity for the entire manufacturing sector, I first calculate TFP growth in each sector weighted by the sector's share of value added:

$$(1) \quad \text{TFP}^* = \sum_i (VA_i / VA) \text{TFP}_i^*$$

where i indicates individual branches such as food processing, textiles, and machinery within the manufacturing sector, VA_i is value added originating in sector i , VA is manufacturing-wide value added, and TFP_i^* is the rate of TFP growth in sector i . The ratio of value added in each sector to value added in all of manufacturing, VA_i / VA , represents the industrial structure. Industrial policy may affect manufacturing-wide productivity by increasing the importance of industries whose TFP growth is above average, by altering VA_i / VA , or by stimulating TFP_i^* itself. The major issue is to establish a counterfactual set of figures for the two variables contained in equation 1.

The ratios of value added in each sector to value added in all manufacturing can be thought of as representing industrial structure, where sectors with higher ratios are more prominent than sectors with lower ratios. TFP growth in all manufacturing, then, is the sum of TFP growth in each sector, weighted by a measure of the importance of that sector.

The Counterfactual Sectoral Structure of Production

I consider the periods 1960–79 for Japan and 1966–85 for Korea. The period 1960–79 is one in which Japan initiated efforts to enter new sectors. In Korea the period 1966–85 includes the intensive heavy and chemical industry program of 1973–80. Although the Korean government encouraged some sectors in all periods, the magnitude of the HCI effort dwarfed previous and subsequent efforts to promote individual sectors. I use the values of VA_i / VA at the end of the periods during which industrial policy was important to calculate a base value for equation 1. The use of end-of-period sectoral shares is favorable to finding a positive effect of industrial policy because it assumes that any higher growth rate of favored sectors that resulted from sectoral promotion generated benefits for the entire period rather than only part of it.

Without government intervention, international trade theory predicts that the major determinant of the structure of production (and international trade patterns) is the relative supply of factors of production, assuming that tastes are similar across countries. Macroeconomic and education policies may affect relative factor supplies, but these policies are not targeted to particular sectors and, by definition, are not part of industrial policy. Most of the research using these models has generated relatively poor predictions of production and trade patterns. Statistical estimates that use as many as 10 factors of production do not explain well the distribution of value added among manufacturing sectors (Harrigan 1995) or the pattern of exports (Noland 1997). Given the lack of a rigorous statistical model for generating the counterfactual values of VA_i/VA , I employ these values for a number of countries that had similar income per capita at the end of the periods in question and for which the value added by detailed industrial branches is available.

Japan's benchmark countries in 1979, in ascending order of per capita income, are Italy, Finland, Austria, Australia, France, and the Federal Republic of Germany (table 3). These countries are relatively similar to Japan in terms of their stock of capital and the education of their citizens, so that differences in industrial structure might be attributable to specific sectoral interventions. For Korea, the countries of comparison are Uruguay, Portugal, Malaysia, Mexico, and Panama. None of these had fostered the intensive industrialization of Korea; certainly none had attempted so consciously to shift the structure of production. Using these countries as peers provides a maximum measure of the alteration in the structure of production engendered by industrial policy. Other researchers have used alternative measures of sectoral evolution, including those implied by Syrquin and Chenery (1989). Use of the sectoral distribution implied by their estimates suggests a smaller impact on industrial structure in both Japan and Korea than in the peer countries. Thus the calculation used here contains a bias in favor of finding a greater impact from discrimination among industries.

To compare Japan and Korea with their peer countries, I calculate average sectoral shares of value added for each of 28 sectors in the peer economies and aggregate these to 11 sectors (figures 1 and 2). Japan and Korea show a few substantial sectoral differences in the structure of production relative to their benchmark countries. In particular, in both countries the combined metal products, machinery, and electrical equipment (MPMEE) sector is much larger than in the peer countries, suggesting that government policies may have had their intended impact on sectoral structure.

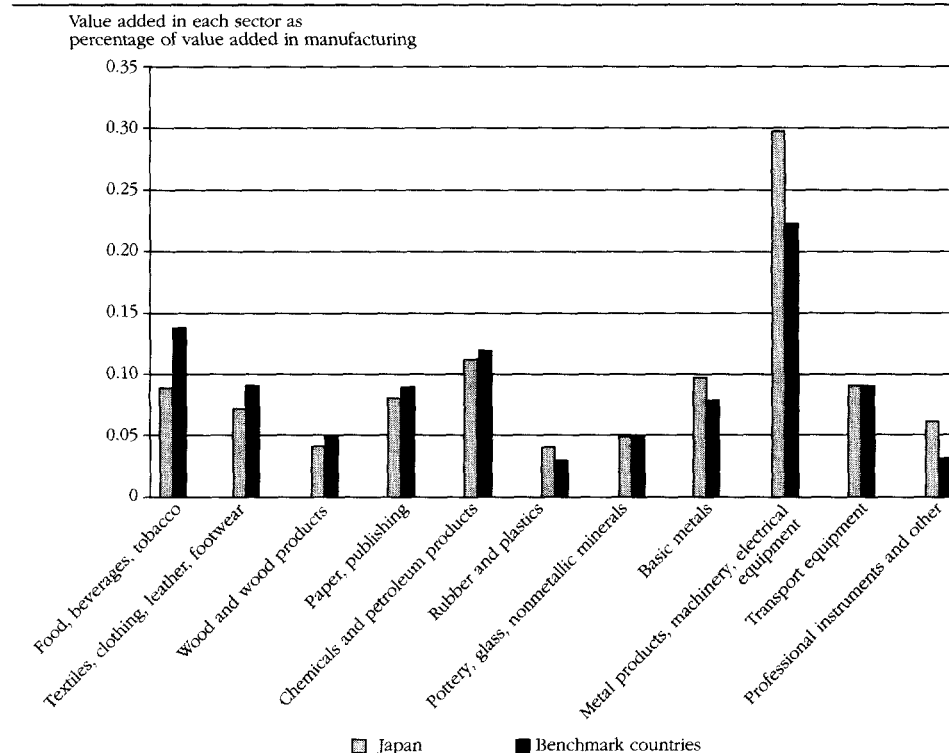
By using the industrial sectoral structure derived from the benchmark countries, I am assuming that all of the observed differences in industrial structure are attributable to industrial policy rather than to (unobserved) differences in supplies of factors of production. Insofar as the favored sectors in Japan and Korea contributed greater shares to total value added *and* exhibited higher rates of TFP growth, this assumption

Table 3. Per Capita Income of Japan, Korea, and the Benchmark Countries, 1979 and 1985
(U.S. dollars in current prices)

Country and year	Per capita income
1979	
Japan	8,810
Italy	5,250
Finland	8,160
Austria	8,630
Australia	9,120
France	9,950
Germany, Fed. Rep.	11,730
1985	
Korea, Rep. of	2,150
Uruguay	1,650
Portugal	1,970
Malaysia	2,000
Mexico	2,080
Panama	2,100

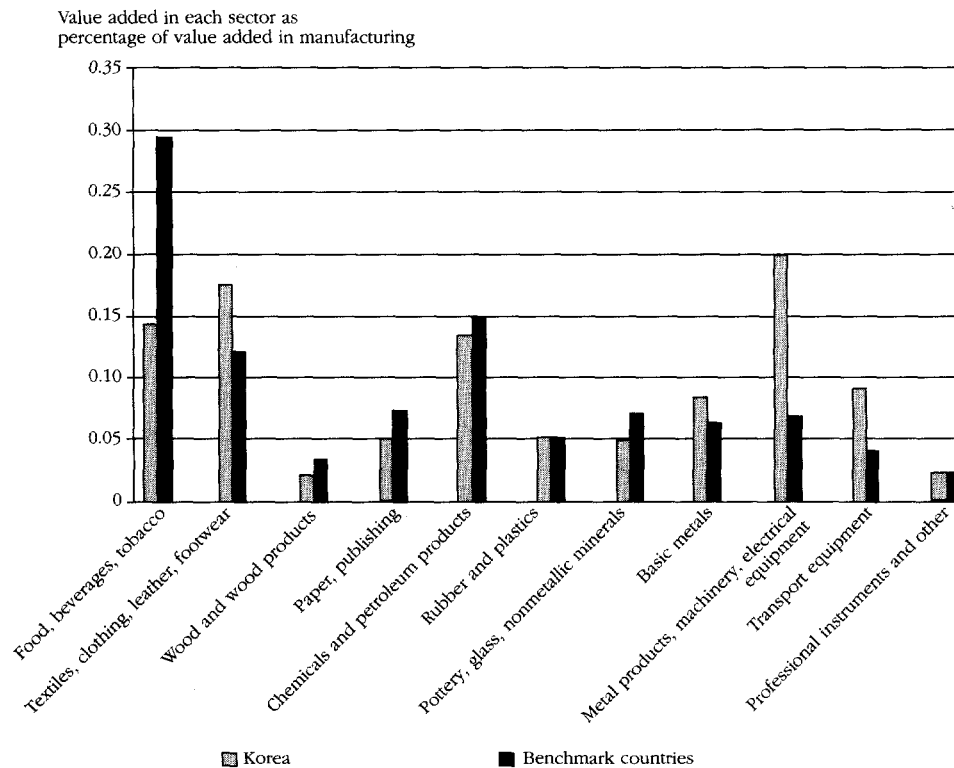
Source: World Bank (various years).

Figure 1. Sector Shares, Japan and Benchmark Countries



Source: United Nations (various issues).

Figure 2. *Sector Shares, Korea and Benchmark Countries*



Source: United Nations (various issues).

overstates the contribution of industrial policy. But the value calculated helps to establish a plausible upper limit on the effect of industrial policy.

The Counterfactual Impact of Industrial Policy on Manufacturing-Wide Productivity Growth

It is possible to calculate the counterfactual growth of TFP by comparing actual TFP growth rates across sectors in Japan and Korea or by comparing TFP growth in each sector in Japan and Korea with that in comparable countries. Differences in rates of productivity growth across countries, however, reflect country-specific factors, such as the intensity of competition, public investment in infrastructure and education, the legal structure governing intellectual property rights, and firms' investments in learning and worker training. It is inappropriate to attribute the higher rates of TFP growth in favored sectors in Japan and Korea, compared with those in, say, Austria or Mexico, to selective industrial policy alone, since Austria and Mexico lack several

of these productivity-enhancing characteristics. I thus focus on interindustry differences in productivity in Japan and Korea by comparing favored and neglected sectors rather than relying on international comparisons for identical industrial branches.

Jorgenson, Kuroda, and Nishimizu (1987) have estimated sectoral TFP growth for Japan during 1960–79 (table 4).¹ As noted, many of the critical acts of the Japanese government with respect to industrial policy occurred in the 15 years following World War II and were designed to reestablish the previous peak levels of production in sectors such as coal mining, textiles, and steel production. The attempt to foster nontraditional industrial sectors began around 1960. It can be seen that MPMEE and transport equipment exhibited much higher rates of growth of productivity than other sectors, confirming the views of proponents of Japan's industrial policy. Given that the MPMEE sector also had a higher share of VA_i/VA in Japan than in the benchmark countries, this resulted in an increase in sectoral TFP growth. It appears that industrial policy in Japan may have increased both the importance and the productivity of the industry; the issue is the precise size of the increase.

For Korea, I calculate measures of TFP and convert them to annual growth rates (table 5).² During the height of the HCI program, 1970–78, the mean values of TFP growth in the HCI sectors, 4.9, substantially exceeded the group average of the “ne-

Table 4. Total Factor Productivity Growth in Japan, by Industrial Sector, 1960–79

<i>Sector</i>	<i>TFP growth rate (percent)</i>
Food	-1.20
Textiles	0.47
Clothing	1.98
Leather and shoes	1.03
Wood	2.81
Furniture	1.74
Paper	1.44
Printing	-0.18
Chemicals	3.36
Petroleum	-3.55
Rubber	1.02
Plastics	0.55
Pottery and glass	0.92
Iron and steel	2.86
Other metals	0.16
Metal products	3.41
Machinery	2.30
Electrical machinery	5.38
Transport equipment	4.32
Professional instruments	4.45
Other manufacturing	4.98

Source: Jorgenson, Kuroda, and Nishimizu (1987).

glected" sectors, 3.1. In the succeeding period, the neglected sectors had a higher average value of TFP growth. Individual sectors in Korea—both neglected and favored—had high TFP growth rates. The difficulty of establishing the beneficial effects of promotion on productivity can be seen in one example: the much greater growth of TFP in the industrial chemical sector in the period 1966–70, before the HCI drive, than in the succeeding periods in which the sector was encouraged. The fact that its TFP growth rate for the entire 1966–85 period is the highest of any sector is attributable to its performance in the earliest period. The same is true of the transport equipment sector.

The results in table 5 are more favorable to the HCI strategy than are other estimates of growth. For example, Dollar and Sokoloff (1990), examining 1963–79, find that TFP growth rates were higher in labor-intensive industries than in capital-

Table 5. Total Factor Productivity Growth in Korea, by Manufacturing Sector, 1966–85

<i>Industry</i>	<i>1966–70</i>	<i>1970–78</i>	<i>1978–85</i>	<i>1966–85</i>
<i>Light industries</i>				
Food	6.5	–0.8	3.7	2.3
Beverages	10.3	4.3	2.1	4.0
Tobacco	13.8	2.0	5.2	4.5
Textiles	7.2	3.4	2.8	3.3
Clothing	9.9	3.8	4.5	4.2
Footwear, leather	6.2	4.4	–3.5	2.4
Wood	1.1	6.6	–1.1	2.5
Furniture	25.4	–2.4	0.7	4.7
Pulp, paper	7.4	4.0	0.3	2.7
Printing	–3.2	4.1	0.0	1.4
Other chemicals	4.2	6.8	–1.8	2.9
Petroleum, coal products	3.5	–0.1	2.1	1.3
Rubber products	3.1	6.8	1.0	3.5
Nonmetallic minerals	4.0	4.0	0.2	2.5
Other manufactures	13.2	–0.1	–2.1	2.5
Average	7.5	3.1	0.9	3.0
<i>Heavy and chemical industries</i>				
Industrial chemicals	22.7	9.0	1.3	6.6
Oil refining	13.3	–1.8	–7.5	0.1
Iron and steel	–0.4	3.8	4.0	2.5
Nonferrous metals	0.4	3.7	6.4	3.6
Fabricated metals	1.1	8.0	–3.6	2.8
Nonelectrical machinery	1.2	7.7	–1.7	3.0
Electrical machinery	5.3	5.7	0.4	3.3
Transport equipment	8.5	3.3	4.0	3.9
Average	6.5	4.9	0.4	3.2

Source: Author's calculation of Tornqvist indexes based on data contained in Yoo (1990).

intensive ones, which include the HCI sectors.³ They note that “whereas capital deepening does indeed seem to have been the dominant factor in the (growth of) highly capital-intensive industries, total factor productivity growth was the major contributor to gains in labor productivity in the rest of manufacturing” (Dollar and Sokoloff 1990: 310). Their results would lower the increase in sectorwide TFP growth due to selective policy.

What is most striking about manufacturing productivity in Korea is the high absolute values of TFP growth in most sectors. Although there are sectoral differences, the individual values and their average are extremely high by international standards (Nishimizu and Page 1987). They exceed the productivity growth achieved by the Organisation for Economic Co-operation and Development (OECD) countries in the same period. Although industrial policy achieved its goal of shifting factors among sectors, the cost of doing so was forgone high productivity growth in the neglected sectors. Unless the “neglected” sectors also somehow realized high productivity growth as a result of policies that implicitly discriminated against them, industrial policy cannot have been a major factor in Korean industrial growth. (The potential impact of spillovers from promoted to neglected sectors is considered below.)

It seems likely that government pressure to export was a major impetus for the relatively high rates of growth of TFP. In return for subsidized loans and various other incentives, the government set ever-increasing export quotas for each firm (Jones and Sakong 1980); the targeted quotas depended on previous export growth and assessments of future potential. Given Korean firms’ high ratios of debt to equity, the credible threat of withdrawal of subsidized credit was a potent inducement to meet export targets. Assuming that in each period firms were equating marginal cost to world price, a 20 percent increase in the export target forced them to reduce their costs rapidly if they were to avoid a loss on the increment in exports. Another source of productivity growth was technical advice that exporters received from customers in the OECD countries (Rhee, Ross-Larson, and Pursell 1984).

The Counterfactual Calculations

I use four calculations to measure the potential effect of industrial policies in Japan and Korea.

BASE CALCULATION. The basis of comparison is the calculated rate of TFP growth employing equation 1, using the observed value added shares in 1979 (Japan) or 1985 (Korea) and the sectoral TFP growth rates shown in tables 4 and 5. This calculation assumes that the sectoral structure of production and any differences between TFP growth in favored and neglected sectors were attributable entirely to industrial policy. The values for TFP growth, 3.12 for Korea and 2.36 for Japan, are shown in row 1 of table 6.

I now consider three variations of the basic calculation of what the path of TFP growth would have been in the absence of industrial policy.

ALTERNATIVE 1. In the first calculation, I assume that the only effect of industrial policy was to shift the sectoral patterns of production; TFP growth in individual subsectors was not affected by the policy. I assume that the sectoral pattern in the absence of industrial policy would have been similar to that in the benchmark countries. Under these assumptions, Korea's TFP growth was 3.04 percent and Japan's was 2.04 percent. In other words, Korea obtained a 0.08 percentage point increment ($3.12 - 3.04$) and Japan obtained a 0.32 percentage point increase in annual TFP growth rates from the policy-induced difference in sectoral structure.

ALTERNATIVE 2. The second scenario assumes the reverse: that, instead of shifting the sectoral pattern of production, industrial policy only had an effect on the TFP growth rates of the sectors. I assume that half of the observed TFP growth rates in the favored sectors was attributable to industrial policy. Under these assumptions, the contribution of industrial policy to TFP growth was 0.72 percentage point in Korea and 0.89 percentage point in Japan.

ALTERNATIVE 3. The third calculation combines the assumptions of the first two. I assume that industrial policy affected both the sectoral structure and productivity growth in the individual sectors. These assumptions imply that industrial policy accelerated TFP growth by 0.60 percentage point in Korea and by 0.99 point in Japan.

These calculations overestimate the benefits from industrial policy because they assume that the entire sectoral deviation in value added from benchmark countries and any improvements in TFP growth are due entirely to intervention.

Were these (maximum) figures of decisive importance to aggregate economic growth in the two countries? Given that Korea's manufacturing sector accounted for about a third of gross domestic product (GDP) at the end of the period, industrial policies that contributed 0.60 point to the manufacturing growth rate would have accounted for no more than 0.20 point of aggregate growth (roughly 9 percent a year). For Japan, a similar calculation implies that the extra 0.99 percentage point in

Table 6. *Simulation of the Effect of Industrial Policy on Total Factor Productivity Growth*

<i>Scenario</i>	<i>Korea</i>	<i>Japan</i>
Base	3.12	2.36
Alternative 1	3.04	2.04
Alternative 2	2.40	1.47
Alternative 3	2.52	1.37

manufacturing would have contributed about 0.3 point to aggregate growth of 9 percent. Even if these figures were doubled, it would still be the case that industrial policy was a minor hormone rather than the magic elixir of aggregate growth.

There are many anecdotes relating to the accelerated development of individual companies. If, however, the growth of these companies has not been sufficient to affect the results at the level of disaggregation used here, they cannot have been, *in the aggregate*, quantitatively important sources of growth.

Externalities and Investment Coordination

So far, it has been assumed that selective industrial policies directly affected the targeted sectors and that high rates of productivity growth in the neglected sectors did not reflect spillovers from the promoted sectors. But industrial policies could have generated benefits in other sectors as a consequence of three developments: domestic production of intermediate goods with special characteristics that were not available internationally but improved productivity in the local purchasing firm; job transfers by a trained labor force from firms in targeted sectors to other firms, bringing with them uncoded knowledge; and direct interactions on equipment design by producers and local buyers that led to adaptations that were particularly suitable for local firms.

All three externalities could potentially increase TFP growth in the neglected sectors. The potential quantitative importance of specialized nontraded intermediate inputs and uncoded knowledge transmitted by workers depends on how much the neglected sector interacts with the promoted sector. One way to gauge these benefits is to measure the purchases of an input from a favored sector per dollar of gross output in the neglected sector. The larger the purchase, the more likely it is that the neglected sector will benefit from the existence of local producers. The neglected sector may also derive greater benefits if there are few imports, which constitute an alternative source of specialized inputs.

Several measures showing the magnitude of the interaction between promoted and neglected sectors in Korea are presented in table 7; those for Japan are presented in table 8. First, in both countries the average input-output interaction is quite small. The favored sectors account for a very small portion of the domestically purchased inputs of most neglected sectors. Second, the heavy industries purchase extensively from one another. Third, in Korea imports by the neglected sectors are, on average, twice as large as total purchases from the favored domestic sectors (0.134 versus 0.068). In Japan, imports constitute a smaller percentage of total purchases. Whether this is due to the nontraded characteristics of Japanese production or to the restrictive trade regime is not clear (Lawrence 1993; Saxonhouse 1993). These patterns suggest the following probable effects of industrial policy on neglected sectors:

Table 7. Intersectoral Purchases, Korea, 1985

<i>Purchasing sector</i>	<i>Purchases from</i>			
	<i>All domestic sectors</i>	<i>Heavy industries</i>	<i>Chemical industry</i>	<i>Foreign suppliers</i>
Neglected sectors	0.293	0.021	0.047	0.134
Favored sectors				
Chemical industry	0.357	0.010	0.249	0.209
Heavy industries	0.411	0.342	0.021	0.176

Source: Author's calculations from input-output tables contained in Bank of Korea (various issues).

- It is unlikely that the promoted sectors were quantitatively critical in increasing the range of available inputs. Although industrial policies may have encouraged the domestic production of some unique, nontraded inputs, the overall impact was slight relative to all domestic and foreign purchases. Unless there was very low substitutability between domestic and foreign inputs, the quantitative effect of domestic inputs was small. Rosenberg (1976) cites the importance of local interactions in situations where both user and producer were themselves at the world frontier and there were no suppliers in other countries. In contrast, Korean and Japanese firms in the periods considered were not at the world frontier in the neglected sectors and had many opportunities for obtaining specialized inputs from abroad.
- Insofar as workers and managers transmitted important knowledge, the small purchases from the promoted sectors imply that the effect of such learning was limited. Although one can posit, as in the case of specialized inputs, that there was a critical piece of knowledge whose possession had exceptionally high marginal productivity for the recipient sector, the quantitative case does not seem plausible. Moreover, such information could have been obtained from technology licensing agreements and foreign consultants.
- Promoted sectors are substantial purchasers of one another's inputs, at least in the metal-based sectors. Any externalities from such interaction are already accounted for in the calculations shown in table 6 insofar as they employ the

Table 8. Intersectoral Purchases, Japan, 1980

<i>Purchasing sector</i>	<i>Purchases from</i>			
	<i>All domestic sectors</i>	<i>Heavy industries</i>	<i>Chemical industry</i>	<i>Foreign suppliers</i>
Neglected sectors	0.354	0.016	0.048	0.113
Favored sectors				
Chemical industry	0.532	0.011	0.356	0.051
Heavy industries	0.521	0.329	0.008	0.035

Source: Author's calculations from input-output tables contained in Bank of Japan (various issues).

Table 9. *Ratio of Imported to Domestically Produced Machinery, Korea and Japan*

<i>Sector</i>	<i>Korea (1985)</i>	<i>Japan (1980)</i>
General machinery	3.04	0.06
Electrical machinery	0.27	0.04

Source: Author's calculations based on input-output tables contained in Bank of Korea (various issues); Bank of Japan (various issues).

observed values of total factor productivity growth, which includes any benefits from the posited spillovers among sectors.

Some interactions are not captured by the input-output transactions shown in tables 7 and 8. In particular, the interactions between the producers and *final* purchasers of machines are not given because investment is a final demand. In Korea, the value of imports of nonelectrical machinery was three times that of domestic production (table 9). It is difficult to argue that there were no imported substitutes or that special adaptations to local conditions were quantitatively significant. Even if locally produced equipment was less expensive and conferred some cost reductions for its users, it would have affected only one-quarter of annual general machinery investment as late as 1985.

For Japan, the evidence is more ambiguous; Japan imports very little industrial equipment relative to domestic production (table 9). It thus is possible that domestic manufacturers may have designed equipment that was not available from imports and that did increase productivity.

Investment Coordination

The establishment of a domestic steel industry may provide low-cost steel for auto producers, but it does not pay to build a steel mill unless there is an auto industry to use the steel, guaranteeing it a large market and enabling it to realize economies of scale. Conversely, the auto factory may not be built if it is unable to obtain low-priced steel. Investment coordination, which was part of government policy in Japan and Korea, could have benefited both sectors (Pack and Westphal 1986). However, the prices that allow viability could have been obtained in the first place if inputs (steel used in autos) had been available at world prices. Conversely, although the steel sector may benefit from scale economies as its level of production increases, this increase in productivity could have been obtained by exporting steel, as indeed occurred in Japan and Korea. Both countries relied on exports to reduce the need to coordinate investment in sectors where economies of scale were important. Even if one abstracts from the fact that investment coordination only generates benefits where one of the goods is not traded and asks whether Japan and Korea could have ob-

tained significant benefits from such coordination, the data in tables 7, 8, and 9 suggest that the gains from coordination would have occurred largely within the heavy industries, as very few neglected sectors made large purchases from them. Thus any productivity gains from coordination are already reflected in the higher productivity growth of the heavy industries.

Some discussions have noted that Korea's export growth in the 1980s and 1990s has consisted increasingly of products that were manufactured in the promoted sectors, and this has been taken as a sign of success. However, just as the sectoral structure of production would have changed as the use of human and physical capital became more intense, so the structure of exports would have changed. Thus it is necessary to consider the evolving export structure relative to that of other countries. Noland (1997) shows that the export structure of the East Asian countries (including Korea) is not much different than would be expected on the basis of factor endowments. Yoo (1990) compares Korea's exports in the 1980s with those of Taiwan, which did not intensively promote the machinery and chemical industries. In almost all product categories that fall within the HCI complex, Taiwan's export growth was similar to or greater than that of Korea's, suggesting that the growth in exports from these sectors resulted from changing comparative advantage rather than from sectorally targeted intervention.

There are, of course, many individual examples of spectacular success that have led some observers to infer a much more important role for industrial policy, but the aggregate impact of such efforts was limited. Some analysts point to the technological complexity of Korean and Japanese industry, contrasting it favorably with that of Hong Kong. But such complexity is not an end in itself—it must yield higher growth per capita than would have been achieved otherwise. The results reported here fail to measure such an effect. Moreover, the complexity usually considered is that of the manufacturing sector. As the events of late 1997 and 1998 underline, a broader view of the economy, including the capabilities of the financial sector, suggests that Hong Kong was hardly inferior to either of the two industrial giants.

Conclusions

In contrast to other cases of interventionist development strategies, Korea and Japan had vastly better experiences, having generated higher growth rates than many economies that pursued import-substituting industrialization. What accounts for the difference? The simplest explanation is that policies in both countries induced significant competition, whether by holding "contests," as in Japan (Stiglitz 1996), or by linking preferential interest rates and tariffs on imported goods to success in export markets, as in Korea. Firms thus had strong incentives to improve productivity. Other countries that attempted to encourage specific sectors relied on protecting the do-

mestic market and never credibly sought to reduce such protection. Profits and wages were never threatened, and incentives to learn were weak. Countries attempting to extract the benefits from industrial policy that Japan and Korea obtained have to possess not only an exceptionally capable bureaucracy but also the political ability to withdraw benefits from nonperforming firms. Experience in dozens of other countries suggests that these conditions rarely obtain.

Using a variety of assumptions, perhaps as much as 1 percentage point of growth in the manufacturing sector might have been attributable to industrial policy, implying one-third of 1 percent of GDP growth. The implied increase in the national marginal product of capital and labor also may have led to some increase in investment rates in physical and human capital; the magnitude would depend on the unknown elasticity of such investment with respect to the rate of return. Allowing for such secondary effects, the increase in aggregate growth rates induced by industrial policy may have been perhaps half of 1 percent a year, hardly trivial, but not the secret of success. To answer the question posed by the title of this article, industrial policy may have been a minor growth hormone. It seems unlikely that, absent a host of other factors that impinged on both Japan and Korea, the delayed adverse side effects of industrial policy on the banking system were the poison that necessitated very strong antidotes in the late 1990s. But in view of the minor benefits and the potentially adverse effects on the financial sector and the neglected industrial sectors, countries should be exceptionally cautious before embarking on such policies.

Notes

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1. The estimates for Japan and Korea overstate the correct value for TFP growth, since data on the impact of education on the labor force are omitted. Thus the calculations of TFP growth overestimate the contribution of industrial policy by some unknown amount.

2. The estimates are based on Tornqvist indexes. I have used the data given by Yoo (1990) for Korean value added, capital stock, and labor force. Yoo's data on capital stock are derived from a study of Pyo (1988). The data are based on consistent input-output definitions of sectors and include a number of adjustments of the labor force to allow for unpaid workers.

3. Their results, however, are not directly comparable because Dollar and Sokoloff use fixed-weight estimates of factor shares rather than a Tornqvist index and their data on capital, labor, and value added rely on different sources (see footnotes to table 1 in Dollar and Sokoloff 1990).

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Financial Safety Nets: Lessons from Chile

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Should governments ever override bank regulators who are attempting to close down insolvent financial institutions? An analysis of Chile's history shows that time after time from the 1850s to the 1980s, prudential banking regulations were abandoned during economic crises when attempts to impose tight solvency standards proved impossible to enforce. Chile's current stringent banking regulations may prove more durable, but mounting financial distress is equally likely to lead the government to adopt policies that prevent bank failure but undermine the authority of regulators.

Bank regulators, including the central bank, are responsible for creating a financial safety net to protect depositors against loss and for enforcing the rules of prudent behavior that are required for a stable financial system. Because safety nets often additionally cover losses to bank owners and borrowers, the support they offer encourages risk-taking by the private sector—an action that may promote financial deepening, but at a high budgetary cost to the government. Poorly designed safety nets may have to be suspended during crises to prevent losses from mounting and to limit the government's liability.

The central aim of government-created institutions and regulations establishing financial safety nets has been to strengthen the financial system's ability to withstand bank runs and severe economic shocks while at the same time shifting risk to the government and promoting financial deepening (an increase in the stock of financial assets). Although it is frequently said that the best safety net is one that results in market participants behaving as if it did not exist, well-designed safety nets *should* alter bank behavior.

This article explores the issues surrounding financial safety nets in small, open economies, drawing on Chile's experience in the 1980s. It argues that a good institutional safety net will balance the benefits of financial deepening with the costs of shifting risk from the private sector to the government. Financial deepening, which is typically measured as an increase in the ratio of bank liabilities to gross domestic product (GDP) or in broad measures of bank assets to GDP, is generally regarded as a

good thing for an economy because it relaxes self-financing constraints and is associated with the increasing monetization of transactions. The components of a good safety net—including lender-of-last-resort facilities, deposit insurance, capital requirements, supervision, and closure and recapitalization rules—must be designed to control the amount of risk borne by the government. Without prudential supervision, the anticipated benefits of financial deepening may be illusory.

The discussion shows how government regulation can lower the cost of lending. The creation of better bankruptcy laws, the granting of special legal powers to bank boards, and the requirement that liquid bank liabilities be backed up by liquid assets are all ways in which prudential regulations can expand the scope for intermediation by banks and other financial institutions. Although prudential regulation does not always accompany the creation of an explicit safety net, it frequently results in government intervention during financial crises, even when the government has no formal role. The article then describes the creation of central banks as an example of an innovation to promote financial deepening and expand intermediation by formally monitoring bank operations and by acting as lender of last resort to ensure the liquidity of the banking system.

The extension of the financial safety net to depositors is a relatively new and untested development in many countries. If the state has a comparative advantage in monitoring banks, deposit insurance has the potential to improve welfare and expand output, but it also may misallocate an economy's resources. For most small, open economies the long-term challenge to prudential regulation of the financial system is to protect depositors in the wake of large macroeconomic shocks.

Characteristics of Prudential Regulation

Banks typically have been subject to a moderate amount of regulation committing them to observe more stringent prudential practices than they otherwise would guarantee depositors. Under this sort of regulation, bank closures generally are triggered by bank runs, and the government remains outside the compensation process as far as depositors and other bank creditors are concerned. Even so, pressures arise to provide aid to debtors during severe economic downturns. An example from Chile illustrates how borrowers who owed money to a financial institution with no explicit safety net were able to generate enough pressure on the government to force it to create an ex post safety net.

Borrower Distress in the 19th Century

During the gold rush of the early 1850s, demand for grain exports from Chile to California and Australia surged. New loans for large landowners who were anxious

to expand production were unavailable, however, because existing mortgage laws were poorly defined in legal terms and because potential lenders lacked reliable information on the holdings, quality, and legal status of the properties involved.

In 1856 the Chilean Congress responded by creating a special mortgage giving clear rights in case of default to the lender. Property registries were set up to make information on sales, mortgages, and censuses readily available, and a state-sponsored mortgage bank, the *Caja de Crédito Hipotecario*, was established.¹ The property registries helped to mitigate the information problem facing lenders, and the *Caja* became a monitor that could reduce the costs of lending by adhering to legally mandated collateral requirements, holding a diversified portfolio of loans, and applying economies of scale in monitoring. The new mortgage law gave clear authority to the *Caja* to enforce bankruptcy proceedings if a landholder fell sufficiently behind in making mortgage payments.

The reform of mortgage laws and the creation of the *Caja* shifted some risk from landowners to the *Caja* and to purchasers of its securities. By the end of 1860 more than 5 million pesos of the *Caja*'s securities were in circulation (equal to 10 percent of exports). The financial deepening associated with these agricultural loans propelled the expansion of irrigation and other improvements to the land.

Although the rapid five-year credit expansion permitted landowners to undertake capital improvements on their land, it also exposed them to macroeconomic shocks. When the California and Australian export markets collapsed in the late 1850s, many Chilean landowners were unable to make their mortgage payments. In 1858–59, responding to intense pressure to prevent the foreclosure of landholdings, the government clandestinely funneled about 2 million pesos to landholders (which it skimmed from a 7-million-peso railroad loan that had been financed in the London bond market). This action, which effectively shifted the risk to the taxpayers, was not envisioned by the *Caja*'s institutional structure and was opposed by the foreign investors who had supplied the capital for the railroad loan. In 1860 a new government was installed, and it tried to recover the clandestine loans. The resulting economic contraction of 1861 and 1862, which produced the liquidation of a large number of landholdings, was Chile's first financial crisis and one of the most severe economic contractions of the 19th century (Brock 1992; Fetter 1931).

This example highlights features common to the dynamics of many implicit financial safety nets. The *Caja* and the accompanying legal reforms were created to promote financial deepening. In theory, prudential lending practices were legally mandated so that the risk to the *Caja* was carefully controlled. In practice, though, the *Caja* expanded mortgage lending so quickly that it became overexposed to the risk of a mass default by landowners in the event of a crisis. The threat of massive bankruptcies initially created pressure for a remedial safety net underwritten by the government and then contributed to a severe economic downturn when the properties were finally liquidated.

The Establishment of Central Banks

Governments have devised ways to deal with these kinds of problem by establishing central banks and other financial institutions to supervise banking activity. The creation of the Federal Reserve System in the United States in 1914 is often described as a legislative response to instability in the financial sector.

Similarly, the introduction of central banks into Latin America in the 1920s and 1930s had far-reaching consequences for financial deepening and for incentives to shift risk to the government. The Central Bank of Chile, like that of several other countries in Latin America, was established on the recommendation of a commission headed by Edwin Kemmerer, a professor at Princeton University, who proposed a central bank and a superintendency of banks that would jointly watch over the financial system.

The institutions and laws recommended by the Kemmerer Commission modernized banking rules and made all banks subject to standardized conventions of management and accounting, and they established minimum ratios of capital to assets and of reserves to liabilities. Bank superintendents were created to examine the banks and to enforce banking legislation (the detailed rules and norms issued by the central banks). The superintendencies were located outside the central banks under the aegis of the finance ministries, but they were set up as semipublic institutions and were guaranteed independence from the finance ministries and the rest of the government. The central bank was required to hold gold and foreign exchange reserves sufficient to cover at least 50 percent of its liabilities.

The key policy tool was the rediscount window, which allowed central banks to extend credit only against the collateral of short-term commercial paper (Tamagna 1965). Central banks established one set of discount rates for banks and a slightly higher set of discount rates for the public. The former were intended to foster the role of the central bank as the lender of last resort. The slightly higher, but moderate, public rates were designed to put pressure on banks to lower interest rates on loans and make rates more uniform.

The new legislation and institutions did not create an explicit safety net for banks. They did set up capital requirements, provisions for monitoring financial institutions, and authority to close banks. These measures reduced the costs of financial intermediation and led to financial deepening by decreasing the costs of borrowing.

The legislation in Chile created a guarantee that domestic currency would be convertible into foreign exchange at a fixed exchange rate. This, in combination with the newly instituted oversight of the banking system, created strong incentives for foreign investment. In essence, the fixed exchange rate with fiscal oversight of the banks created an implicit guarantee of the banks' foreign exchange liabilities, thereby shifting the risk to the government. As more investment was intermediated through the financial system, financial depth increased.

The Emergence of the Safety Net

The conditions that led to the creation of the safety net in Chile were similar to those that have become familiar in more recent financial crises in the region. In the late 1920s Chile's banks were financially stable. They operated with capital-to-asset ratios of 20 to 30 percent; they were rigorously monitored by the Superintendency of Banks; and the mechanisms for closing troubled banks were enforced. By normal standards, there was no need for a safety net for the banks. Indeed, the whole apparatus lowered the cost of financial intermediation, so that depositors required a smaller premium, borrowers paid lower loan rates, and foreigners were assured that their loans would be repaid in foreign currency. All of these effects enhanced financial deepening between 1925 and 1929.

Following the creation of the Central Bank and the passage of accompanying banking legislation in 1925, the economy grew at an average rate of about 10 percent a year from 1926 to 1929. With the start of the Great Depression, Chile's GDP fell 11 percent in 1930, 17 percent in 1931, and 27 percent in 1932—a cumulative decline of more than 50 percent in three years. As the economy spiraled downward, the Superintendency of Banks and the Central Bank raised deposit rates in several incremental steps up to the third quarter of 1931. The superintendency also took strong steps to force banks to adjust to the deterioration in the quality of their loans and investments, including stepping up inspections of loan portfolios, requiring bonds and real estate investments to be priced to reflect the downturn in prices, enforcing provisioning against possible loan losses, and setting penalty interest rates on nonperforming loans. The immediate result was a rise in nonperforming loans, which climbed from 4.3 percent of total bank assets in 1929 to 15.3 percent by the end of 1931. As a result of the economic and financial deterioration, 4 of the 22 banks in the country were forced to close in 1930 and 1931.

Through mid-1931 the economy's adjustment followed the rules of the gold standard—outflows of gold produced a contraction in the money supply. Between January 1930 and July 1931, the Central Bank lost more than half its gold holdings but still had a reserve of 72 percent against its demandable liabilities (notes and deposits). From July 1931 to the beginning of June 1932, economic policy began to deviate from the automatic adjustment of the money supply to changes in the Central Bank's gold holdings. Exchange controls were announced on July 30, 1931, to protect the remaining gold reserves, following an earlier default on Chile's foreign debt.

In mid-1932, amid growing civil opposition to the government's largely inactive economic policies, the military staged a coup and established a socialist republic, which lasted only 100 days. During this time, the president, who was given vast powers to intervene in the economy, introduced trade quotas, import licenses, and a jobs program for the unemployed. The government also devalued the currency 70 percent and declared a three-day bank holiday (June 6–8, 1932), during which bank

deposits were frozen and foreign funds in the banking system were declared the property of the state. In an effort to bail out private debtors, a moratorium on the repayment of debts was announced (Ellsworth 1945).

In the next six months, successive governments increased domestic credit by about 800 million pesos, equal to about 70 percent of the banking system's total loan portfolio (Chamorro 1985). Recovery was rapid; in the first year real GDP rose 16 percent, due in part to an improved external environment. The government also announced a 10-year tax holiday for all new commercial and residential construction under way by the end of 1935, creating a building boom that succeeded in raising depressed property prices. The 30 percent price increase between June 1932 and June 1933 provided debt relief to enterprises that had borrowed funds, while interest rates were controlled at low rates and penalty interest rates were rescinded. In 1933–34 the real value of debt was reduced substantially, and nonperforming loans declined rapidly.

The main lesson here is that orthodox governments frequently respond to a financial crisis by initially affirming that there is no safety net, only to announce later a series of emergency rescue measures that create one in response to pressures generated by widespread financial distress among borrowers. Did the new Central Bank and bank regulations lower the cost of financial intermediation too much? “Too much” refers in a narrow sense to the government's ability to make good on its fixed exchange rate guarantee. In a broader sense it refers to the government's desire to insure against large macroeconomic shocks. In Chile, as in much of Latin America during the 1930s, the answer was that governments could not guarantee the banking system under the rules of the gold standard. The ad hoc bank safety nets created at the start of the Great Depression saved the banks at the cost of capital levies on depositors, moratoriums on foreign debt service, and emergency loans from the central banks.

Financial Liberalization

The attempts at financial liberalization that began in the Southern Cone of South America in the 1970s and spread throughout the world during the succeeding two decades have not been painless. Liberalizing countries eliminated targeted credit programs and lifted interest rate controls. In addition, new banks were allowed to begin operations. However, in most countries the existing financial regulatory structures were not designed to require that banks be evaluated when they reshaped their portfolios from government-directed loans toward much higher yield loans to companies and consumers. Monitoring their borrowers has proved to be difficult for banks, and deficient internal bank controls on both initial and ongoing loan evaluations have allowed banks to lend even in circumstances in which repayment seems unlikely.

Government bank examiners have been equally incompetent; many of the best examiners have been hired away by banks at high salaries, and those who remained have been too few and too powerless to meet the demands placed on them. During liberalization, bank capital often has been inadequate, and even published capital-to-asset ratios frequently have been overstated by officials anxious to conceal bad loans. Bank managers may even resort to accounting gimmicks such as double-gearing, whereby a bank lends, say, \$100 to a firm within its group so that the firm can buy \$100 of the bank's stock. The bank's reported capital rises by \$100, but the group's capital remains the same.

Because financial liberalization frequently results in increased risk, governments typically guarantee funds lent to banks by domestic and foreign lenders who otherwise would hesitate to invest in banks that might fail. The Chilean government's rescue of Banco Osorno in early 1977, for example, saved foreign creditors from losses that would have put an end to the capital inflows that were helping to fuel the economic recovery. The implicit government guarantees associated with that rescue meant that bank spreads (that is, the difference between loan rates and deposit rates) were kept much lower than they would have been otherwise, attracting more borrowers and encouraging financial deepening. The ratio of private sector domestic credit to GDP rose from 8.8 percent in 1977 to 39.3 percent in 1981 (Brock 1996). But in the context of poor monitoring capacity and low bank capital, the implicit guarantees meant that the government was assuming excessive risk.

The apparent initial success of Chile's liberalization was held together on the strength of an implicit government guarantee to protect depositors and other bank creditors. The true extent of the safety net was unveiled only as the financial crisis began. Because governments virtually always step in to save banks from failing, even when there is no explicit provision for a safety net, financial structures should be designed to take into account past experience with these ex post safety nets. The example of Chile illustrates the point and demonstrates that once the financial safety net has been thrown out to save banks, untangling it may be complex and time-consuming.

The Implicit Safety Net in Chile

In Chile, as in many other countries, the financial crisis initiated an exchange rate crisis. Throughout 1981 and the first six months of 1982, the financial sector continued to deteriorate. In June 1982 the government devalued the currency and instituted a preferential exchange rate for dollar debtors—a subsidy that would amount cumulatively to about \$3.4 billion by the end of 1987—to reinforce the government's implicit guarantee that the fixed exchange rate would be a permanent anchor for the economy. In July the central bank began to buy part of the banks' bad loan portfolios at face value and agreed to buy back the rest of the loans over a three-to-five-year

period. This action improved the banks' balance sheets by replacing nonperforming assets with a Central Bank bond, but because the bond paid no interest and was not transferable, no resources were transferred to the banks.

Regulatory forbearance also played a role in the safety net. In September 1982 the Superintendency of Banks allowed banks to use the June 30 exchange rate in calculating the peso value of their dollar liabilities. This represented a 35 percent underestimation of the value of dollar liabilities by the end of 1982, but it prevented several banks from violating minimum regulatory capital ratios. Banks originally were told to provision against these losses by the end of 1982, but the deadline later was extended to the end of 1986. In addition, in October 1982 the authorities extended the time limit for declaring a loan nonperforming from 30 days following failure to make a loan payment to 90 days.

The intervention in the flagship banks of the two largest economic conglomerates on January 13, 1983, also stabilized the financial system by terminating the creation of shell companies (that is, companies that existed only on paper) and by blocking other measures such as the use of offshore subsidiaries to evade prudential regulations. This step brought more than 50 percent of the financial system's assets and liabilities under the direct control of the government and provided explicit government backing of the liabilities of the remaining institutions. It also gave the government control of several of the largest firms in the economy.

In a major departure from previous policy, the government announced that all existing bank debt, both external and domestic, would now be guaranteed by the government. Although the new law created a huge contingent liability for the government associated with bank insolvencies, it prevented a run on the banks and, by converting external debt into sovereign debt, averted the forced liquidation of banks by foreign creditors.

By early 1983 it had become clear that many loans would not be repaid at the contracted terms. In April of that year, in response to the growing threat of a debtor revolt, the government announced a restructuring plan to reschedule 30 percent of an eligible company's debts for 11 years, with a 1-year grace period for interest and a 5-year grace period for principal. The operation created a cash flow subsidy to the banks that amounted to 7 percent of the amount of the restructured loans. The last major stabilization measure, announced in June 1983, protected holders of home mortgages by rescheduling installments unpaid since 1981.

Modifying the Guarantees

One year after the devaluation, all the safety net measures were in place. Three of the programs were modified substantially the next year. In February 1984 the government expanded its repurchase program and shortly thereafter extended the produc-

tive debtor plan and home mortgage refinancings. None of these measures entailed restructuring the financial system; the largest banks and enterprises were still in limbo, under temporary government control but without any plan to restore private ownership.

In 1985 a new finance minister raised the argument with foreign creditors that the Chilean government had provided \$3.4 billion to date to help borrowers repay their dollar loans and that it was time for the foreign creditor banks to bear their share of the losses. For their part, the creditor banks were pressing Chile to renew its guarantee on bank debt, much of which was due to mature during 1985–87. In subsequent negotiations the government agreed to the renewal, and the banks' creditors gave tacit approval to debt buyback and debt-equity conversion mechanisms. Between mid-1985 and mid-1987 about \$3.2 billion in bank debt was written down or converted into equity by these mechanisms at market discounts of about 30 percent. These transactions were essential for recapitalizing Chile's banks.

Between 1982 and 1984, 17 private banks had exchanged bad loans for Central Bank bonds. In January 1985 a "popular capitalism" law authorized the Central Bank to capitalize a portion of its loans to the five banks over which the government had assumed control. The law resulted in the recapitalization of four of the five banks (the fifth merged with another bank). Existing stockholders had first claim on stock purchases. The remainder was given to the Chilean Development Corporation (CORFO) and then sold in small amounts to individual investors.

In 1989 concern regarding the possible fiscal manipulation by future governments of banks' ability to repay led the outgoing military government to redraft the agreements between the banks and the Central Bank. In place of a fixed obligation, the new law created a debt obligation that was equal in nominal value to the fixed obligation but that had no fixed timetable for payment. The new contracts were protected by law against unilateral changes by the Central Bank. In the case of the five heavily indebted banks, there was effectively no date by which the subordinated debt would ever be repaid.

When the newly elected democratic government took power in 1990, the total value of the subordinated debt of 11 banks was about \$3.3 billion, while the value of paid-in capital was only \$1.3 billion. The new government wanted changes that would eliminate the indeterminacy of the resolution of the debt problem. Despite renewed efforts in 1992–93, the government made no appreciable progress in drafting a replacement for the subordinated debt law that would be acceptable to the banks. In 1995, after a series of disputes, an agreement was drafted stipulating that the banks would repay part of the debt in exchange for forgiveness of the remainder. During the negotiations the president of the Central Bank, who argued that the banks should be forced to assume a greater portion of their losses, resigned. Ultimately, the Central Bank wrote off approximately \$2 billion to recapitalize the banks.

Deposit Insurance

All financial systems have an implicit as well as an explicit safety net. Until the late 1980s, depositors generally were not included in the explicit safety net. Indeed, they generally became part of the ex post measures to prevent bank failures. In Argentina and Brazil in the 1980s deposits were frozen and then reduced in real value by high inflation as a way of improving bank solvency. Even in Chile, where deposits were guaranteed in January 1983, interest rates on deposits were kept artificially low by a combination of capital controls and Central Bank suggestions regarding the appropriate rates to pay. Since 1981 the number of countries with explicit deposit insurance programs has tripled, from 15 to 45. These programs represent a significant, but untested, institutional innovation in the adopting countries. Providing a safety net for depositors lowers the cost of deposits to banks by moving contracting problems associated with asymmetric information to the government insuring agency. As with other contractual innovations, deposit insurance leads to financial deepening and a shift in financial risk. In this way it is no different from loan contracts that banks negotiate with their borrowers. For loan contracts to remain viable in the long run, banks must be able to restrict the ability of borrowers to shift risk to the banks. Similarly, if deposit insurance is to remain viable, the government must restrict banks' ability to shift risk to the insurance agency and to the taxpayers. The best example of the perverse dynamics of risk-shifting coupled with financial deepening in the context of deposit insurance comes from the crisis in the U.S. savings and loan industry in the 1980s.

As a result of high interest rates paid to attract depositors during the late 1970s and early 1980s, the net worth of many savings and loan institutions in the United States deteriorated. The Federal Reserve Board originally responded to the problem by imposing interest rate ceilings on deposits, in effect taxing primarily small depositors to keep the savings and loans solvent. When the creation of new financial instruments, such as mutual funds, caused a flight of funds away from the savings and loans, Congress passed legislation to help the industry by deregulating its asset powers, permitting savings and loans to issue credit cards and to make consumer loans up to 30 percent of assets; to make commercial real estate loans up to 40 percent of assets; to offer commercial loans up to 11 percent of assets; and to take direct equity positions up to 3 percent of assets. State chartering authorities, especially in California, Florida, and Texas, provided even wider asset powers to thrifts in what appears to have been regulatory competition to keep thrifts from adopting national charters. During 1983 and 1984 the resulting asset growth of savings and loans (19 percent a year) far outstripped the asset growth of commercial banks (7 percent a year). Romer and Weingast (1990) argue that the fast-growing thrifts were gambling for resurrection and were able to do so because Congress forced the Federal Savings and Loan Insurance Corporation (FSLIC) to pursue a policy of forbearance that prevented the closure of undercapitalized savings and loans.

Although deregulation expanded bank lending, it also shifted excessive risk to the government. The government, for its part, failed to enforce capital standards and curtailed inspections of savings and loans during 1984–85. Although the formal safety net (the funds of the FSLIC) was modest, the informal safety net (the funds of the U.S. Treasury) was almost unlimited. Depositors were not worried about risk, and indeed, fast-growing thrifts only needed to offer small premiums on certificates of deposit to generate large deposit inflows.

The ex post safety net to protect depositors against loss involved shutting down more than 700 savings and loans with assets of \$400 billion. The Resolution Trust Corporation (RTC), which directly or indirectly employed up to 20,000 people during a three-year period, either liquidated the assets it acquired from failed thrifts or reorganized existing institutions. The cleanup operations of the RTC involved losses to taxpayers of approximately \$200 billion.

Prudential Regulation and Aggregate Economic Shocks

Much of the discussion on safety nets is based on the premise that bank-specific risk poses the major challenge for the design of bank capital, supervision, and closure mechanisms. Much of the risk faced by banks in Latin America and elsewhere, however, is aggregate rather than bank specific. Aggregate risk is observable by all agents in an economy: everyone knows when and by how much the price of copper or coffee changes or by how much the London interbank offer rate moves. Aggregate risk need not be borne by banks and other financial intermediaries. Indeed, being forced to bear it may interfere with intermediaries' incentives. Enforcing penalty loan rates on firms, changing ownership of the banks, or ordering the liquidation of assets may be a socially inefficient response to a negative aggregate shock. Such actions in the aftermath of an aggregate shock penalize competent owners and managers and may result in inferior utilization of an economy's assets.

The incentive problem posed by aggregate risk to the financial system is similar to that associated with government disaster relief programs. By providing insurance against catastrophes such as floods and hurricanes, the government offers homeowners an incentive to buy property in high-risk areas. To prevent this outcome, the government should implement tough rules that prevent homebuilders from building too close to the ocean or using construction materials that are too flimsy. Governments should similarly provide a safety net for the financial system in the event of a catastrophic shock to the economy. But the size of the bailout associated with the safety net will be affected by the government's ability to control excessive risk-taking in the years before a shock. It is in the good years before a shock occurs (like the calm years with no hurricanes) that government agencies should be given the incentives to strictly enforce conservative capital, monitoring, and closure policies.

Capital

Risk-adjusted capital requirements can play an important role in the design of a financial safety net *provided* that bank monitoring and closure policies are adequate. Without good monitoring, banks have an incentive to engage in accounting tricks that artificially raise the book value of their capital, such as the double-gearing discussed earlier. This technique increases the bank's capital for regulatory purposes without increasing the economic group's real capital.

Banks also have an incentive to underreport and underprovision bad loans. Adequate provisioning is crucial for the long-term viability of risk-adjusted capital requirements. Underprovisioning keeps the return to bank equity artificially high, and the cumulative excess flow of dividends destroys market value capital in a process that amounts to looting the bank. Looting of this sort is easy when an increase in the value of implicit or explicit deposit guarantees automatically offsets the decline in the value of the bank's capital.

Monitoring

Evaluating the true net worth of banks presents technical problems. For example, regulators must decide when loans that are current should be classified as doubtful. When the collateral value of the real estate securing a \$30 million mortgage falls from \$35 million to \$25 million, the loan may stay current for a while, but eventual default is almost inevitable. Regulatory enforcement is especially difficult when the fall in collateral is perceived to result from an external shock rather than from reckless lending practices. Given the possibility of disagreement over market values during a collapse in the real estate market, even market value accounting permits long delays in recognizing losses. A two-year delay in forcing the recognition of losses while the real estate market is adjusting downward, for example, can create the incentives and provide sufficient time for even good bankers to gamble away a bank's future by taking on excessive risk.

Closure Policy

Closure policy is the Achilles' heel of any explicit or implicit government safety net. The inability to close failing banks permits equity holders to roll over loan losses and engage in other risky lending practices, thereby bidding deposits away from other institutions and transmitting incentives for risky lending to the rest of the financial system. Just a few banks operating in this way during good times can weaken the whole system's ability to withstand a large aggregate shock.

Both technical and political reasons explain why closure policy is such a thorny issue for bank regulation. From a technical standpoint, bank liquidation generally is

undertaken only as a last resort to avoid the loss of the bank's value as an ongoing operation. In between forbearance and liquidation is a wide range of possibilities, including voluntary recapitalization by the bank's owners, cash-assisted acquisition by another bank, temporary administration by a government workout agency, and forced capital levies on depositors.

From a political standpoint, allowing a bank to fail not only will incur the wrath of uninsured lenders to the bank but also will run counter to the interests of politicians who depend on bank owners for political support. The problem is to create agreements before a bank failure that make it difficult afterward to renege on the no-bailout position. Because the impending failure of a large bank may disrupt the payments system, the various intervention options must be spelled out in some detail in advance to facilitate the bank resolution process without resort to a political rescue of the bank's owners. About one-fourth of the 1986 Chilean bank law, for example, is devoted to the precise specification of alternative closure and recapitalization mechanisms for banks.

A more subtle political problem involves interagency cooperation in bank interventions and closures. The banking regulatory agency has responsibility for determining whether intervention is called for; the deposit insurance agency must be willing to provide the necessary funds to resolve the insurance problem; and the central bank must provide liquidity while the intervention is resolved. Lack of cooperation by any one of these agencies can derail the closure or recapitalization process. Underfunding the deposit insurance agency, for example, may cause that agency to push for the delay of a bank intervention that would deplete the agency's funds. One possible solution is to create a truly independent central bank that would have the incentive to be tough on banks and the deposit insurance agency in order to guard its capital. This also implies, of course, that the central bank may be unwilling to provide emergency liquidity if it cannot be assured that it will recover those funds eventually.

When to Overrule Prudential Regulators

Various institutional arrangements for prudential regulation do tolerably well in preventing the shifting of risk to the government during normal times. Several writers, including Benston and others (1986) and Calomiris (1997), have advocated the use of subordinated debt requirements to counter the incentive to underprovision bad loans. Subordinated debt creates creditors who can put additional pressure on bank owners and managers to take adequate measures to cover such loans. The big problems arise in the aftermath of a negative aggregate shock when borrowers' debts become impossible to service and banks' capital and reserves become inadequate to cover probable losses. In all these cases it is unlikely that subordinated debt will

prevent bank owners and managers from increasing the bank's risk, since subordinated debt holders may have been wiped out along with the shareholders, with both groups willing to gamble by having the bank take on more risk.

In virtually any small economy, a negative macroeconomic shock will overwhelm a well-designed safety net. Imposing penalty interest rates and shutting down banks, which is the correct course of action given the incentives of bank regulators, will in fact be counterproductive. Chile's decision in the early 1930s to stand by the gold standard and to enforce prudential bank regulation eventually resulted in a military coup.

Regulators should be given strong incentives to control risky behavior that could cause an expensive bailout when a shock occurs. But government, too, has an incentive to avert a crisis by assuming the remaining macroeconomic risk borne by banks. There are several ways to do this: one is for the government to self-insure by accumulating a large fund of liquid resources. Another is to secure international lines of credit; Argentina followed this approach. A third is to rescue the banks using government debt but to require repayment (over many years, if necessary) if a bank wishes to expand into new areas. This was Chile's solution in the 1980s and 1990s.

Authorities must take into account the costs of establishing prudential regulation and safety net institutions that are immune to political pressures. Although these regulations and institutions minimize the private sector's incentives to take risks in good years, they may prove too rigid when a macroeconomic shock hits. If no one in the government can overrule the central bank, and the central bank is intent on enforcing prudential regulations and on guarding its capital, it may take a revolution (such as occurred in Chile in 1932) to put a more extensive safety net in place. Conservative prudential regulation and enforcing agencies therefore should be insulated from political pressure, but not so much that true economic catastrophes are made worse by the actions of those agencies.

Because catastrophes such as the Great Depression and the 1980s depression in Latin America are rare events, one may question whether it is worth preparing for them. Perhaps it is enough to put strong prudential regulations and safety nets into place that control moral hazard during normal times. However, the costs associated with not knowing when to relax prudential standards or how to implement rescue packages are quite large (Caprio and Klingebiel 1996)—although few studies have explored the actual transitions from standard prudential regulation to the ex post safety nets generally associated with financial crises.

Conclusion

Safety nets are the result of a government decision to assume risk that otherwise would be borne by depositors and shareholders. Society often benefits from the ex-

pansion of banks and bank lending associated with this protection, but excessive financial expansion can take place if the government does not limit the amount of risk it assumes (either explicitly or implicitly). The threat of macroeconomic shocks makes design of prudential regulation difficult in small economies. Because governments generally assume responsibility for some macroeconomic risk, the private sector may be implicitly encouraged to undertake activities that are especially exposed to such risks. These considerations work in the direction of a tough regulatory framework, but a lack of flexibility may worsen the economy's response to an especially severe macroeconomic shock.

For most small, open economies, a desirable level of financial activity would be impossible without some assurance of government guarantees to depositors and banks. Financial deepening often accompanies strengthened guarantees. These government guarantees shift risk toward the government and imply that at some point the government may need to throw out a safety net that involves government resources. Wise governments in these small economies will create strong supervision to limit the size of the safety net but will also recognize the value of encouraging financial deepening to promote domestic lending and economic growth.

Notes

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1. The Caja was authorized to lend up to 50 percent of the assessed value of the real estate and was given legal precedence in the collection of its loans. In exchange for the mortgages, the Caja issued letters of credit with maturities of 21–25 years and coupon rates of 5–8 percent. Borrowers could then sell the letters on the secondary market for cash. Landholders who sold the letters on the secondary market received a higher price than without Caja backing because purchasers demanded a smaller insurance premium, knowing that the Caja, via its capital and reserves, was the primary insurer of the mortgages.

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Lessons in Structuring Derivatives Exchanges

George Tsetsekos • Panos Varangis

The global deregulation of financial markets has created new investment opportunities, which in turn require the development of new instruments to deal with the increased risks. Institutional investors who are actively engaged in industrial and emerging markets need to hedge their risks from these cross-border transactions. Agents in liberalized market economies who are exposed to volatile commodity price and interest rate changes require appropriate hedging products to deal with them. And the economic expansion in emerging economies demands that corporations find better ways to manage financial and commodity risks. The instruments that allow market participants to manage risk are known as derivatives because they represent contracts whose payoff at expiration is determined by the price of the underlying asset—a currency, an interest rate, a commodity, or a stock. Derivatives are traded in organized exchanges or over the counter by derivatives dealers.

Since the mid-1980s the number of derivatives exchanges operating in both industrial and emerging-market economies has increased substantially. What benefits do these exchanges provide to investors and to the home country? Are they a good idea? Emerging markets can capture important benefits, including the ability to transfer risks, enhance public information, and lower transaction costs, but the success of a derivatives exchange depends on the soundness of the foundations on which it is built, the structure that is adopted, and the products that are traded.

Since the mid-1970s interest and exchange rates and prices of primary commodities have fluctuated widely. Major exchange rates—both nominal and real—have varied since the move to the floating-rate system in 1973. Commodity prices have been even more volatile, with large shifts in supply and demand for individual commodities. Unanticipated changes in exchange rates, interest rates, and commodity prices introduce risks that cannot be ignored.

Financial price risk has important implications for both the private and public sectors. Price fluctuations not only affect business profits but can also affect a firm's

survival (Smith, Smithson, and Wilford 1990). Changes in exchange rates intensify competition from other countries. Commodity price fluctuations result in changes in input prices and costs. Similarly, changes in interest rates can lead to financial distress as borrowing costs increase. Governments are also affected by volatile markets, particularly in developing countries, where commodities exports account for a large share of total exports, affecting tax revenues. Moreover, a significant part of the external debt of developing countries carries variable interest rates and often is denominated in currencies that do not match the currency composition of their exports.

During the 1980s and 1990s financial markets responded to price volatility by introducing a vast range of instruments for managing price risks.¹ These instruments, which are called derivatives, represent contracts whose payoff at expiration is determined by the price of the underlying asset (a specific currency, interest rate, commodity, stock price, or stock price index). Examples of derivatives include forward, futures, and option contracts, and swaps (see the definitions in the appendix). Derivatives are traded both in organized exchanges and over the counter (OTC) by derivatives dealers. Approximately 75 derivatives exchanges are in operation worldwide, most of them in industrial countries, although a growing number of emerging economies plan to establish their own derivatives exchanges. The enormous levels of global trading for both exchange-traded and over-the-counter products (Abken 1994; Beckett 1993; Remolona 1992; Stout 1996) have attracted the attention of academic literature and the popular press, but relatively little has been published about the internal organization and structure of derivatives exchanges.

A derivatives exchange can be defined as a trading forum or a system that links a central marketplace (such as a trading floor or an electronic trading system), where all those with buying and selling interests in a product designed to permit the shifting of risk can meet, with a mechanism (such as a clearinghouse) for intermediating, validating, and enhancing the credit of anonymous counterparts. Elements of exchange design accordingly need to address issues related to the facilitation of trades and the reduction of credit risk in transactions among market participants.

The primary function of a derivatives exchange is to facilitate the transfer of risk among economic agents by offering mechanisms for liquidity and price discovery. *Liquidity* refers to the ability to buy and sell large volumes of derivatives contracts in a relatively short period of time without affecting prices. If risks are to be transferred efficiently, there must be a large number of agents ready to buy or sell. In other words, there must be agents who desire to reduce risk (that is, to obtain price insurance) and agents who want to accept risk (that is, to provide price insurance). The exchange brings together a large number of participants, making quick transactions at high volumes feasible. *Price discovery* refers to the establishment of a price for an asset. The exchange collects and provides immediate information regarding the price of an asset as traders continuously offer to buy or sell. Participants outside the exchange can easily obtain this information and find what the price for the asset is at any moment.

A critical element in the efficient transfer of risk among market participants is the microstructure of the derivatives exchange, which includes regulatory oversight, trading systems, settlement and clearing procedures, membership of the exchange, ownership of the clearinghouse, and products traded. An examination of the microstructure of derivatives exchanges around the world could yield recommendations for improvements in exchanges, as well as data for analyzing the relationships and linkages between critical exchange parameters and the broad economic environment.

In a well-designed derivatives exchange, resources are efficiently allocated, and risk-sharing arrangements are optimal. Merton and Bodie (1995) developed a framework that is applicable to derivatives exchanges and helps explain the institutional form of the exchange and the particular features of its microstructure. Perhaps the largest single influence has been the evolution of technology, such as communications, computer software, and electronic information systems (Chapman 1994; Stout 1996). The functions of a derivatives exchange may be performed under various organizational arrangements. For example, an American and a European derivatives exchange may have different arrangements for clearing and settling transactions, even though both exchanges may trade similar contracts.

This article provides information on key elements and characteristics of the exchange microstructure and identifies differences in organizational structure among derivatives exchanges. The information and analysis should be of particular interest to emerging economies seeking to develop a derivatives exchange.

Why Establish a Derivatives Exchange?

Economic reasons and national pride motivate the establishment of derivatives exchanges. A country's financial infrastructure is enhanced by the links among hedgers, speculators, and cash markets. A derivatives exchange can improve the allocation of resources, maintain efficient pricing and information flows, and act as a conduit for the transfer of risk within a country—and even across countries. Additionally, because derivatives exchanges make more information publicly available, credit systems and capital markets are more responsive, with uniform repayment regulations and market surveillance; transaction costs are lower; forward prices are more accurate; and resources are better allocated (Chang, Kaplan, and Knapp 1999, Peck 1985).

Derivatives allow risk-averse market participants (such as banks, farmers, processors, and traders) to offset risk among themselves or transfer it to other market participants willing to accept the risk-return ratio. In the process, derivatives attract additional participants who in turn increase the volume of transactions, thus contributing to the creation of a liquid market.

By definition, derivatives contracts traded at an exchange tend to be standardized; a clearinghouse guarantees transactions between parties, acting as buyer to all sellers

and seller to all buyers. By requiring that buyers and sellers deposit funds (margins) as security for their transactions and by adjusting these margins to reflect changes in market prices, the clearinghouse substantially reduces, or even eliminates, the performance (counterpart) risk among transacting parties.

In many emerging markets the price for an asset is difficult to determine. An active derivatives exchange plays an important role in facilitating an efficient determination of prices in the underlying cash (or spot) market by providing improved and transparent information on both current and future prices for an asset. For example, in commodity markets spot prices are often pegged to futures prices because the futures market provides excellent pricing information for the underlying product (for security markets, see Scott 1992). Prices on derivatives markets reflect anticipated supply and demand, and derivatives markets thus enhance the ability of market participants to make decisions about future production, processing, and trade.

The exchange writes the specifications for contracts traded, setting standards for grading, measurement, methods of transfer, times of delivery, and contractual obligations. The standardization makes these contracts conducive to centralized trading on an exchange. The ease with which transactions can be executed and positions opened and closed stimulates high trading volumes and higher usage than does the spot market. This ease of execution opens the exchange to almost anyone who wishes to trade, whether involved in the physical trade (spot market) or not, and contributes to reducing transaction costs.

Derivatives transactions using exchanges abroad or OTC markets can expose individual firms and financial institutions to greater risks, however. The increased exposure stems in part from the same source as the benefits: the ability to transfer risks easily means that some market participants are exposed to greater risk than would otherwise have been the case. In countries with weak accounting, auditing, and disclosure regulations, derivatives can be abused, which can potentially destabilize markets (Garber 1998).

Should emerging economies establish their own derivatives exchanges? The two key benefits from establishing a domestic derivatives exchange are improved price discovery and a higher correlation between the prices of derivatives products and cash prices. In this respect domestic derivatives markets may be more closely correlated with local cash market conditions. These benefits should be compared with the risks and benefits of using already established derivatives exchanges that are more liquid and that stress prudential regulation. Higher transaction volumes usually lower transaction costs, which can outweigh the benefit of having a derivatives contract closely associated with local market conditions. The major risks when using established exchanges are the lower correlation between exchange contract prices and local cash prices, and the risk associated with fluctuating exchange rates.

The establishment of derivatives exchanges in emerging markets requires certain preconditions, including well-functioning cash markets, a large number of traders

and speculators, a legal structure that includes a system of property rights and enforceable contracts, well-functioning credit institutions, the support of the government and policymakers, adequate financial resources (particularly for the clearinghouse), and the absence of competing derivatives products and exchanges (Leuthold 1992).

The Microstructure of Derivatives Exchanges

The success of a derivatives exchange is determined to a large extent by the soundness of the foundation on which it is built. Thus, the design of the formal structures and systems created to ensure orderly trading and execution of exchange transactions is crucial. The microstructure may become a form of competitive advantage to the degree that it motivates, facilitates, or enables price discovery and eliminates asymmetric information.

The microstructure of derivatives exchanges is important for several reasons. It provides insights into the workings of the market through an examination of the features of the exchange and of the linkages that allow a disciplined flow of orders and execution of transactions, and it plays an important role in creating and disseminating market information. Both trading activity and price determination are sensitive to institutional arrangements. Moreover, the microstructure ensures the smooth execution of transactions. Finally, market arrangements have implications for the long-term properties of derivatives contracts and the returns on underlying assets. Important elements of the microstructure include trading mechanisms, clearing arrangements, the regulatory structure, and the choice of derivatives products to be traded.

Trading Mechanisms and Clearing Arrangements

Depending on the automation and sophistication of the market, trades can be executed on the floor (open outcry) or through electronic trading (Domowitz 1995; Gennotte and Leland 1994). Increasingly, electronic trading is preferred (Chang, Kaplan, and Knapp 1999; Pirrong 1994).

Clearing trades typically involves processing of transactions, including reporting to transacting parties; confirmation of trades; and matching of orders. The function of the clearinghouse is to eliminate or reduce the counterparty credit (performance) risk by standardizing and simplifying the processing of transactions. The clearinghouse matches all purchases and sales on a daily basis. After all the trades have been matched, the clearinghouse becomes the seller to all buyers and the buyer to all sellers, thereby guaranteeing the contractual obligations of each transaction. Thus, the clearinghouse provides security in transactions and absorbs settlement failures

should these occur (Hentschel and Smith 1994; Mengle 1995). The ability to absorb failures is dependent on the provisions for capitalizing the agents involved (Iben and Brotherton-Ratcliffe 1994). Exchanges can own their own clearinghouse, or the clearinghouse can be owned by other exchanges or financial institutions, such as banks.

Exchange Regulation: Monitoring, Control, and Enforcement Functions

The proliferation of derivatives exchanges is a rather recent phenomenon, and governments are uncertain about how to regulate this market. Although there are signs of some tendencies toward convergence, the variations in legal and regulatory environments and in trade and business practices, together with the availability of derivatives products and the extent of domestic involvement in them, imply that systems will vary among countries. Despite the institutional choices available, the government's main objective is to monitor the exchange's activities and to set broad parameters for its operation. Minimum standards should be in place in areas such as contract design, market surveillance, reporting and record keeping, market transparency, safeguarding customer funds and assets, ensuring the financial integrity of the trading process, and protecting customers from fraud and markets from manipulation and trading abuses. Alongside these controls, a derivatives exchange needs to develop the capability to self-regulate by monitoring trading activities, ensuring contract execution, resolving disputes, enforcing rules and sanctions, and promoting professional conduct in order to increase investors' confidence (van der Bijl 1997).

Choice of Derivatives Products to Be Traded

To a large extent, the success of a derivatives exchange will depend on the choice of products to be traded. The main categories of products are commodities, interest rates, currencies, individual stocks, and stock indexes. The usual type of derivatives for these products are futures and options, although swap contracts are starting to appear in some exchanges. The products to be traded need to have the following characteristics: a sufficiently high level of price volatility to attract hedgers or speculators; a significant amount of money at risk; a significant number of domestic market participants—and possibly buyers and sellers from abroad; a large number of producers, processors, and banks interested in using derivatives contracts (that is, enough speculators to provide additional liquidity); and a weak correlation between the price of the underlying asset and the price of the already-traded derivatives contract(s) in other exchanges (basis risk). In the case of commodities, there also needs to be homogeneity in product specification, quality, and grade. The creation of a single derivatives contract is conducive to increasing the contract's liquidity and hence its appeal to hedgers and speculators. Note that financial products (that is, interest rates, currencies, and stocks) are almost by definition homogeneous products.

Results from an International Survey

This examination of derivatives exchanges is based on data from a survey that was distributed to 75 derivatives exchanges in 29 countries—almost all the exchanges that were in operation in 1996. Forty-two major exchanges in industrial and emerging markets answered the survey. Detailed results can be found in Tsetsekos and Varangis (1998), particularly in tables 1 through 11. Our analysis relied on the stage of development of the country's capital market to separate the respondents into emerging-market and industrial-country derivatives exchanges based on the International Finance Corporation's *Emerging Stock Market Factbook* (1988–95). Under this classification, 8 of the 42 respondents are considered to be emerging derivatives exchanges.

Chronology of Contract Introduction

The first derivatives contract was an agricultural contract introduced at the Chicago Board of Trade (CBOT) in 1859. That agricultural contracts were the first derivatives reflects that sector's importance in economic development during that period. Trading in derivatives of nonprecious metals began in 1878 at the London Metal Exchange. Globalization of transactions and exchange rate volatility led to the development of currency contracts in the late 1960s. Increasing capital mobility and the development of capital markets in emerging economies promoted the development of interest rate contracts and contracts based on stocks and stock indexes. The Chicago Mercantile Exchange (CME) introduced currency derivatives in 1968 and interest rate derivatives in 1971. Shortly thereafter, the Chicago Board of Options Exchange offered equity-based derivatives. Energy indexes were introduced in 1974, stock indexes in 1978, and swaps in 1989.

Although exchanges had typically introduced derivative instruments for agricultural commodities first and more recently added interest rate, index-based, and equity derivatives products, emerging markets have typically introduced index-based and interest rate derivatives first. Index-based contracts are derivatives contracts whose underlying price is the value of an index of stocks. The U.S. indexes are the Dow Jones Industrial Average, the S&P 500, and the Nasdaq 100. Other major indexes include the Nikkei 225 index in Japan, the FTSE 100 in the United Kingdom, the DAX in Germany, and the CAC 40 in France. In terms both of total number of products traded globally in derivatives exchanges and of volumes traded, the most popular products are based on stock indexes, followed by interest-rate-based products, currencies, and, finally, agricultural commodities.

FINANCIAL DERIVATIVES PREFERRED TO COMMODITY DERIVATIVES. In view of the globalization of commodities markets and the liberalization of agricultural markets

in emerging economies, these countries' interest in establishing commodity derivatives may seem less justifiable. Several reasons, however, explain this apparent anomaly. First, the liberalization of commodities markets has increased the pass-through of international commodity prices to domestic commodities, making the use of derivatives contracts traded abroad feasible for domestic hedgers. In other words, the basis risk for using existing derivatives contracts has been declining. For example, Mexican wheat producers may now find that using the CBOT wheat futures contract is feasible for hedging Mexican wheat price risk. Thus, the need to develop a Mexican wheat contract may be reduced.

Second, financial markets are more country specific, and the demand for derivative instruments stems mainly from domestic users. Equity derivatives are based on equities in the local stock market; currency derivatives refer to the local currency relative to a foreign currency; and interest rate derivatives are based on the local bond market. More recently, institutional investors have taken an interest in these products. For example, to take a position in the local stock market, an institutional investor could purchase (or sell) futures on the equity index. If an investor wants to purchase a domestic stock but hedge that purchase against a drop that would affect stocks across the board, he could purchase a "put" option on the domestic equity index. Thus the market (country) specificity of financial instruments (stocks, bonds, and currencies) usually makes derivatives based on these instruments appear in local markets. The introduction of derivative instruments usually follows the development of domestic capital markets, but in some cases derivative instruments based on one market are traded on another. For example, the Nikkei 225 stock average is traded on the CME, while Italian and German bonds trade on the London International Financial Futures Exchange (LIFFE), and the Brazilian real trades on the CME.

Third, experience has shown that financial derivatives attract relatively higher liquidity than commodity derivatives. The Budapest Commodity Exchange experienced a dramatic increase in volume when it introduced financial derivatives contracts. In Brazil the São Paulo Commodities and Futures Exchange (BM&F) reported that the turnover of all agricultural contracts traded was about \$3.5 billion for 1996, less than 1 percent of the total value of the \$4.2 trillion contracts traded. At the CBOT and the CME, agricultural trades were less than 30 and 5 percent, respectively, of the total trading volumes of the exchanges.

TIMING OF SUCCESSIVE CONTRACT INTRODUCTION. According to survey respondents, about 36 months elapsed between the introduction of the first and second contracts, 18 months between the second and third, and 48 months between the third and fourth. The survey finds that introducing a derivatives contract takes relatively longer in emerging than in industrial markets. A noticeable difference is that emerging-market exchanges introduce (stock) index products relatively more quickly than do industrial markets.

The survey shows that agricultural derivatives products were the first to be delisted by an exchange, followed by index products. The data do not cover exchange-traded products that are inactive (that is, still listed but not traded, or traded but illiquid).

Exchange Structure

Most exchanges use an open outcry system, but electronic trading systems are increasingly used. Twelve exchanges (of the 39 reporting) rely exclusively on electronic trading, and 8 others employ some form of electronic trading system. Recently established exchanges are more likely to use electronic-based systems for trading, anticipating lower trading costs, which will be more attractive to businesses and investors. An exchange using an electronic system could also draw business from traders around the world, significantly expanding the potential market. And advocates of electronic trading say that it could be safer. For example, at the Beijing Commodity Exchange each trade is checked for adequate margins before the computer accepts it. And the BM&F in São Paulo performs back-office trade clearing and processing, a task performed by member firms in most developed markets.

CLEARING ARRANGEMENTS. Most of the exchanges in the survey require initial margin deposits and margin calls (variation margins), with the exchange guaranteeing the contracts through its own clearinghouse. There is some uniformity in margin requirements across the exchanges surveyed, and most require initial and variation margins with daily settlements. There are, however, disparities in the ways that margin deposits are collected (whether gross or net) and in the collateral the clearinghouse accepts—cash, securities, or letters of credit. Two-thirds of the exchanges surveyed own their own in-house clearing facilities; the remaining third cited ownership by banks, other financial institutions, or other exchanges.

In recent years exchanges have begun to explore a system of common clearing to improve efficiency. In 1997 discussions picked up with an initiative by the Futures Industry Association to develop a proposal that meets the needs of all parties involved. In Canada the Winnipeg Commodity Exchange is negotiating with the Canadian Derivatives Clearing Corp. (CDCC) to enter into a clearing services agreement. CDCC clears for the Toronto and Montreal exchanges.

EXCHANGE OWNERSHIP AND MEMBERSHIP. Most exchanges operate as nonprofit self-governing entities owned by their members; a few operate as subsidiaries of other exchanges or as limited liability companies. Exchange membership distinguishes between full (or regular) and associate (or limited) members. Only full members are entitled to voting privileges pertaining to self-regulation of the exchange. Associate members have the same trading rights as full members, but often their activities do not cover clearing transactions. Among the exchanges in the survey, the median

percentage of full or regular members is 80 percent, of which 76 percent have clearing rights. Only 16 percent of associate members have clearing rights.

Survey respondents indicated that the prevailing regulatory structure was exercised through a parliamentary law, under the authority of the government.

Economic and Capital Market Conditions

Using data from the International Monetary Fund's *International Financial Statistics* for various years, we examined the extent to which differences in economic and capital market conditions explain differences in the derivatives exchanges in industrial and emerging economies. As economic proxies, we used changes in consumer prices, prime interest rates, government bond yields, industrial production, growth in real gross national product (GNP), the level of GNP, and the share of investments in GNP. As proxies for capital market conditions, we used stock market turnover and capitalization, the variance in stock market capitalization, the value of stocks traded, the volatility in value traded, and the number of listed companies in the stock exchange, as reported by the International Finance Corporation in its *Emerging Stock Market Factbook*.

We found no statistically significant differences between emerging and industrial derivatives markets with respect to the economic proxies. We did find some differences in capital market conditions, but these may be explained by the size and maturity of industrial capital markets. We concluded that our tests give no conclusive indicators for the degree of market readiness for developing a derivatives exchange. In this respect, additional research is needed to establish whether such indicators exist and, if they do, to quantify them.

Launching New Derivatives Exchanges and Products

In considering the establishment of new derivatives exchanges, policymakers should begin with a feasibility analysis. Such an analysis should investigate the degree to which the preconditions discussed earlier are met, identify key areas of weakness, and formulate plans to address these areas. There is no point in proceeding with the design of the exchange and the products to be traded until this analysis is conducted. The next step involves selecting the products to be traded and deciding on the elements of the exchange's microstructure. The research presented here, and experiences from various countries, point to some important lessons.

First, the chances of success are higher if index-based and interest-rate-based derivatives products are introduced first. Because our survey indicated that it takes more time to introduce derivatives contracts in emerging than in industrial markets, with the notable exception of derivatives based on an index of equities, emerging markets are likely to have more success in introducing financial derivatives related to equities.

Recent experience indicates that derivative instruments on agricultural products are more difficult to introduce because liberalization of agricultural markets tends to lag behind financial markets. Furthermore, financial markets tend to create much more liquidity than agricultural markets. For instance, in 1996 the Budapest Commodity Exchange increased its liquidity by 400 percent when it introduced financial contracts (mainly currency) to its product line. And because of the globalization of commodity markets, the potential for using existing contracts in established exchanges reduces the need to develop local agricultural contracts. As a general rule, emerging-market economies that have relatively successful commodity exchanges have sizable local commodity markets (for example, Argentina, Brazil, China, and Malaysia).

Second, appropriate regulations and a conducive legal environment are crucial for the development of derivatives exchanges. The literature attributes problems in the legal-regulatory infrastructure as major impediments in the drive to develop derivatives exchanges in emerging markets. The most important of these problems are:

- Antagonism between market sectors (banking, derivatives, and securities) over which entity should regulate and supervise the exchange—and under what rules
- A lack of confidence as a result of scandals, corruption, and market failures
- Uncertainty about the equitable application of laws and regulations, the enforceability of obligations, and the lack of market-oriented insolvency laws.

Third, partnerships and joint ventures between new and existing exchanges can be mutually beneficial. The CBOT is considering such ventures with exchanges in Argentina, Poland, and Turkey. Established exchanges can offer technology and know-how, and their members in turn can gain access to a potentially high-growth market. In fact, rather than setting up their own derivatives exchanges, several emerging economies could do better by using other well-established exchanges and listing their products with them. Regional exchanges such as the Stockholm-based Options Market offer another way to improve market liquidity, but they may be harder to develop and coordinate.

Fourth, policymakers in emerging economies should look at whether access provided to market participants in their countries allows them to trade in derivatives exchanges abroad. Even where there are local exchanges, removing the barriers to overseas trading could increase the liquidity of the local exchange by providing opportunities for arbitrage between local and foreign exchanges.

Fifth, electronic trading appears to be the choice among new exchanges. Lower transaction costs for users are often cited as the key benefit of electronic trading.

To some extent, derivatives markets complement developments in the stock markets. By the end of 1996, more than 78 developing countries had stock markets; during the 1990s their capitalization increased more than 10 times, and the number of domestic companies listed more than doubled. Derivatives exchanges have played a major role in these developments. They have contributed to more balanced alloca-

tion of resources and have enabled the transfer of risk within a country and even across countries. Although there are concerns about the explosive growth of derivatives and the risks that they may create, business at these exchanges is increasing, and the exchanges continue to grow and to introduce new products.

Appendix. Types of Derivative Instruments

Forward Contracts

A forward contract is an agreement to purchase or sell a given asset at a future date at a fixed (predetermined) price. In a forward contract the buyer and the seller assume each other's performance risk. The terms and conditions of the forward contract are usually specific to each transaction, although some forward contracts are standardized.

Futures Contracts

A futures contract is similar to a forward contract: the buyer (seller) of a futures contract agrees to purchase (sell) a specified amount of an asset at a specified price on a specified date. But futures contracts differ significantly from forward contracts in several ways. First, contract terms (amounts, grades, delivery dates, and so forth) are generally standardized. Second, transactions are handled only by organized exchanges through a clearinghouse system. Third, profits and losses in trades are settled daily (marked to market). Fourth, futures contracts require depositing a certain amount of margin money in the exchange as collateral. Fifth, while forward contracts involve delivery (exchange) at maturity, futures contracts are usually closed before that. Thus, futures contracts separate the purchase and sale of assets from hedging. Through these arrangements, futures contracts significantly reduce the credit and default risk entailed in forward transactions. Contract standardization also improves liquidity (that is, the contract volumes traded).

Options Contracts

An option on a futures contract is the right—but not the obligation—to purchase or sell a specified quantity of the underlying futures contract at a predetermined (strike) price on or before a given date. Exchange-traded options, like futures contracts, are standardized. There are also over-the-counter options offered by banks and brokers, which can be customized. The purchase of an option is equivalent to price insurance; therefore, there is a price to be paid (just like an insurance premium). Some important definitions regarding options are:

Call. A call option gives the buyer the right, but not the obligation, to buy the underlying futures contract at a predetermined price during a given period of time. Call options are usually purchased as insurance against price increases.

Put. A put option gives the buyer the right, but not the obligation, to sell the underlying futures contract at a predetermined price during a given period of time. Put options are usually purchased as insurance against price declines.

Strike or exercise price. The price at which the futures contract underlying an option can be purchased (if a call) or sold (if a put).

Premium. The price paid for the options contract.

Exercise. To exercise a call (or put) is to buy (or sell) the underlying futures contract at the strike price.

Time to expiration. An option is good only for the length of time specified in the contract. The last day that an option can be exercised is called the expiration date.

Swap Contracts

A swap contract is an agreement to exchange, or swap, a floating price or rate for a fixed price or rate (or vice versa) for an asset at specific time intervals. A swap is like a series of forward contracts lined up on a schedule, but it does not involve physical exchange of assets. Swaps solve problems relating to the need for longer-term price fixation, but they tend to be credit-intensive and carry the risk of nonperformance.

Notes

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1. According to the Bank for International Settlements (BIS), at the end of 1996 the notional principal outstanding of financial derivatives approached \$35 trillion, of which approximately \$10 trillion was in exchange-traded instruments; the rest was traded over the counter.

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Growth and Institutions: A Review of the Evidence

Janine Aron

Africa's disappointing economic performance, the East Asian financial crisis, and the weak record of the former Soviet Union have focused attention on the role of institutions in determining a country's economic growth. This article critically reviews the literature that tries to link quantitative measures of institutions, such as civil liberties and property rights, with growth of gross domestic product across countries and over time. An important distinction is made between indicators that measure the performance or quality of institutions and those that measure political and social characteristics and political instability. The evidence suggests a link between the quality of institutions and investment and growth, but the evidence is by no means robust.

I wish to assert a much more fundamental role for institutions in societies; they are the underlying determinant of the long-run performance of economies.

North 1990: 107

The role of institutions in promoting growth in developing and emerging economies has sparked renewed interest in recent years (World Bank 1993, 1997; Stiglitz 1998). A burgeoning literature thus seeks to determine the extent to which the quality of public and private economic institutions, the particular structure of governance, and the extent of social capital (or civic engagement) affect growth. Evidence from global cross-country econometric studies is potentially important because the paucity and weakness of both macroeconomic and institutional data for many developing countries preclude robust policy interpretations on a country-by-country basis (Srinivasan 1995; Lal and Myint 1996).

If there is clear evidence that weak political and economic institutions significantly hamper growth, policymakers might propose measures that strengthen institutions in particular ways or that encourage more appropriate political structures (Aron 1996). For instance, African countries usually form a significant part of the

cross-country samples, and the region plays a distinctive role in this literature. Many African countries possess very weak public and private institutional frameworks, and Sub-Saharan Africa has experienced the slowest economic growth of any region in the world, with poverty large and deepening.¹ Several cross-country studies of growth (for example, Easterly and Levine 1997) have found that the conventional factors of growth (labor, physical and human capital accumulation, and so on) do not fully explain Africa's experience and have turned to an institutional explanation.

Unfortunately, interpreting the evidence on growth using institutional measures is not a straightforward matter. First, the process of integrating institutions and institutional change into economic theory is of comparatively recent vintage. The growth literature does not subscribe to one overarching definition of economic, political, and social institutions, their processes of change, and their likely channels of influence on economic outcomes. Yet, as North (1990: vii) suggests, "The specification of exactly what institutions are, how they differ from organizations, and how they influence transaction and production costs is the key to much of the analysis." In the empirical literature the terms politics and institutions encompass a wide range of indicators, including institutional quality (the enforcement of property rights), political instability (riots, coups, civil wars), characteristics of political regimes (elections, constitutions, executive powers), social capital (the extent of civic activity and organizations), and social characteristics (differences in income and in ethnic, religious, and historical background).² Economists often rely on several of these types of indicators to capture the features of institutions, although each has a potentially different channel of impact on growth.

Second, the growth literature is burdened by a range of serious problems with data, methodology, and identification, which many authors underestimate or choose to ignore (see the survey in Temple 1999). As Heston and Summers (1996) note, there has been an astonishing proliferation of research based on the Penn World Tables data. Yet, although various studies establish statistically significant relationships, they frequently do not test the sensitivity of their results to different model specifications, data outliers, measurement errors, reverse causality between regressors and growth, and bias due to the possible omission of variables.

Finally, much of the cross-country empirical literature on growth, while loosely related to the structural growth models of Solow (1956) and Mankiw, Romer, and Weil (1992), in fact consists of reduced-form growth regressions (explained in box 1). The structural Solow growth equation (explained in box 2) includes current investment as a determinant of growth, as well as a range of other variables (such as population growth, income, and human capital). Where the variables that measure the quality of institutions enter this equation, they can be interpreted as having a direct effect on growth because they improve the efficiency of investment. Since investment is already included in the growth equation, any effects that institutional variables exert on growth through an increase in the volume of investment are indi-

Box 1. *Structural Growth Equations versus Reduced-Form Growth Equations*

In the literature on growth and institutions, it is important to distinguish between the results from *structural* models and those from *reduced-form* models.

The complete structural system for a growth model consists of at least two equations, usually derived from economic theory—typically, equations for current growth and investment. Although current investment is a determinant of current growth, there also is reverse causality. For instance, high current growth may have a demand effect on investment and may also increase saving, which in turn helps to finance investment. The variables whose value is determined within the system—namely, growth and investment—are called *endogenous* variables; those outside the system, on which the system has no influence, are called *exogenous* variables. For example, population usually is treated as *exogenous*. Examples of *lagged* endogenous variables in growth models are beginning-of-period values for income or the level of human or physical capital.

Single structural equations. Many empirical growth models are based on single structural growth equations (for example, the Solow growth equation). Since there is reverse causality between current growth and investment, it becomes important to correct for bias (or overestimation) in calculating the importance of investment for growth. Most single-equation growth studies fail to make this correction. A discussion of these issues in some of the literature on politics and institutions appears in Deaton and Miller (1996).

Reduced-form models. In reduced-form models, the endogenous dependent variable is expressed only in terms of exogenous variables and parameters. For example, endogenous investment on the right-hand side of the equation is replaced by a set of variables fully determining investment. Thus the reduced form describes the results of interactions among the endogenous variables but not the simultaneous interactions themselves. The important disadvantage of these models, generally speaking, is that one loses the ability to distinguish the different channels of influence on growth (for example, to quantify the effect of investment on growth). Moreover, in many single-equation reduced-form growth equations in the literature, the set of variables determining investment is incomplete or contains other current endogenous variables.

rect. A separate investment equation would be necessary to ascertain the direct effects of institutional variables on the volume of investment.

However, no problem arises in connection with the simultaneity of investment and growth when reduced-form growth regressions are used because these regressions omit the investment variable and replace it with the set of variables that determine investment. For sufficiently general models, this approach should capture both the influences on the volume of investment and the efficiency of investment (that is, both the direct and indirect influences on growth). Unfortunately, therefore, when institutional quality variables are included, the different effects of institutions on growth are conflated and difficult to disentangle. Furthermore, in practice these models are rarely sufficiently general.

This review examines a range of influential studies in the heterogeneous literature on growth and institutions, both to obtain a better understanding of the linkages involved and to assess critically the sometimes strong claims made by the authors. It argues that a sensible interpretation of the effects of politics and institutions on eco-

Box 2. *How Do Institutions and Politics Enter the Solow Growth Model?*

Solow's model of economic growth is based on the premise that output in an economy is produced using a combination of labor (L) and capital (K), under constant returns, so that doubling inputs results in a doubling of output. Modern versions of the story distinguish between physical and human capital. The quantity of output (y) is also determined by the efficiency (A) with which capital and labor are used, or

$$(1) \quad y = Af(L, K).$$

With the further assumption of competitive markets, the growth rate of the economy, then, is a weighted sum of the growth rates of the efficiency parameter, g_A (sometimes called technical progress), of the labor force, g_L , and of the capital stock, g_K , where the weights on the latter two are the shares of payments to labor and capital in gross domestic product:

$$(2) \quad g_y = g_A + a_L g_L + a_K g_K$$

A critical assumption in the Solow model is that the marginal product of capital decreases with the amount of capital in the economy. In the long run, as the economy accumulates more and more capital, g_K approaches 0, and the growth rate is determined by technical progress and growth in the labor force. But in the short run, an economy that accumulates capital faster will enjoy a higher level of output.

Cross-country growth regressions study the determinants of growth by using each country's experience as a data point. Typically, there are two types of regressions: (a) those (the majority) that estimate changes in levels of output—essentially estimating equation (1) at two points in time—and (b) those that estimate equation (2), linking growth rates over several decades with technical progress (assumed constant across countries) and with labor force and capital stock growth rates.

How can country institutional differences enter into these regressions? For both categories, the quality of institutions can affect technical progress. For instance, David (1997) discusses how take-up of technology is constrained by “social capability.” Thus the rate of technical progress is no longer constant across countries; rather, it depends on country-specific institutional differences. For those in the first category, the country's initial level of technical efficiency may be affected by the quality of its institutions. This in turn will affect the efficiency of investment. Regressions that neglect the role of initial technical efficiency (due to institutions) may then overstate the role of investment in economic growth. Finally, in many developing countries there are threshold levels of infrastructure, property rights, and education (all of which are sensitive to institutions) that must be met before production is feasible. The presence of these thresholds means that the constant-returns assumption may not hold. Thus, introducing country-specific institutional variables can affect the estimate of the responsiveness of output to capital (human as well as physical) in both categories of regressions.

economic growth requires a more structural theoretical approach based on a common institutional framework.

What Is Meant by the Term “Institutions,” and How Are They Measured?

Proxies for institutions were first introduced into cross-country growth and investment equations more than a decade ago, and recently this literature has experienced

a renaissance. Researchers have used diverse measures, encompassing political instability, the attributes of political institutions, social characteristics and social capital, and measures of the quality of institutions that affect economic exchange. The literature on economic growth typically has classified and treated these proxies collectively as “sociopolitical measures.” This practice has tended to obscure the different channels through which institutions operate and has impoverished the interpretation of the role of institutions in growth. This is a serious flaw in analyzing developing countries, where weak institutions are implicated in low growth.

Defining Institutions

Classifying schools of thought in the relatively recent tradition of political economics, Posen (1998) indicates that the considerable influence of North (1990) and his school largely has affected political scientists and economic historians, not economists as such. Yet North provides a clear institutional framework that may be integrated with the burgeoning economic literature to provide a richer interpretation of the effect of institutions on growth. Consider the following observation:

We have only to contrast the organisation of production in a Third World economy with that of an advanced industrial economy to be impressed by the consequences of poorly defined and/or ineffective property rights. Not only will the institutional framework result in high costs of transacting in the former, but also insecure property rights will result in using technologies that employ little capital and do not entail long-term agreements. . . . Moreover, such mundane problems as the inability to get spare parts or a two-year wait to get a telephone installed will necessitate a different organisation of production than an advanced country requires. A bribe sufficient to get quick delivery through the maze of import controls or get rapid telephone installation may exist, but the resultant shadow transactions costs significantly alter relative prices and consequently the technology employed. (North 1990: 65)

The institutional framework comprises both formal and informal constraints. North describes a continuum with unwritten taboos, customs, and traditions at one end and constitutions and laws governing economics and politics at the other. In the absence of formal rules, a dense social network leads to the development of customs, laws, trust, and normative rules that constitute an informal institutional framework (for example, see Bates 1989). Naturally, informal constraints on behavior are pervasive and important in modern economies too (David 1994, 1997).

With economic development comes a unidirectional move along the continuum as increasing specialization and the division of labor associated with more complex societies raise the rate of return to formalizing political, judicial, and economic rules

and contracts that facilitate political or economic exchanges. There is a hierarchy of such rules: from constitutions, to state and common laws, to specific by-laws, to individual contracts. Usually, the higher the rules lie in the hierarchy, the more costly they are to alter.

WHY ARE INSTITUTIONS WEAKER IN SOME COUNTRIES THAN IN OTHERS? Institutions may be weak because rules simply are absent, rules are suboptimal, or useful rules are poorly enforced. North emphasizes the cost of information, since resources are required not only to measure the attributes of a good or service in economic exchange but also to define and measure the rights that are transferred and to protect these rights by policing and enforcing agreements. The more complex is the exchange, the more costly are the institutions. Where such costs are prohibitive (given the technology), rules may not be worth devising, and ownership rights remain undefined. Of course, changes in technology or in relative prices may alter the relative gains from devising rules. Where rules do exist, they may be counterproductive (excessive import controls, for instance). Finally, useful rules may not be enforced when the costs of monitoring and enforcement prove too high. For instance, constitutions abound in Africa, but many are ineffective. Similarly, a lack of correlation between the central bank's constitutional autonomy and low inflation in developing countries is likely due to weakness of the judiciary in enforcing autonomy (Cukierman, Webb, and Neyapti 1992).

HOW IS ECONOMIC GROWTH AFFECTED BY THE INSTITUTIONAL FRAMEWORK? The structure of both formal and informal rules and the character of their enforcement are what define the incentives and wealth-maximizing opportunities of individuals and organizations. North (1990: 110) asserts, "Third World countries are poor because the institutional constraints define a set of payoffs to political/economic activity that do not encourage productive activity." Such rules affect both individuals and organizations, defined as political organizations (city councils, regulatory agencies, political parties, tribal councils), economic organizations (firms, trade unions, family farms, cooperatives, rotating credit groups), educational bodies (schools, universities, vocational training centers), and social organizations (churches, clubs, civic associations).

The institutional framework affects growth because it is integral to the amount spent on both the costs of transactions and the costs of transformation (in the production process). Transaction costs, for example, are far higher when property rights or the rule of law are not reliable. In such situations private firms typically operate on a small scale, perhaps illegally in an underground economy, and may rely on bribery and corruption to facilitate operations. Transformation costs, too, can be raised substantially because unenforceable contracts mean using inexpensive technology and operating less efficiently and competitively on a short-term horizon.

When institutions are poorly defined or there are few formal institutions, economic activities are restricted to interpersonal exchanges. In such cases, repeat activities and cultural homogeneity facilitate self-enforcement. Transaction costs may be low in such an environment, but transformation costs are high because the economy operates at a very low level of specialization. Economic exchange also could operate at one remove, via social networks, but contracts still are constrained by kinship ties. It is clear, however, that firms or agents in an environment of weak institutions cannot engage in complex, long-term, and multiple-contract exchanges with effective enforcement as they do in industrial economies. A basic structure of property rights that encourages long-term contracting appears essential for the creation of capital markets and economic growth.

Rules with the wrong incentives can be hard to change when the costs are too high. There may be considerable sunk costs in developing political and economic organizations that can operate in a weak institutional environment. It is conceivable that such organizations ultimately could force an improvement in institutions, but unless a certain threshold of inefficiency is reached, they are more likely to perpetuate and entrench the weak institutional environment. Any organizations that develop in this framework may then become more efficient, but more efficient at making the society even less productive.

Classifying Institutions by Empirical Measures

The political science literature has been constructing and testing measures of political instability, political and civil freedom, and the characteristics of democracy for many years (Przeworski and Limongi 1993). Kormendi and Meguire (1985) and Scully (1988) are among the first papers to explore the effect of variables describing qualitative political and civil liberties on cross-country growth and investment. More recently, the literature has adapted a number of the original indexes but is increasingly using disaggregated measures by country risk-rating or credit-rating agencies using subjective surveys to capture more focused economic notions of institutional quality, such as respect for property rights.

The way in which the empirical institutional measures are categorized is important for interpreting their effects. The theory-based classification adopted here differs from related empirical surveys by Alesina and Perotti (1994) and Brunetti (1997) in that it distinguishes between measures that describe the attributes of institutions and those that evaluate their performance.³

Descriptions of the features of political and economic institutions—such as the presence or absence of constitutional rights—say nothing about how well such institutions perform. In contrast, measures of the quality of formal and informal institutions indicate how effectively the existing institutional rules or norms are implemented. For example, measures of the quality of formal institutions include

subjective rankings of the effectiveness of property rights and of the bureaucracy (that is, the ease of doing business), often drawn from cross-country surveys conducted by risk agencies. Such measures are proxies for the transaction and transformation costs of production that may affect the volume and efficiency of investment and hence growth (there also may be reverse causality from growth and investment to institutions).

It is difficult to measure informal constraints, but Putnam (1993) provides some measures of social capital that capture the extent (or perhaps the quality) of civic activity and organization. As indicated by North, informal social constraints based on the trust and norms inherent in networks and associations may influence growth both directly and indirectly (as with formal constraints). Some measures of social capital also reflect the ability of citizens to hold the state accountable. This highlights the role of external domestic and international agencies in promoting good governance, including civil society (Collier 1996). An example of such a measure is the subjective Gastil index of civil freedoms (including freedom of the press and of assembly).⁴ Again, there could be a reverse causality from growth and investment to social capital.

It also is important to distinguish between the performance of formal and informal institutions and various measures of social characteristics and political instability. Clearly, although extremes of political instability leading to riots and civil war can destroy existing investment, the way in which instability affects the volume and efficiency of new investment is probably through limits on the effectiveness of formal and informal institutions. Social measures such as the degree of ethnic diversity in a country may well explain the tendency to experience political instability (or the duration of different political regimes) or could have a direct impact on the character of social capital and of formal institutions.

Thus social characteristics are perhaps more appropriate in explaining the duration of political regimes, while political instability measures and social characteristics may explain formal and informal property rights. Note again the possibilities for reverse causality, although social characteristics are fairly exogenous measures (Aron 1998).

Table 1 classifies the components of indicators of institutional measures in five categories: quality of formal institutions (typically drawn from surveys or risk ratings by investors); measures of social capital, which capture the intensity of social participation and organization; measures of social characteristics, including ethnic, cultural, historical, and religious categories; characteristics of political institutions, including constitutional rights and descriptions of the type of regime (dictatorship, democracy); and measures of political instability, including riots, strikes, civil war, duration of regime, and changes in the executive. The table also differentiates subjective measures, based on surveys and personal assessments, and objective measures,

(Text continues on page 114.)

Table 1. *Political, Economic, and Social Measures from the Empirical Growth Literature*

<i>Institutional measure</i>	<i>Source</i>	<i>Period, country</i>	<i>Components of index^a</i>	<i>Growth references using the measures</i>
<i>A. Institutional quality measures</i>				
BERI disaggregated business risk indicators: subjective (ranked by a "permanent" panel of experts)	Knack and Keefer (1995), data from Business Environmental Risk Intelligence (BERI): private firm for potential foreign investors	Annual from 1972; about 47 countries (7 African countries); not all countries start in 1972	<i>Security of contract and property rights</i> Bureaucratic delay; nationalization potential; contract enforceability; infrastructure quality	Knack and Keefer (1995, 1997); Barro (1996a); Clague and others (1996); Hassan and Sarna (1996); Knack (1996); Lane and Tornell (1996)
ICRG disaggregated business risk indicators: subjective (ranked by staff of political risk services)	Knack and Keefer (1995), data from International Country Risk Guide (ICRG): private firm for potential foreign investors	Annual from 1982; 135 countries (34 African countries); not all countries start in 1982	<i>Security of contract and property rights</i> Rule of law; corruption in government; quality of the bureaucracy; repudiation of contracts by government; expropriation risk of private investment	Knack and Keefer (1995, 1997); Barro (1996a); Clague and others (1996); Hassan and Sarna (1996); Knack (1996); Lane and Tornell (1996); Sachs and Warner (1997)
Business International disaggregated risk indicators: subjective (ranked by local observers)	Mauro (1995), data from Business International (BI): private firm for potential foreign investors, now incorporated into the Economist Intelligence Unit	1971–79, annual; 57 countries 1980–83, annual; 68 countries (10 African countries)	<i>Institutional quality</i> Corruption index; bureaucratic efficiency: sum of three measures (efficiency of judicial system, absence of red tape and absence of corruption); political stability: sum of six measures (institutional change, social change, opposition takeover, stability of labor, relationship with neighboring countries, terrorism); institutional efficiency sums all nine	Mauro (1995); Clague and others (1996); Helliwell (1996a)

(Table continues on the following pages.)

Table 1 (continued)

<i>Institutional measure</i>	<i>Source</i>	<i>Period, country</i>	<i>Components of index^a</i>	<i>Growth references using the measures</i>
Borner, Brunetti, and Weder's political credibility index: subjective (ranked by local entrepreneurs)	Borner, Brunetti, and Weder (1995), based on own 1992–93 survey of entrepreneurs in 28 countries	1981–90; 28 countries (8 African countries)	<i>Political credibility</i> Unexpected changes in laws and policies regularly affecting business; expectation that government sticks to major announced policies; changes in uncertainties over lawmaking in the last decade	Borner, Brunetti, and Weder (1995); Brunetti, Kisunko, and Weder (1998)
Measure of contract-intensive money: objective	Clague and others (1995)	Uses available data in <i>International Financial Statistics</i> (IMF)	<i>Poor enforcement of contracts or property rights</i> $M2 - C/M2$; $M2$ is broad money, and C is currency outside banks (increases with efficiency)	Clague and others (1995, 1996)
Heritage Foundation index of economic freedom: partly subjective (but not from risk-rating agencies)	Heritage Foundation, Washington, D.C.	Annual, from 1996; 161 countries	<i>Dimensions of market efficiency</i> Trade policy; taxation; government intervention; monetary policy; capital flows and foreign investment regulations; banking regulations; wage or price controls; protection of property rights; efficiency of regulation; extent of parallel market	Ng and Years (1999)
Gastil's political rights index (Freedom House index): subjective (ranked, but not by local observers)	Gastil (1989, 1991), based on published and unpublished information about individual countries	Annual, from 1973; 165 countries	<i>Political rights measure (sometimes called "democracy")</i> Meaningful election of chief authority; meaningful election of legislature; fair campaigning; fair reflection of voter preference; multiple political parties; no military control; decentralized political power; informal consensus; significant opposition vote; recent shift in power through elections; no denial of self-determination of major groups	Kormendi and Meguire (1985); Scully (1988); Barro and Lee (1994); Helliwell (1994); Sachs and Warner (1995); Savvides (1995); Alesina and others (1996); Barro (1996a); Ghura and Hadjimichael (1996); Perotti (1996); Isham, Kaufmann, and Pritchett (1997)

<i>Euromoney</i> country risk disaggregated ratings: mixed objective (financial market conditions) and subjective (ranked by average of evaluations of international panel of 35 bankers and analysts)	<i>Euromoney</i> (various issues)	Annual, from 1970 (35 African countries) Disaggregated data from 1992 (changed methods of calculation of index in 1987)	<i>Components of country risk</i> Economic performance projections; political risk (subjective); debt indicators; debt in default or rescheduled; average of Moody or Standard and Poor credit ratings (part subjective); access to bank lending; access to short-term finance; access to capital markets (part subjective); discount on forfeiting <i>Property rights proxy</i> ("political risk") Risk of nonpayment or nonservicing of payment of goods, services, loans, trade-related finance and dividends and of nonrepatriation of capital <i>Property and contracts rights</i> Credit rating	Clague and others (1996)
<i>Institutional Investor</i> rating of risk of default on sovereign debt: subjective (ranked by international panel of bankers)	<i>Institutional Investor</i> (semiannual publication)	March and September, from 1979; more than 100 countries (25 African countries)		
<i>B. Social capital measures</i>				
Gastil's civil liberties index (Freedom House index): subjective (ranked, but not by local observers)	Gastil (1989, 1991), based on published and unpublished information about individual countries	Annual, from 1973; 165 countries	<i>Civil liberties measure</i> No censorship; open public discussion; freedom of assembly; freedom of political organization; guaranteed socioeconomic rights; no gross inequality; no government indifference; no political terrorism; rule of law in political cases; freedom of religion; free trade unions; freedom of business; guaranteed personal rights; freedom of private organizations	Scully (1988); Levine and Renelt (1992); Barro and Lee (1994); Helliwell (1994); Sachs and Warner (1995); Savvides (1995); Alesina and others (1996); Barro (1996a); Ghura and Hadjimichael (1996); Perotti (1996); Isham, Kaufmann, and Pritchett (1997)

(Table continues on the following pages.)

Table 1 (continued)

<i>Institutional measure</i>	<i>Source</i>	<i>Period, country</i>	<i>Components of index^a</i>	<i>Growth references using the measures</i>
Gastil-Wright economic freedom ratings: subjective (ranked, but not by local observers)	Wright (1982)	One year only; 165 countries	<i>Economic freedom</i> Freedom of property; freedom of association; freedom of movement; freedom of information	Spindler (1991)
Banks's government purges and peaceful demonstrations: objective	Banks (1975 onward)	1970 onward; currently more than 190 countries	<i>Social capital measures</i> Purges: any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition Antigovernment demonstrations: any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly antforeign nature	Easterly and Levine (1997)
World Values Survey: subjective (surveys)	Inglehart (1994a); indexes in Knack and Keefer (1997)	1981, 1990–91 surveys of countries; more than 43	<i>Cultural values</i> Thrift; determination; hard work; obedience; religious faith; respect <i>Social capital measures</i> Associational relationships; trust	Inglehart (1994b); Helliwell (1996a, 1996b); Knack and Keefer (1997)
Putnam's social capital and local government and institutional performance measures: mixed objective and subjective (local surveys)	Putnam (1993)	1860–1987; Italian regions	<i>Civic community</i> Preference voting; referendum turnout; newspaper readership; number of sports or cultural associations <i>Institutional performance</i> Reform legislation; day care centers; housing and urban development; statistical and information services; legislative innovation; cabinet stability; family clinics; bureaucratic responsiveness; industrial policy instruments; budget promptness; local health unit	Helliwell and Putnam (1995)

			spending; agricultural spending <i>Local government performance</i> Implementation of 15 communal facilities including sports, sewers, libraries, trash collection, water system, school transport, day care centers	
<i>C. Social characteristics</i>				
Taylor and Hudson's ethnolinguistic fractionalization measure: objective	Mauro (1995), based on data from Taylor and Hudson (1972)	1960; 113 countries (12 African countries)	<i>Ethnolinguistic fractionalization</i> Probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group <i>Measures of ethnic tension</i> Racial tension in 1984; proportion of population belonging to minorities at risk in 1990; percentage of population not speaking country's official language at home; percentage of population belonging to separatist movements in 1960 and 1975	Many studies, including Mauro (1995); Perotti (1996); Easterly and Levine (1997); Collier (1999)
Easterly and Levine's ethnic diversity and tension measures: objective	Easterly and Levine (1997) data set, from various sources	Specific years as indicated; more than 75 countries	<i>Social development and capability</i> Size of traditional agricultural sector; extent of dualism; extent of urbaniza- tion; character of basic social organiza- tion; importance of indigenous middle class; extent of social mobility; extent of literacy; extent of mass communication; crude fertility rate; degree of moderniza- tion of outlook	Easterly and Levine (1997)
Adelman-Morris index of social development: objective, plus subjective exclusion of two indicators	Adelman and Morris (1968)	1957-62; 73 countries (26 African countries)	<i>Social requisites for democracy</i> Colonial status based on most recent ruler after 1776; religious affiliation by majority religion in a seven-way breakdown (proportion of population)	Temple and Johnson (1998)
Barro's measures of colonial status and religious affiliation: objective	Barro (1996a)	138 and 136 countries, respectively		Barro (1996a)

(Table continues on the following pages.)

Table 1 (continued)

<i>Institutional measure</i>	<i>Source</i>	<i>Period, country</i>	<i>Components of index^a</i>	<i>Growth references using the measures</i>
<i>D. Political characteristics</i>				
Clague, Keefer, Knack and Olsen's political regime indicators: objective	Clague and others (1996), constructed from Banks (1979), Gurr (1990) to 1986 and extrapolated to 1990 with <i>Europa Yearbook</i>	Around 1969–90	<i>Type and duration of political regime</i> Dictatorship, almost dictatorship, intermediate category, almost democracy, and democracy; type of regime based on rankings from summing outcomes from Gurr's and Banks's measures of executive competitiveness, selection, and legislative effectiveness; duration variables refer to numbers of consecutive years spent in regimes, resetting variables when status changes	Clague and others (1996)
De Vanssay and Spindler's constitutional rights indicators: objective	De Vanssay and Spindler (1992)	OECD plus non-OECD countries	<i>19 constitutional variables</i> Bill of rights; right to privacy; right to unionize; political attributes, such as whether supreme court has final constitutional authority	De Vanssay and Spindler (1992)
Bates and others' measures of political transition: objective	Bates and others (1996), work in progress	1970–91; 49 countries (all African)	<i>Measures of political transition</i> Executive scale; legislative scale (further scales in progress)	None as yet
Bollen's democracy measure: objective	Bollen (1990), drawing on Banks (1979) and Taylor and Hudson (1972)	1960, 1965; more than 110 countries	<i>Political components ("democracy")</i> Three concerning political liberties, three concerning political rights	Many studies, including Helliwell (1994); Barro (1996a)
<i>E. Political instability</i>				
Taylor and Jodice's and Banks's political instability indicators: objective	Persson and Tabellini (1994), using Taylor and Jodice (1983, 1988) and Banks (various issues)	Annual, from 1960; 136 countries	<i>Political instability and characteristics</i> Number of revolutions, successful coups, unsuccessful coups, and political assassinations; number of changes in the composition of the executive; number of riots and demonstrations; number of regular and irregular government transfers	Alesina and Rodrik (1994); Persson and Tabellini (1994); Alesina and others (1996); Isham, Kaufmann, and Pritchett (1997)

Barro's political instability measures: objective	Barro and Wolf (1989), using Banks (various issues); and Barro and Lee (1994) for wars measure	Average 1960–85, or subsamples	<i>Political instability</i> Counts of revolutions; coups and revolutions per year; assassinations per million population a year; strikes <i>Wars</i> Number of years a country has experienced a war between 1960 and 1985	Barro (1991); Murphy, Schleifer, and Vishny (1991); Ojo and Oshikoya (1994); Sachs and Warner (1995); Caselli, Esquivel, and Lefort (1996); Levine and Zervos (1996); Easterly and Levine (1997)
Gupta's index of sociopolitical instability: objective	Gupta (1990), using data from Taylor and Jodice (1983)	1960–82; 104 countries	<i>Political instability</i> Number of political demonstrations, riots, political strikes, deaths from political violence, assassinations, armed attacks, political executions, successful coups d'état, unsuccessful coups d'état; nature of government	Hassan and Sarna (1996)
Alesina and others' measures of executive turnover: objective	Alesina and others (1996), with underlying data from Taylor and Jodice (1983) and Banks (various issues)	1950–82, annual; 113 countries (42 African countries); some countries start in 1960	<i>Propensity for government change</i> Total government changes, major government changes (regular and coups), and irregular changes (successful coups); the propensity is estimated by regression analysis	Alesina and others (1996)
Alesina and Perotti's index of sociopolitical instability: objective	Alesina and Perotti (1996), using data from Taylor and Jodice (1988)	See above	<i>Sociopolitical instability</i> Political assassinations; violent deaths per million population; successful coups; unsuccessful coups; democracy	Alesina and Perotti (1996); Perotti (1996)
Collier's civil war indicators: objective	Collier (1999), based on data in Singer and Small (1994)	1816–1992; 92 countries (13 African countries)	<i>Duration of civil wars (monthly)</i> Defined on three criteria: military action, active government participation, and effective resistance by each side	Collier (1999)

a. In most cases, the institutional indexes are constructed as simple (unweighted) averages of all or some of the underlying components and are ordinal indexes. Gastil's indexes of political and civil liberties are weighted subjectively, but these weights are not reported. For the following indexes, the unknown weights are assigned by techniques such as factor analysis: Putnam's indexes, the Adelman-Morris index, Gupta's index, and the Alesina and Perotti index. Bates's measures of political transition employ Guttman scales. In some cases, simple counts are used: Collier's civil war indicators, Barro's political instability measures and colonial measures, De Vanssay and Spindler's constitutional indicators, Taylor and Jodice's and Banks's political instability measures, and Clague and others' political regime duration measures.

based on factual observations and economic data. Risk indicators typically comprise a weighted mix of both types of measures (for example, see *Euromoney* issues of the 1990s). The table also tries to assess the coverage of Africa for these indexes, although in most cases the data on Africa are very limited.

Important Concerns about Institutional Measures

As indicated earlier, adjustments to control for problems of endogeneity and ordinality are appropriate.

Endogeneity

The important distinction between endogenous and exogenous variables is described in box 1. In general, one would expect a country's institutional structure to remain the same over time, in which case institutional variables might be considered fairly exogenous to growth. In many developing countries, however, institutional quality periodically can deteriorate sharply as a result of political instability, terms of trade or climate shocks, policy reversals, or even fiscal austerity programs. In this case, far from being exogenous, institutions may deteriorate in periods of low growth.

More alarming, subjective measures of institutions provided by the risk-rating agencies and widely used in the literature to capture economic and political efficiency may be influenced both by recent measures of growth (Haque, Mark, and Mathieson 1996) and by political events (Brewer and Rivoli 1990). Moreover, these indexes may be subject to biases through herd effects and hysteresis, meaning that bankers' judgments are too optimistic (or too pessimistic) for long periods (Somerville and Taffler 1995).

Ideally, to reduce endogeneity problems, institutional quality should be measured at the beginning of the period on which the research is concentrating. For example, if growth is averaged over 10 years, the institutional variables should be measured before—or at the beginning of—the decade. In the studies considered here, few authors take the question of endogeneity seriously. Frequently, they use indexes of institutional quality that are subjective ratings of risk compiled by private firms such as Business Environment Risk Intelligence (BERI) and International Country Risk Guide (ICRG). Typically, researchers use the endogenous middle-of-the-period ICRG index for 1982 or its components for 1960–90 or 1970–90 cross-country growth regressions (for example, Knack and Keefer 1995). The problem with the earlier BERI index for 1972 is that it covers few countries and thus reduces the samples significantly, with resulting insignificance for institutional measures (Barro 1996a).

Ordinality

Many of the institutional indexes used in table 1 are ordinal indexes. An ordinal index ranks countries on some criterion without specifying the degree of difference between countries and associates a number with the rank position (that is, 2 is second). To be used meaningfully in a growth regression, however, such an index needs to be transformed into a cardinal index, which is an index where the degree of difference matters, not just the ordering. There is no reason to presuppose that the transformation from an ordinal to a cardinal index should be one-for-one (that is, linear): for instance, the difference in the quality of the judiciary in the United States and South Africa may be much smaller than that between South Africa and Zaire, even though the same differential is measured on an ordinal scale of 1 to 10. Such possible nonlinearities, however, can be addressed using various techniques (for example, see Barro 1996a).

A separate vexing question is the often-arbitrary aggregation of different components of many of the indexes. Typically, components are simply added or averaged with the same weights (see table 1). When there are many components, factor analysis—a technique that aggregates components with unknown weights—is a convenient and superior alternative (Temple and Johnson 1998). At the least, the weighting assumptions employed should be tested (as in Knack and Keefer 1995).

Correlation with Growth

Correlations between institutional variables and growth suggest a relationship but not the direction of causality. Causality can run in both directions, from good institutions to growth and from improved growth to better institutions. Given the poor data for African countries, the relative state of African institutions can be gauged from credit-rating measures, where coverage is fairly complete and some intra-African comparisons are possible.

Simple Correlations between Institutions and Growth

The matrix in table 2 shows the degree of correlation between real per capita growth and a range of empirical institutional variables. The institutional variables are organized under headings that correspond to those in table 1. The same variables are listed in the left column and along the top. Where a column and a row meet, the statistic presented is the degree of correlation between the two variables. The shaded squares in the matrix suggest that the correlation is statistically significant at the 1 percent level. For instance, ethnolinguistic fractionalization (or ELF), measured in 1960 and entered under the heading of social characteristics, has a (statistically

Table 2. Correlation Matrix for a Range of Institutional Variables and Real Per Capita Gross Domestic Product Growth, 1980s

Variable	(1) GYP80	(2) BERI70	(3) BERI80	(4) BUREAU	(5) CORRUP	(6) ICRG	(7) TELEPH	(8) PURGE70
Number of countries in sample	112	42	44	63	101	101	106	100
<i>Growth 1980–89</i>		BERI70						
(1) Real per capita growth	1.00							
<i>Institutional quality</i>			BERI80					
(2) BERI index, 1970–79 ^a	0.23	1.00		BUREAU				
(3) BERI index, 1980–89 ^a	0.37	0.95	1.00		CORRUP			
(4) Bureaucracy index, 1980–83 ^a	0.33	0.81	0.88	1.00		ICRG		
(5) Corruption index, 1980–89 ^a	0.37	0.86	0.89	0.87	1.00		TELEPH	
(6) ICRG index, 1980–89 ^a	0.46	0.85	0.88	0.81	0.87	1.00		PURGE70
(7) Log (telephones per 1,000 workers), 1970–79	0.33	0.83	0.84	0.82	0.71	0.75	1.00	
<i>Social capital variables</i>								
(8) Government purges, 1970–79	–0.02	–0.23	–0.29	–0.38	–0.26	–0.22	–0.07	1.00
(9) Antigovernment demonstrations, 1970–79	0.14	0.33	0.30	0.23	0.22	0.31	0.31	0.05
<i>Social characteristics^b</i>								
(10) Ethnolinguistic fractionalization, 1960 ^c	–0.30	–0.25	–0.35	–0.32	–0.36	–0.32	–0.52	–0.06
(11) Racial tension, 1984 ^d	0.23	0.44	0.48	0.43	0.47	0.48	0.59	–0.03
(12) Home language not official language (percent)	–0.23	–0.49	–0.54	–0.40	–0.40	–0.37	–0.57	0.01
(13) Minorities at risk, 1990 (percent)	–0.16	–0.07	–0.22	–0.16	–0.17	–0.24	–0.44	–0.08
(14) Separatist movements, 1975 (percent)	–0.16	–0.21	–0.30	–0.36	–0.27	–0.25	–0.48	–0.08
<i>Characteristic of political institutions</i>								
(15) Constitutional change, 1970–79 ^e	–0.09	–0.01	–0.20	–0.20	–0.19	–0.21	–0.18	–0.01
<i>Political instability</i>								
(16) Cabinet changes, 1970–79 ^f	–0.03	–0.29	–0.37	0.00	–0.08	–0.13	–0.03	0.17
(17) Civil war, 1970–79 ^g	–0.08	–0.39	–0.27	–0.19	–0.20	–0.32	–0.23	0.08
(18) Revolution, 1970–79 ^h	–0.23	–0.28	–0.37	–0.11	–0.28	–0.38	–0.20	0.31

Note: Simple correlation coefficients in the shaded squares are significant at the 1 percent level. Note that the sample sizes differ.

a. The indexes are the BERI indexes (Knack 1996), Mauro's BI bureaucracy composite index (Mauro 1995), and the ICRG composite index (Knack 1996). The corruption index is from Knack and Keefer (1995) and is similar to the Mauro BI corruption index for 1980–83.

b. Social characteristics variables stress ethnic differences.

c. Ethnolinguistic fractionalization is on a scale of 0 to 1 (increasing).

(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
DEMO70	ELF60	RACIAL	HOMELA	MINORI	SEPAR75	CONSTC	CABCHG	CIVWAR	REVOL
100	107	95	111	75	70	100	99	112	100

DEMO70

ELF60

1.00

RACIAL

0.02	1.00		HOMELA						
0.05	-0.71	1.00		MINORI					
-0.13	0.76	-0.55	1.00		SEPAR75				
-0.11	0.51	-0.51	0.45	1.00		CONSTC			
-0.10	0.62	-0.62	0.53	0.56	1.00				
							CABCHG		
-0.13	0.18	-0.12	0.21	0.06	0.26	1.00			
								CIVWAR	
-0.06	-0.09	0.02	0.00	-0.03	0.09	-0.03	1.00		REVOL
0.02	0.20	-0.34	0.11	0.18	0.22	0.02	-0.19	1.00	
-0.05	0.03	-0.12	-0.02	0.16	0.13	0.53	0.17	0.14	1.00

d. Racial tension is on a scale of 0 to 6 (decreasing).

e. Constitutional change captures the number of basic alterations in a constitutional structure or a new constitution.

f. Cabinet change refers to the number of times a premier or more than 50 percent of the cabinet is replaced.

g. Civil war is a dummy variable: 1 if war occurs, 0 otherwise.

h. Revolution is an illegal attempt to replace a government.

Source: Author's calculations and categories using data from Easterly and Levine (1997) and Mauro (1995).

significant) correlation of minus 0.3 with real per capita growth (averaged over 1980–89).

MEASURES OF INSTITUTIONAL QUALITY. The matrix shows that some earlier variables of institutional quality (the BERI 1970–79 and the Business International—BI—bureaucracy 1980–83 indexes) are positively correlated with subsequent growth (averaged over 1980–89). The degree of correlation, of course, increases when the later (more endogenous) measures are used (the BERI 1980–89, ICRG 1980–89, and corruption 1980–89 indexes).⁵

Also of interest here are the relations *among* institutional variables, which may reveal some of their more indirect effects on growth. The number of telephones per 1,000 workers (Canning and Fay 1993) might be considered a measure of public or private service provision (public in Africa) akin to the institutional measures in Putnam (1993). Interesting positive correlations are apparent with indicators of institutional quality and social capital, and negative correlations are associated with various measures of social characteristics indicating racial diversity.

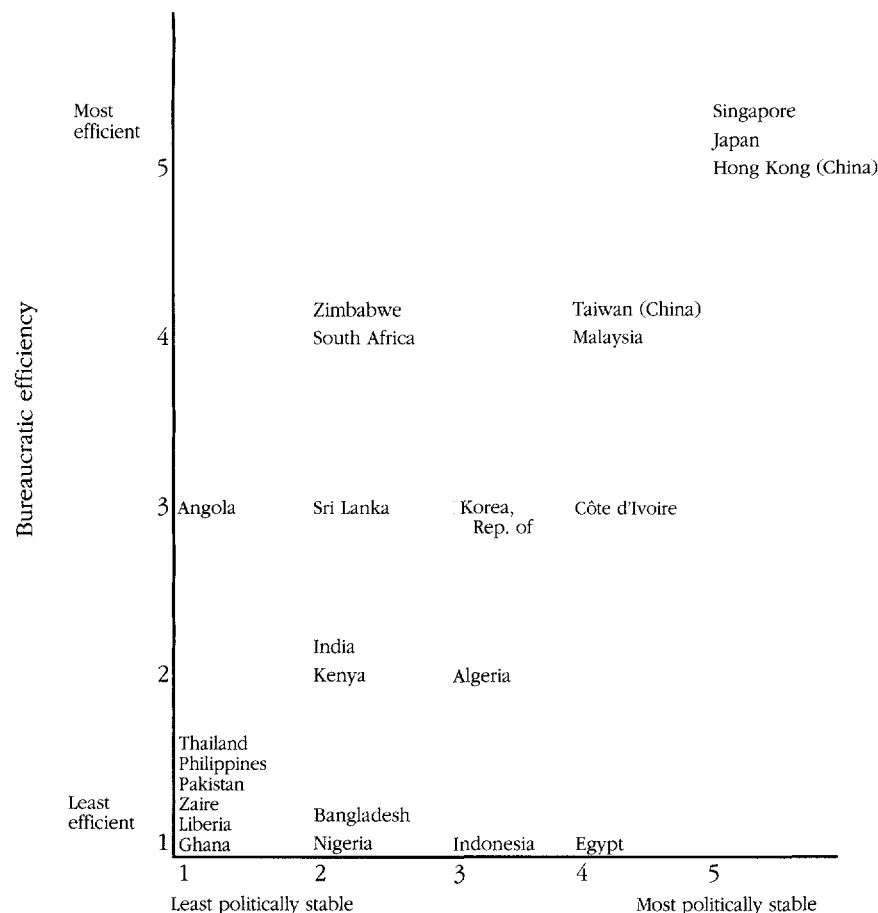
Poor institutional quality in many cases also is significantly correlated with increased political instability. The correlation between low bureaucratic efficiency and increasing political instability in African and Asian economies is shown in figure 1. It is clear that the few African countries represented in the figure lie at the bottom end of the efficiency spectrum, and some countries may have moved even farther down the scale since 1983.

MEASURES OF SOCIAL CAPITAL. Few measures of social capital are included in table 2, and the construction of such measures should prove to be a growth industry in coming years. Two variables proxy for social capital in the table: first, a measure of systematic state purges of the ranks of the regime or of the opposition, which curtail civil liberties and probably inhibit the formation of social capital, and second, peaceful antigovernment demonstrations of 100 persons or more. There are weak positive correlations between social capital and growth, while there are positive and significant correlations with some measures of formal institutional performance (the bureaucracy index).

MEASURES OF SOCIAL CHARACTERISTICS. Several measures of social characteristics reflect ethnic differences. They are highly correlated with one another, and increased ethnic diversity is negatively and significantly correlated with institutional quality and service provision. Increased ethnic diversity appears to have a negative, though largely insignificant, impact on growth. However, there is unlikely to be an endogeneity problem here because ethnicity is expected to change very slowly over time.

ATTRIBUTES OR CHARACTERISTICS OF POLITICAL INSTITUTIONS. The data are rather richer for attributes or characteristics of political institutions, and the African politi-

Figure 1. *Mauro's Measures of Bureaucratic Efficiency and Political Stability: African and Asian Countries, 1980–83 Averages*



Note: The political stability index is the simple average of six Business International indexes: institutional change, social change, opposition takeover, stability of labor, relationship with neighboring countries, and terrorism. The bureaucratic efficiency index is the simple average of three Business International indexes: judiciary system, red tape, and corruption.

Source: Adapted from Mauro (1995).

cal data set being compiled by Bates and others (1996) will prove invaluable. The example given in table 2 is constitutional change, which captures the number of alterations in a state's constitutional structure or, at the extreme, a new constitution. It is not surprising that the creation of a new constitution, which has little to do with the effectiveness or the enforcement of a constitution, however well designed, is not significantly correlated with growth or with institutional efficiency. However, constitutional change seems to be a consequence (or occasionally a cause) of revolution.

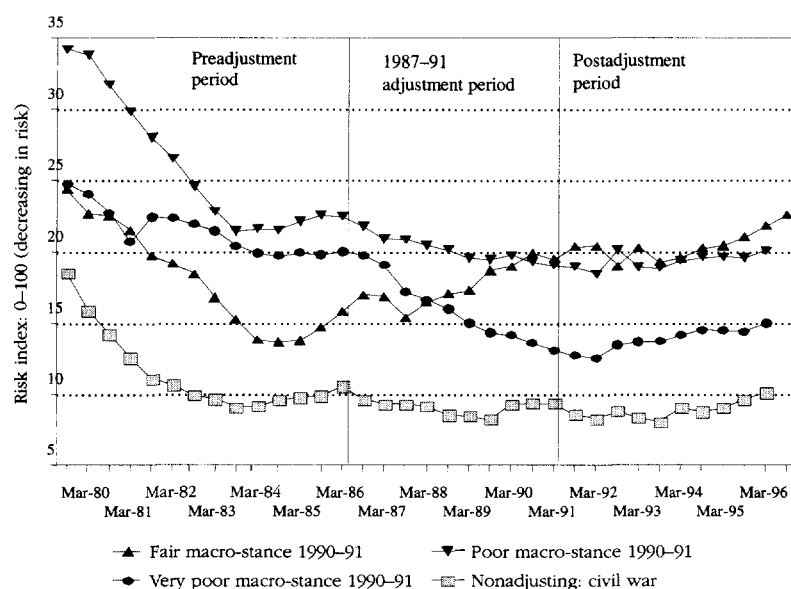
POLITICAL INSTABILITY. As for political instability, real per capita growth in 1980–89 is negatively correlated with an earlier measure of cabinet changes (1970–79) and also with two related sociopolitical measures of political instability during the 1970s—revolution and civil war.

African Economic Performance and Risk Ratings

Annual or twice-yearly credit ratings that serve as rough proxies for the enforcement of property rights are presented in figures 2–4. These data have excellent coverage of Africa. However, it should be noted that recent growth has an important bearing on these ratings.

In figures 2 and 3, African countries are categorized into four groups, each reflecting different relative economic performance. Figure 2 uses the *Institutional Investor* credit ratings, which measure the risk of default on sovereign debt (see table 1). The

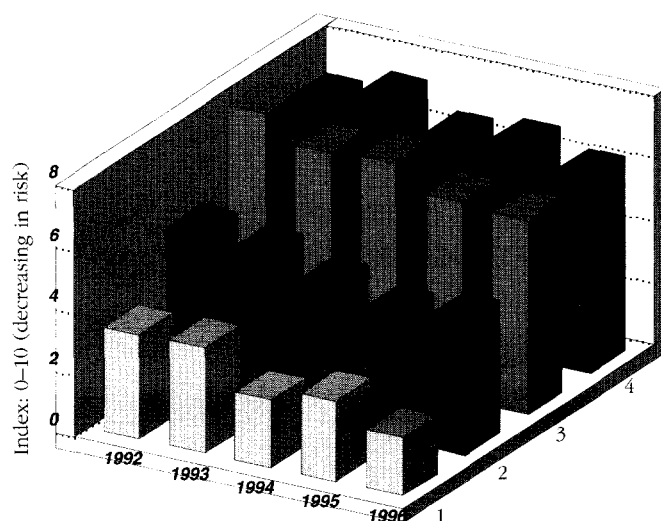
Figure 2. *Institutional Investor Risk Ratings for African Countries, 1980–96*



Note: Simple averages. Years in brackets after particular countries indicate the first available data point: there are thus small step effects in 1993–94. Countries are categorized as follows. *Fair*: Burkina Faso (1993), Gabon, Ghana (1992), Guinea (1993), Kenya, Malawi (1981), Mali (1993), Nigeria, Senegal, Togo (1994), Uganda. *Poor*: Benin (1993), Tanzania, Zimbabwe. *Very poor*: Cameroon (1992), Congo, Côte d'Ivoire, Mozambique (1988), Sierra Leone, Zambia. *Civil war*: Angola (1992), Ethiopia, Liberia, Sudan, Zaire.

Source: Author's calculations using data from *Institutional Investor* and country categories from World Bank (1994).

Figure 3. *Euromoney "Political Risk" Rating for African Countries, by Categories of Performance, 1992–96*



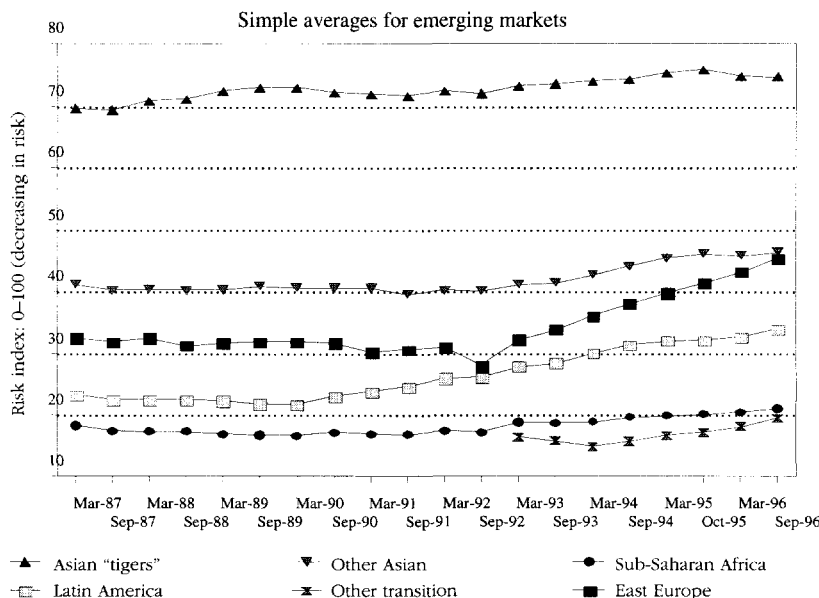
Note: Weighted averages using 1993 gross domestic product. Countries are categorized as follows. 1. Countries with civil war in the early 1990s: Angola, Burundi, Ethiopia, Liberia, Rwanda, Sierra Leone, Somalia, Sudan. 2. Countries with inflation over 25 percent during 1992–94: Equatorial Guinea, Madagascar, Malawi, Mozambique, Niger, Nigeria, Tanzania, Togo, Zaire, Zambia. 3. Countries with poor resource allocation: Cameroon, Chad, Congo, Guinea, Kenya, Lesotho, Zimbabwe. 4. Remaining countries: Benin, Burkina Faso, Côte d'Ivoire, The Gambia, Ghana, Guinea-Bissau, Mali, Mauritania, Senegal, Uganda.

Source: Author's calculations using disaggregated data from *Euromoney* and country categories from Collier and Gunning (1999).

assessment covers economic performance in the 1980s from the standpoint of the overall macroeconomic situation in 1990–91, *after* a period of structural adjustment in 1987–91 (categories from World Bank 1994). With the caveat that the comparability of these survey indicators across time may be in doubt, in figure 2 the countries categorized as “fair” (1990–91) start from a low ratings base, before adjustment, and continue improving in the eyes of foreign investors during the 1990s. “Poor” and “very poor” countries steadily decline in the preadjustment and adjustment periods: the decline in both groups, however, shows signs of leveling off in the 1990s. Countries involved in civil war show little improvement, although Ethiopia’s rating increased marginally in the mid-1990s.

Figure 3 examines political risk, the one subjective component in the *Euromoney* rating of aggregate risk. The assessment reviews economic performance in the 1990s from the standpoint of the country’s macroeconomic position in 1992–94 (categories from Collier and Gunning 1999). Countries are ranked by four “hurdles” and show distinct ratings by economic performance (but the resource allocation criterion proves a weak means of distinguishing countries).

Figure 4. *Institutional Investor Risk Ratings for Africa and Emerging Markets, 1987–96*



Note: Countries are categorized as follows. *East Europe:* Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia. *Other transition:* Albania, Croatia, Estonia, Georgia, Kazakhstan, Latvia, Lithuania, Russia, Ukraine, Uzbekistan, Yugoslavia. *Asian tigers:* Hong Kong (China), Republic of Korea, Singapore, Taiwan (China). *Other Asian:* Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand. *Latin America:* Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Paraguay, Peru, Uruguay, Venezuela. *Africa:* Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Congo, Côte d'Ivoire, Equatorial Guinea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zaire, Zambia, Zimbabwe.

Source: Author's calculations using data from *Institutional Investor*.

From Correlation to Causation

The evidence for causation in the literature on growth and institutions may be compromised not only by deficiencies in the institutional measures but also by the poor quality of the data for other variables. Many growth regressions use data from the cross-country Penn World Tables data set (Summers and Heston 1991); almost half of the 138 countries in this set have poor-quality data, and of these, 37 are African countries.

How Do Institutions Affect Growth?

The usefulness of North's framework, in conjunction with neoclassical growth models, is that it helps to clarify the likely channels of influence on growth of measures of

institutional quality and social capital (proxies for the performance of formal and informal institutions). Box 2, on page 102, suggests how North's institutional framework could be integrated with Solow's growth model (see also Tornell 1997).

Reference has already been made to North's contention that weak institutions may have a direct effect on growth because they reduce the efficiency of investment. The efficiency effect might arise from the initial state of institutions in the model, which will affect the productivity of the existing stock of capital, or it may result from changes in institutions over time. In an environment where the enforcement of property rights is not reliable, firms will tend to be small scale, to use low-capital technology, and to have short-term horizons. Second, there could be an indirect effect on growth resulting from a decline in investment—a variable that is already in the Solow model—such as increased transaction costs through bribes and rent seeking.

Most studies in the literature have used reduced-form growth models in which the direct and indirect effects of institutions are difficult to disentangle. Recently a few authors (such as Mauro 1995) have used Solow-type models as well as separate investment models to evaluate the role of the quality of institutions, testing the extent of social capital and the effectiveness of the laws on property rights both for their direct effects on growth (more efficient investment) and for their indirect effects (larger volume of investment).

The three remaining categories of institutional measures in table 1—political characteristics, political instability (duration), and social characteristics—are often included in growth and investment models as proxies for institutions. However, the observation that measures of political instability are only weakly significant—or insignificant—in growth regressions when the quality of institutions is controlled for, while evidence for “democracy” measures is generally weak in growth regressions, has led authors such as Clague and others (1996) to use these measures instead to model property rights. Similarly, Barro (1996b) recently suggested using indicators of political stability as a determinant of property rights. Finally, Barro (1996a) suggests that what may influence the evolution of a political regime itself are persistent social characteristics such as ethnic diversity, religious or colonial heritage, and past growth.

Findings from Models of Growth

Most of the institutions and growth studies considered here are cross-sectional regressions, that is, they use data from many countries for one period only (which may be an average of years). Increasingly, however, growth analysts are turning to panel data, which cover a range of countries for two or more consecutive periods (ideally, the periods are averages of 7 to 10 years, close to business-cycle frequencies).⁶

ACCOUNTING FOR POLITICAL CHARACTERISTICS, POLITICAL INSTABILITY, AND SOCIAL CHARACTERISTICS. Studies that use objective measures of democracy (that

is, attributes, not performance) tend to find inconclusive results in growth regressions because democracy, acting through various channels, may have both positive and negative implications for growth (Alesina and Rodrik 1994; Helliwell 1994; Alesina and others 1996). On the positive side, transparency and accountability may enhance economic and other rights, including respect for contracts. On the negative side, the consensus required by democratic institutions, or interest group lobbies, may delay responses to shocks and implementation of legislation. A problem with using a single cross-section is that it is difficult to distinguish between changes, their different durations, and the different kinds of dictatorships. Growth performance may be poor during periods of democratic transition because the government must confront the economic legacy of a collapsed regime and the attendant political instability (Alesina and Perotti 1994). Finally, democracy tends to be correlated with high-income countries, good institutions, and an educated workforce. The effects are difficult to disentangle.

Variables used to indicate political instability generally suffer from endogeneity problems. Although, for example, political instability may reduce the volume and efficiency of investment and thus hamper growth, negative income shocks may also promote political instability. Alesina and others (1996) model the effects of executive instability by first measuring the probability of a change in government for three definitions of change (every change in government, major changes in government, and coups d'état) and then estimating the relationship between growth in per capita income and a range of variables, including the probability of a change of government. They find apparently robust results indicating that high executive turnover has a negative impact on growth (but see a methodological critique in Deaton and Miller 1996). Bienen, Londregan, and van de Walle (1993), however, examine the reverse causality and find that current and lagged growth rates inhibit the transfer of power. Londregan and Poole (1990) assume, plausibly, that the current rate of growth and the probability of a coup are not simultaneously linked but also, perhaps less plausibly, that past coups have no effect on current income. They too find that income growth inhibits coups.

Simpler counts of revolutions and coups appear to influence growth negatively, but these effects disappear when property rights are controlled for (Barro 1996a). Aggregate indexes of riots, demonstrations, and assassinations do not appear to affect growth in these estimates, but they may reduce investment and saving (Alesina and Perotti 1996). Here they may proxy for ineffective property rights. Svensson (1998) finds a link between political instability and the quality of property rights. He also finds that when property rights are included in the investment equation, the political instability variables cease to be significant.

Similarly, Clague and others (1996) find that the characteristics and stability of political regimes (type and duration) appear to be important determinants of the quality of economic institutions. This research highlights the tradeoff between credibility and executive flexibility as a possible explanation for why some democratic

regimes do not deliver the goods, while some longer-lived autocratic regimes do. Using annual data to account for frequent changes of regime, the paper finds that short-lived democracies are least likely to ensure adequate property rights, while longer-term democracies offer better protection for property and contract rights than any other type of regime of any duration.

Barro (1996a), who evaluates with panel data the role of social characteristics in determining political regimes using proportions of the population by religion, rates of urbanization, colonial heritage, ethnic differences, income inequality, and social indicators such as life expectancy, actually forecasts which countries are likely to experience declines and improvements in future democracy. That none of the above variables is significant (except an indicator for countries in the Organization of Petroleum-Exporting Countries) may be related to Barro's neglect of the *duration* of democratic and other regimes, which Clague and others (1996) emphasize. Several of these variables also have been shown to be relevant in Solow-type growth equations, although with doubtful robustness (Temple 1999).

ACCOUNTING FOR SOCIAL CAPITAL AND QUALITY OF INSTITUTIONS. In early work examining the influence of institutions on growth, Kormendi and Meguire (1985) and Scully (1988) used cross-sectional growth regressions and Gastil's indexes of civil and political rights. In these two studies, Gastil's indexes are transformed so as to address the ordinality problem. Kormendi and Meguire's paper suggests an indirect effect on growth through investment, but because the measure of civil rights is measured contemporaneously with growth and other variables, endogeneity problems arise, and no definite causal relation is established. Scully's study examines whether civil, political, and economic rights have a direct efficiency-enhancing effect on growth, and again, the evidence is mixed and is compromised by endogeneity problems.

More recently, Isham, Kaufmann, and Pritchett (1997) find that purely political rights (a measure of the quality of democracy) and type of political regime (attributes) have no effect on the rates of return to World Bank-financed government investment projects but that civil rights are significant—which we classify as a possible “social capital” proxy in table 1. However, the indexes are both ordinal and endogenous.

An interesting paper by Knack and Keefer (1997) examines informal institutions using measures of trust and civic norms drawn from the World Values Surveys (see Inglehart 1994a). The authors find that in reduced-form growth regressions, singly and together, trust and civic norms are positively associated with growth and claim a causal role. Specification tests for the robustness of these results find that they are fairly insensitive to changes in specification, exclusions of influential observations, and the use of additional regressors. In the Solow regressions (not reported), these variables lose significance or become insignificant. This could suggest that the in-

vestment relationship where both variables, but especially civil norms, prove to be important fully captures their (indirect) impact on growth. However, as with other studies surveyed here, the endogeneity of these ordinal indexes and their measurement error raise doubts about a robust causal role for these measures. There probably is considerable measurement error here: some groups are oversampled (higher-status groups), which the authors try to correct for, but the five survey questions comprising the civic performance measure may not have been answered truthfully, while the question regarding trust is ambiguous.

The authors also test another proxy for social capital (following Putnam 1993): associational activity or membership in groups, again using World Values Surveys data. They find no significance for these measures and perverse relations in some cases, but this measure is flawed because it fails to reflect the intensity (or quality) of membership. Thus the authors' conclusion that declining social capital reflects declining trust and civic norms rather than declining associational life may be too strong.

Finally, Knack and Keefer (1997) examine the impact of trust and civic norms on the quality of formal institutions and report positive and significant links, although it should be noted that there are endogeneity problems. They also find evidence that income equality and low ethnic divisions are linked with trust and civic cooperation.

Clague and others (1995) use an innovative objective measure of contract enforcement that they call contract-intensive money for 96 countries during 1969–90. They describe this stock of money as the amount that is held on deposit in banks and other financial institutions. They reason that where third-party enforcement of contracts is not reliable and insecure property rights hamper or preclude the use of assets as collateral for loans, banks and financial intermediaries will not profit from providing low-cost retail banking services or from offering incentives to attract deposits. In such cases, where there are few advantages to holding money on deposit and customers also face the risk of nonrecovery, individuals will hold a lower proportion of their assets in such accounts. The authors are at pains to show that this measure is not just an indicator of financial development but that it is also highly significant in an investment equation (controlling for financial depth), suggesting an indirect influence on growth.⁷ They fail to find evidence for a direct or efficiency influence on growth.

The remaining studies all use data from the risk-rating agencies referred to earlier to assess the effects of institutional variables on investment and growth: the ICRG, BERI, and BI. They generally show that measures of corruption and weak institutions have the expected negative effect on investment and growth, while efficient bureaucracy and observation of the rule of law effectively support the achievement of these objectives.

Mauro (1995) reports results from three regressions: an investment equation, a reduced-form growth regression, and an extended Solow growth equation. As expected, he finds that efficient bureaucracy (although not corruption) indexes are significant in an investment equation (and hence influence growth indirectly) and

demonstrates their importance in a broad range of simple correlations with investment for different periods and different types of investment. In reduced-form regressions the bureaucracy index is robustly significant, but corruption is insignificant. In a Solow model bureaucracy is barely significant, and corruption is insignificant. With a broader set of variables, including political instability measures, the significance of bureaucracy diminishes further. Mauro attempts to address the endogeneity problems with both the institutional variables and investment, but in neither case is the institutional index significant. It is surprising that the Solow model lacks a robust institutional “efficiency” link with investment, but this absence may be due to the ordinality, aggregation, and endogeneity problems discussed earlier.

Helliwell (1996b) is one of the few studies where the institutional variables are arguably not too endogenous, since a bureaucracy index for 1981–83 for some Asian countries is related to average growth for the subsequent decade. In a reduced-form growth equation, the institutional linkages surprisingly do not show up (investment is absent, and the institutional variables are “free to take all the credit”). The answer may lie with measurement and ordinality problems.

Knack and Keefer (1995) and Knack (1996) use two institutional indexes in growth regressions capturing security of contract and property rights, the ICRG index from 1982, and the earlier and hence less endogenous BERI index (from 1972). They report some results without statistics to support them. It appears that both institutional indexes are significant in investment regressions during 1974–89 and 1960–89, confirming an indirect effect on growth through factor accumulation. There also appears to be weak evidence for a direct efficiency effect on growth.

Lane and Tornell (1996) address two commonly omitted variables—natural resource abundance and institutions—and attempt to explain why some resource-rich countries have lower growth rates than resource-poor countries. They report reduced-form growth and investment regressions, and their results focus on the effects of weak property rights (reflected in estimates of the ICRG risk indicator) and an increase in manufacturing concentration. The coexistence of weak institutions and powerful industrial groups affects growth and investment negatively and significantly.

A 1960–90 panel study by Barro (1996a) uses a Solow model and the ordinal ICRG and the earlier BERI indexes of property rights. With an endogenous rule of law index (dated 1982), he finds a consistently positive and significant effect on growth. But, unfortunately, probably due to reduced sample size using the less endogenous BERI index, it is rendered only marginally significant (although not too different in value). In the same study, Barro transforms Gastil’s political rights index into three categories—high, middle, and low measures of the quality of democracy—and finds that the middle level of democracy most favors growth. The implication is that where a moderate amount of political rights already has been extended, a further increase could actually diminish growth, perhaps due to pressures for income redistribution.⁸

What We Know and What We Don't

The more recent literature suggests that the appropriate institutional variables to include in investment and growth regressions are those that capture the *performance* or *quality* of formal and informal institutions rather than merely describe the characteristics or attributes of political institutions and society or measure their political instability. Reinforcing this view, evidence suggests that the characteristics and duration of political regimes are important in determining whether countries have well-enforced and well-defined property rights, demonstrating a possible link between political stability and investment and implying that inefficient political institutions with high transaction costs may result in weak property rights and thus discourage economic growth. Barro (1996a) has attempted to model such political characteristics as a function of cultural, social, and historical variables (including indicators for colonialism), although not with particularly conclusive results.

The performance or quality measures for formal and informal institutions include respect for contracts, property rights, trust, and civil freedom. Evidence suggests that the quality of institutions has a robust and significant indirect relationship to growth via its effect on the volume of investment. There also is evidence, although it is weak, for a direct relationship between institutions and growth.

Thus better-performing institutions may improve growth by increasing the volume of investment—for example, by eliminating bureaucratic red tape and rent-seeking costs—and (more weakly) by improving the efficiency of investment, say, by enforcing well-defined property rights. Similarly, the promotion of social capital strengthening informal institutions may positively influence growth both directly and indirectly.

It is important to highlight the simultaneous relationship between growth, investment, and institutions. However, most of the studies in this survey ignore simultaneity issues and have other methodological problems found in cross-country growth studies in general (see Temple 1999). In particular, they often deal inadequately with endogenous institutional measures, while there are aggregation biases and other problems with the institutional measures used. Thus a definite positive conclusion on the links between growth and institutions is difficult to pin down, suggesting that the claims for causality should be treated with caution.

Although the results are suggestive, many commentators are skeptical because of the problems that plague cross-country studies. However, it is possible to take a more constructive view of this literature, from which a great deal already has been learned. Recent literature is paying increasing attention to many of the methodological difficulties, and the result is more thorough specification and other tests, more attention to endogeneity issues, and more guarded and less cavalier policy conclusions. There are limited data in the institutional sphere, but the construction of

more subtle empirical measures for institutions is by now a growth area in itself. Admittedly, the growth and institutions models are highly stylized, but this frontier research area may well yield stronger conclusions in the future.

To the extent that these tentative results are reinforced by later, more careful research, this would underline the importance of the state in facilitating the development and enforcement of an independent and effective judiciary, in refraining from predatory actions that discourage saving, investment, and production, and in extending civil and political rights that promote the development of social capital.

Although the limited evidence reveals the likelihood of linear relationships between various efficiency measures of institutions and growth, Barro (1996a) finds evidence suggesting that after a certain threshold, further extension of political rights could retard growth, perhaps due to pressures for income redistribution, and even argues against the desirability of exporting democratic institutions to developing nations (for example, countries such as Mexico and Malaysia). This conclusion probably is overstated, and another interpretation can be considered. It is possible that Barro is picking up strong effects from a subset of authoritarian and relatively recently fast-growing countries that have exploited the “catch-up” phase and increasing returns to scale and now are entering a mature period of slower growth. Increased demand for democracy could be due to the consequences of slowing growth (for example, recent trade union demands in the Republic of Korea) as well as to exposure to democratic rights through internationalization and higher standards of living. However, it also is possible that countries like South Africa that have a high potential for catch-up and have recently extended political rights may suffer delays in implementation and setbacks to economic reform under participatory politics.

The complex area of institutional change lies outside the scope of this review. A crucial problem for developing countries is to achieve institutional credibility via third-party enforcement. Even if a neutral state is able to monitor property rights and enforce contracts effectively, the question arises as to who guards the guards. Many observers are skeptical that constitutional reform will be capable of restraining the tyrannical exercise of power. Others believe that the permanent extension of civil and political liberties may serve to restrain the state.

Clearly it is important initially to match the state’s role to its capabilities as well as to foster growth by invigorating institutions. In the context of law reform, Posner (1998) believes that fairly modest fiscal expenditures may secure reforms that could enhance economic growth, thereby generating further resources to proceed with deeper reforms, and so on, in what he describes as a virtuous circle. Other authors agree that a less costly and more rapid reform involves enacting efficient rules to be administered by less-than-efficient institutions, rather than wholesale, expensive, and time-

consuming reforms of the institutions themselves (Hay, Schleifer, and Vishny 1996). However, a more sophisticated legal reform will be required to protect civil and political liberties.

Whether such profound institutional change and development can be rapidly achieved and sustained is uncertain. Institutionalists tend to emphasize the slow pace of change. Indeed, North's sobering view is that "creating a system of effective enforcement and of moral constraints on behavior is a long, slow process that requires time to develop if it is to evolve—a condition markedly absent in the rapid transformation of Africa from tribal societies to market economies" (North 1990: 60).

Notes

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1. Recent evidence on Africa's growth performance is recorded in Collier and Gunning (1999), Easterly and Levine (1997), Elbadawi and Ndulu (1995), and Sachs and Warner (1997), while Ravallion and Chen (1997) provide a recent analysis of poverty and distribution.

2. Characteristics of political regimes often are called measures of democracy. By contrast, Bates and others (1996) stress that their scales of detailed features of political institutions do not measure "democracy": they measure the attributes rather than the performance of institutions. (Such measures do clarify the scope for political reform, however.)

3. Alesina and Perotti (1994) categorize variables as definitions of democracy (civil and economic liberties and competitiveness of elections) and political instability (sociopolitical instability, executive turnover, and the risk-agency measures of corruption and bureaucracy). Brunetti (1997) categorizes political variables into democracy, government stability, political violence, policy volatility, and subjective perceptions of politics.

4. Gastil's (1991) subjective rankings of civil liberty and political liberty have been constructed annually since 1973 for a large number of countries using various public sources, including newspaper reports, human rights reports, and U.S. State Department reports to Congress on human rights in countries that receive U.S. aid (see Scully 1987 for further discussion). Political rights rankings are based on criteria reflecting the degree to which citizens have control over government, while civil rights rankings use criteria reflecting individual rights relative to the state (see the criteria in table 1).

5. An examination of the underlying data shows that in practice the ICRG measures of Knack and Keefer (1995) are predominantly measured *later* in the 1980s, that is, 1984/85–89 (this is especially true for African countries).

6. It remains controversial whether panel studies can better address the vexing problem of endogenous regressors. For discussion on this, see Caselli, Esquivel, and Lefort (1996) and Arellano and Bover (1995). Moreover, Pritchett (1998) argues against the usefulness of panel data for investigating long-term growth rates in developing countries, given the great instability in their growth rates over time.

7. The authors find that the results are somewhat sensitive to the exclusion of outliers but find no evidence of reverse causality in the measure of contract-intensive money.

8. Given the very limited variation in the institutional indexes for African countries, often with serious endogeneity problems, there probably is little to gain on the role of institutions from studies focused solely on Africa, such as the panel data studies of Ghura and Hadjimichael (1996) and Savvides (1995) and the cross-sectional growth study of Sachs and Warner (1997).

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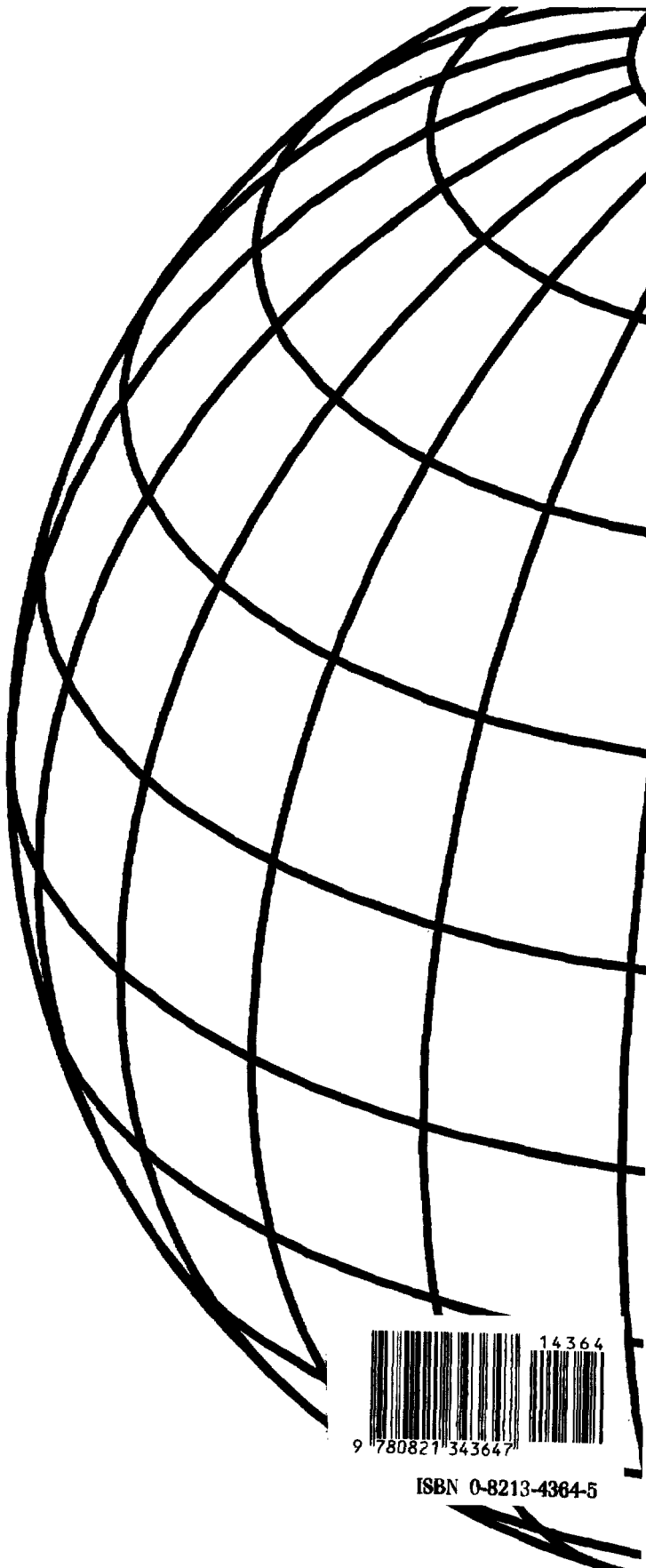
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