

Why Did Asian Countries Fare Better during the Global Financial Crisis than during the Asian Financial Crisis?

DONGHYUN PARK, ARIEF RAMAYANDI, AND KWANHO SHIN

The global financial crisis that started in 2008 marked a momentous turning point in the global financial and economic landscape. In contrast to most crises, which originated in developing countries, the global crisis originated in the advanced economies. Its immediate origins lay in market failures in the US housing and financial markets. The crisis had a disproportionate impact on the advanced economies and less of an impact on developing countries.¹ More significantly, while the advanced economies still remain mired in stagnation and uncertainty, developing countries have largely shrugged off the effects of the crisis and are recovering with a healthy dose of certainty and momentum. The outbreak of the euro area sovereign debt crisis has further held back the stuttering recovery of the advanced economies.

From the viewpoint of developing Asia, the global crisis heralds a new era of diminished growth expectations. Despite the large and growing relative weight of developing countries in global output, advanced economies still exert an outsized influence on Asia's external environment. In particular, advanced economies continue to absorb a large share of the region's exports, especially final goods. The weakness of advanced economies is likely to persist beyond the short term in light of the wide range of structural problems they face. This has negative ramifications for Asia's growth prospects, since exports

Donghyun Park is principal economist at the Economics and Research Department of the Asian Development Bank. Arief Ramayandi is an economist at the Economics and Research Department of the Asian Development Bank. Kwanho Shin is professor of economics at Korea University. They thank Ilsoo Han and Aleli Rosario for their excellent research assistance and the Asian Development Bank for financial support.

1. See Blanchard, Faruqee, and Das (2010) for the relatively manageable impact of the global financial crisis across emerging-market economies. Morris Goldstein and Daniel Xie (2009) also find that for Asia the impact of the global financial crisis was less severe than that of the Asian crisis.

continue to be a major driver of growth for the region. In addition to a slower growth rate, Asian countries are likely to face greater external instability in the postcrisis period. The traditional bedrocks of global financial and economic stability—that is, the advanced economies—have increasingly become the sources of global instability since the crisis. The advanced economies are large enough to systematically matter, and they affect Asia and the rest of the world.

Notwithstanding its substantial adverse implications for Asia’s medium-term growth prospects and global stability, the global crisis has had a relatively limited short-term impact on Asia and other developing countries. Indeed, Asia’s surprising resilience is one of the most striking stylized facts about the global crisis. This is by no means to suggest that Asia was completely immune from the global crisis, even in the short run. In particular, the crisis left a tangible mark on the region’s real economy, primarily through the trade channel. Asia’s exports and growth plummeted in the fourth quarter of 2008 and first quarter of 2009 due to the severe recession in the advanced economies and the consequent collapse of global trade. However, massive fiscal and monetary stimulus enabled the region to mount a robust recovery. More fundamentally, the region was largely spared the financial turmoil and seizing up of credit markets that devastated the United States and the European Union. Contrary to widespread fears, Asia never suffered a financial crisis, although it did suffer a trade crisis that curtailed its growth.

However, the fact that Asia largely averted financial instability in the face of a full-blown global financial crisis is no cause for hubris or overconfidence. In fact, in 1997–98 Asia had suffered a devastating financial crisis of its own. That crisis brought the region’s financial markets to their knees as stock markets and currencies collapsed. The crisis soon spread to the real sector, pushing the economy into a deep recession and putting millions of Asians out of work. Although the region staged a V-shaped recovery in 1999, the crisis was a game changer that put a rude stop to the vaunted “East Asian miracle.”

The central objective of this chapter is to analyze and compare the macroeconomic performance of East Asian countries during the global financial crisis with their performance during the Asian financial crisis of 1997–98. East Asian countries fared much better during the global crisis than they did during the Asian crisis. East Asia’s resilience in the face of the global crisis is all the more surprising in light of the sheer magnitude of the shock and the region’s high level of integration into the world economy. From the region’s perspective, the immediate catalyst of both crises was the sudden outflow of foreign capital. During the Asian crisis, the region suffered a massive reversal and withdrawal of capital inflows as investor confidence in the region evaporated. During the global crisis, US and European financial institutions withdrew their funds from Asia to support their badly damaged balance sheets at home. Yet, despite the common central role of foreign capital in both crises, the Asian crisis had a more markedly deep impact on East Asia than the global crisis. This chapter seeks to shed some light on why this is the case.

In the section that follows, we examine and compare the macroeconomic empirical stylized facts of the Asian and global financial crises. We then lay out the empirical framework used to perform a more in-depth comparative analysis of the two crises and discuss key findings from our analysis, before concluding with some final observations.

Macroeconomic Performance of Five Asian Countries: The Asian versus the Global Financial Crisis

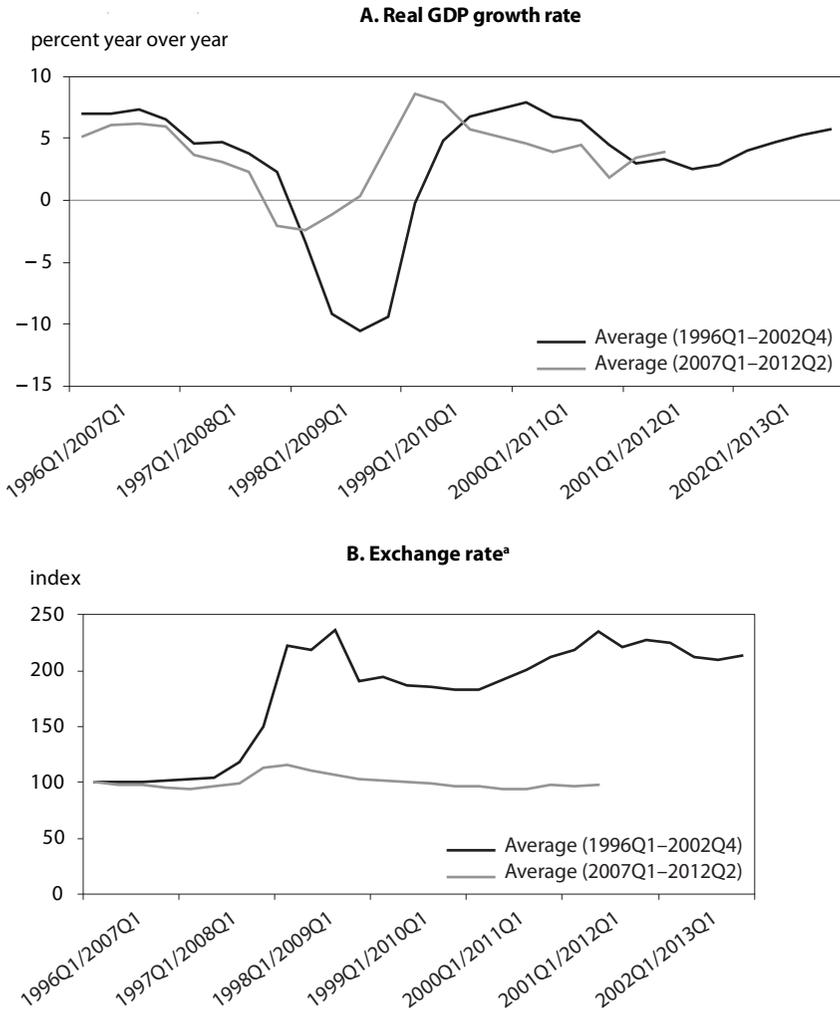
This section examines the macroeconomic performance of Indonesia, the Republic of Korea, Malaysia, the Philippines, and Thailand during the Asian financial crisis and the global financial crisis. We selected those East Asian countries—referred to as the EA-5—because they were the most severely affected by the Asian crisis, which was triggered by the forced devaluation of the Thai baht in July 1997. The crisis spread like wildfire to Indonesia and the Republic of Korea, which suffered a similar collapse of their currencies. All three countries turned to the International Monetary Fund (IMF) for large bailout packages. Malaysia instead imposed capital controls, while the Philippines, which was not as severely affected as the other four countries, did not have to undergo similar extreme policy responses. Before we can meaningfully analyze and compare the causes and impacts of the two crises in the context of the five countries, we have to first understand the stylized facts of the crises in those countries. The next subsections look at the countries' aggregate performance during the two crises and then examine in more depth the behavior of some key macroeconomic indicators prior to each crisis. The aim is to seek possible descriptive explanations of the stylized facts.

Macroeconomic Performance of the EA-5 during the Two Crises: Stylized Facts

In this subsection, we examine the macroeconomic performance of the EA-5 as a whole. Figure 4.1 compares the behavior of some key macroeconomic indicators during the two crises. Panel A compares the average real GDP growth rate of the five countries before and after the Asian financial crisis and the global financial crisis. It is evident that the recession was much milder and the recovery much quicker during the global crisis. Depreciation of the exchange rate against the US dollar was also much smaller during the global crisis (panel B), with only Indonesia and the Republic of Korea suffering a currency crisis in 2008, according to Carmen Reinhart and Kenneth Rogoff's (2011) classification.

External demand was much stronger after the Asian crisis. While the five countries enjoyed an export boom after the Asian crisis, exports dropped sharply after the global crisis (panel C). This is intuitively plausible, since exports to the advanced economies, and in particular the United States, were the primary driver of Asia's V-shaped recovery in 1999. In contrast, during the global crisis

Figure 4.1 Key macroeconomic indicators around the two crises, East Asia-5 average

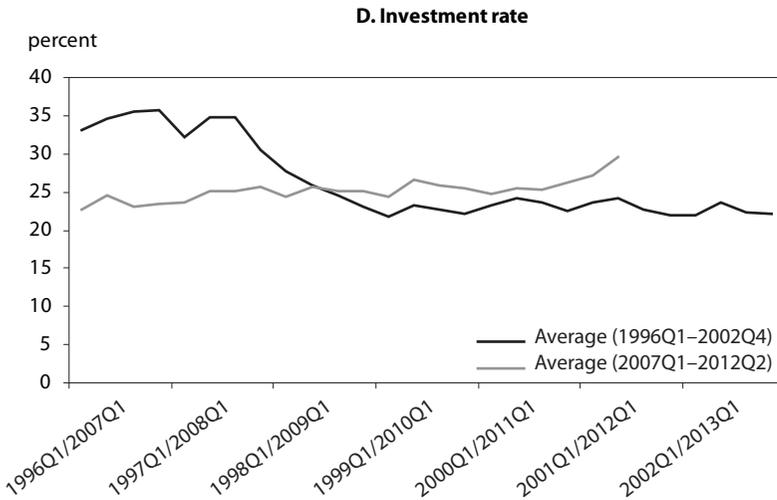
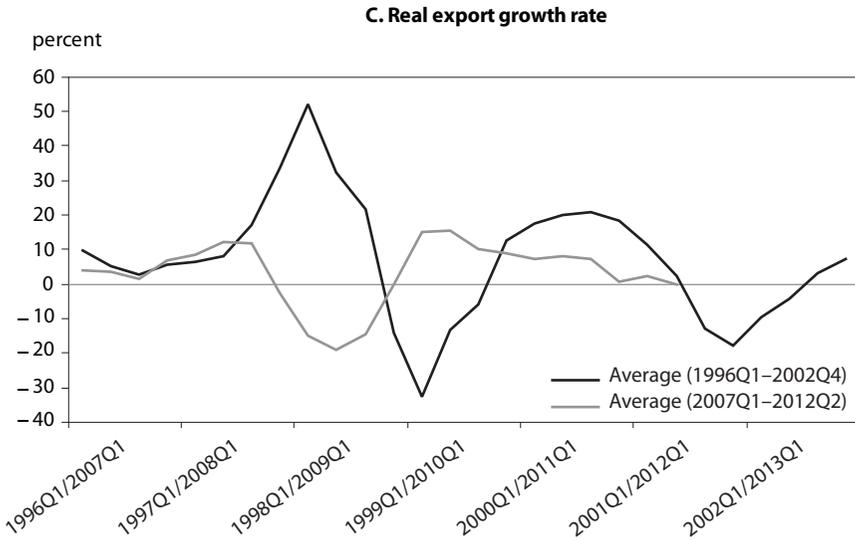


(continues on next page)

the advanced economies were the epicenters of the crisis and contributed to the collapse of global trade.

Investment fell after the Asian crisis but held up well after the global crisis (panel D). Fiscal policy moved in opposite directions during the two crises (panel E). While Asia witnessed strong fiscal expansion after the global crisis, deep fiscal contraction was the norm after the Asian crisis. On the basis of the IMF's policy prescriptions, during the Asian crisis the Asian countries pursued fiscal contraction, which deepened the recession. On the other hand, large fiscal stimulus programs quickly and decisively implemented by the Asian countries

Figure 4.1 Key macroeconomic indicators around the two crises, East Asia-5 average (continued)

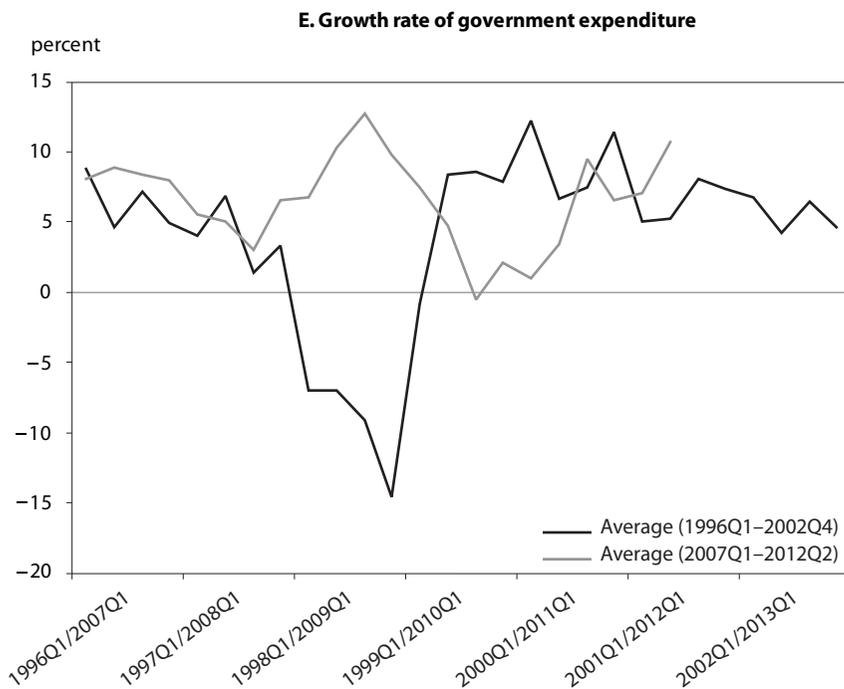


(continues on next page)

supported aggregate demand and laid the foundation for recovery. Taken together, panels D and E indicate that the five countries were in much better shape during the global crisis. In particular, domestic demand was stronger.

Finally, panel F suggests that monetary policy quickly turned expansionary during the 2008 crisis as central banks sought to support growth by providing liquidity for their financial systems. In contrast, during the Asian crisis, central banks raised interest rates. While higher interest rates were intended to stem

Figure 4.1 Key macroeconomic indicators around the two crises, East Asia-5 average (continued)



(continues on next page)

capital outflows and restore the confidence of financial markets, they had an adverse impact on the real economy.²

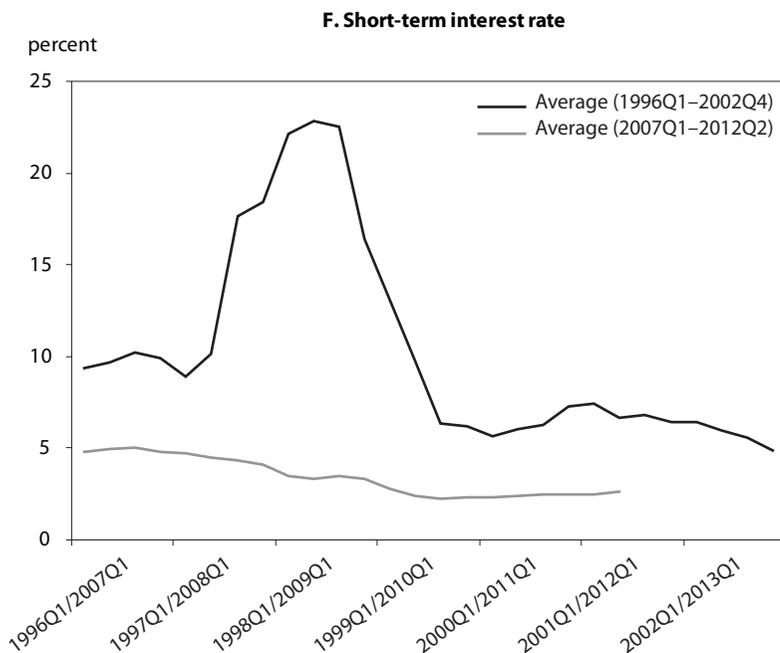
Overall, internal structural problems contributed considerably to the outbreak of the Asian crisis and robust external demand helped the five countries export their way out of the crisis.³ In contrast, the global crisis was largely an external crisis from the viewpoint of the five countries, which enjoyed relatively strong internal fundamentals in 2007–08.⁴ Another important difference between the two crises was the stance of fiscal and monetary policy. Whereas both policies were clearly countercyclical during the global crisis, they amplified

2. The high interest rates during the Asian crisis were heavily criticized by, among others, Jason Furman and Joseph E. Stiglitz (1998) and Steven Radelet and Jeffrey Sachs (1998). More recently, Hangyong Lee and Changyong Rhee (2012) also emphasize that, during the global financial crisis, advanced economies did not use the prescriptions given to Asia in 1997.

3. We investigate internal structural problems during the Asian crisis in greater depth later in this chapter.

4. Dongchul Cho (2012) also emphasizes that the Republic of Korea managed to recover quickly thanks to relatively sound fundamentals achieved as a result of the restructuring process following the 1997–98 crisis.

Figure 4.1 Key macroeconomic indicators around the two crises, East Asia-5 average (continued)



a. The exchange rate is the nominal exchange rate against the US dollar.

Note: East Asia-5 comprises Indonesia, the Republic of Korea, Malaysia, the Philippines, and Thailand.

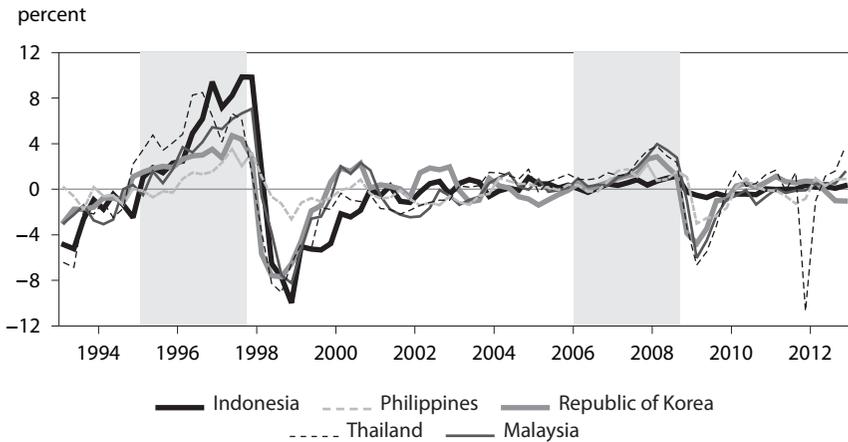
Source: Authors' calculations based on data from IMF, *International Financial Statistics*.

the downturn during the Asian crisis. These issues are examined more rigorously later in this chapter. The next subsection, however, takes a closer look at the macroeconomic situation of the individual EA-5 countries in the years prior to the two crises.

Behavior of Key Macroeconomic Indicators Prior to Both Crises in the EA-5

In this subsection, we take a more in-depth look at the macroeconomic performance of the EA-5 by dissecting the performance of individual countries to seek possible explanations for their different reactions during the two crises. In the years leading up to both crises, output in the EA-5 countries outpaced their trend, opening up growing output gaps before output plunged during the crisis (shaded areas in figure 4.2). Although qualitatively similar, the output gaps prior to the global crisis are much smaller than those prior to the Asian crisis. Rapid growth prior to both crises pushed actual output far above its potential, creating macroeconomic imbalances and high inflationary pressures. Those imbalances were especially evident in the buildup to the Asian crisis.

Figure 4.2 Output deviation from trend in the five East Asian countries, 1994–2012



Note: The gap is measured as the log difference between the seasonality adjusted quarterly output and its Hodrick-Prescott filtered trend. The shaded areas indicate a 3-year window prior to each crisis.

Source: Authors' calculations based on data from the CEIC.

Table 4.1 Average quarterly (year-over-year) inflation in the five East Asian countries, 1993–2012 (percent)

Year	Indonesia	Republic of Korea	Malaysia	Philippines	Thailand
1995–96	8.2	4.7	3.5	7.6	5.8
2006–07	9.7	2.4	2.8	4.2	3.5
Noncrisis years	7.9	3.5	2.4	5.4	3.3

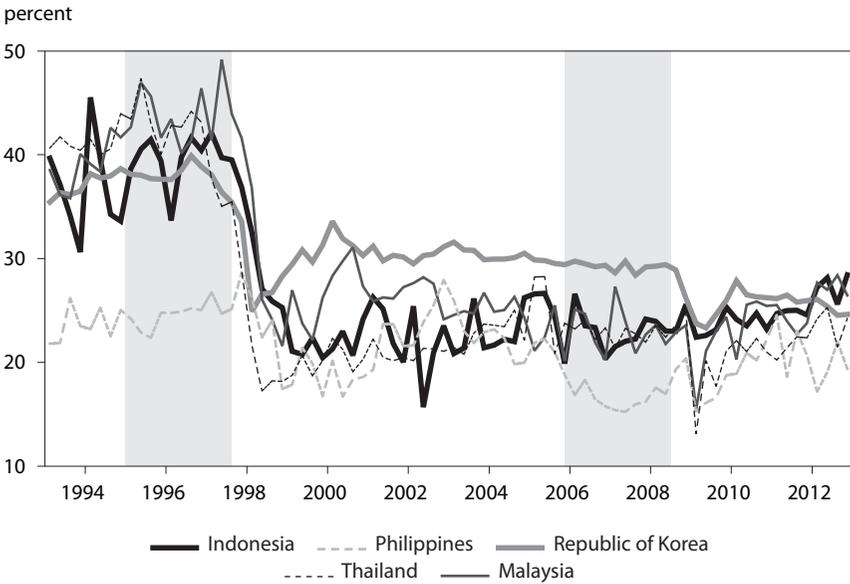
Notes: "Noncrisis years" indicates the average quarterly inflation for 1993–2012, excluding the period of the Asian financial crisis (1997–99) and the global financial crisis (2008–09).

Source: Authors' calculations based on data from the CEIC.

Average inflation in the years leading up to the two crises was generally higher than the average of noncrisis years during the last two decades (table 4.1). Since aggregate demand pressures prior to the global crisis were much weaker than before the Asian crisis, the average inflation rate was lower.⁵ In the

5. Indonesia appears to be an exception due to a jump in inflation as the government dramatically increased its domestically administered fuel prices in March and October 2005. Adjusting for the direct impact of this increase on the consumer price index inflation rate produces lower inflation figures for 2006, which are more consistent in reflecting the price movements that are due to demand pressures faced by the economy (Ramayandi and Rosario 2010). Average inflation for 2006–07 after adjusting for this direct impact of the domestic fuel price increase is much lower, at about 6.9 percent.

Figure 4.3 Share of investment in GDP in the five East Asian countries, 1994–2012



Note: The shaded areas indicate a 3-year window prior to each crisis.

Source: Authors' calculations based on data from the CEIC.

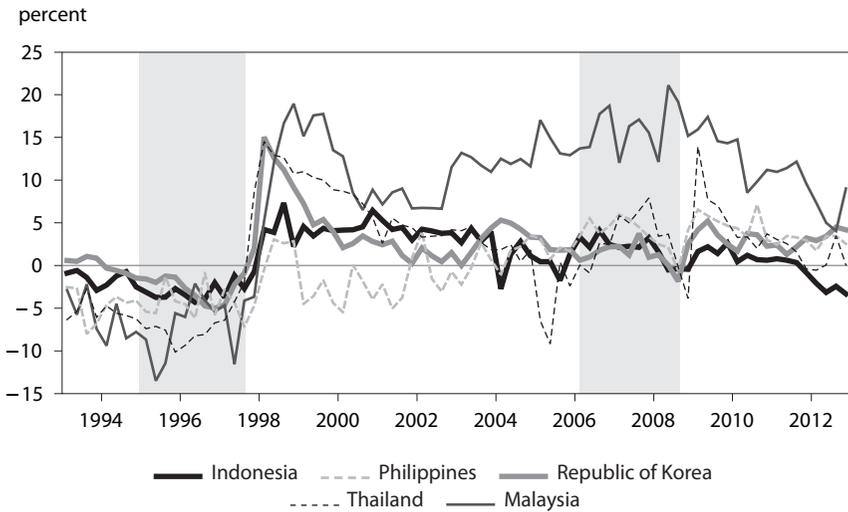
Republic of Korea and the Philippines, inflation prior to the global crisis was even lower than the noncrisis average, suggesting that it was not a major issue during this time.

The behavior of investment plays an important role in the EA-5's economic performance during the two crises. The share of investment in GDP prior to the Asian crisis was much higher than that prior to the global crisis (figure 4.3). This share dropped sharply during the Asian crisis and has not fully recovered since then. In turn, the lower share of investment reversed the saving-investment gap into positive territory, making room for lower interest rates after the Asian crisis.

The massive surge in investment prior to the Asian crisis was accompanied by high rates of imports that led to current account deficits despite the EA-5's export-led growth strategy. Figure 4.4 shows that the current account balance turned negative prior to the Asian crisis and turned positive afterward. The deficit widened in the period leading up to the Asian crisis, but narrowed somewhat in the period leading up to the global crisis. Rapid growth in exports, coupled with falling imports, reversed the current account balance of the EA-5 after the Asian crisis.

The exchange rate seems to play a significant role in explaining the different behavior of investment and the current account during the two

Figure 4.4 Current account balance as a share of GDP in the five East Asian countries, 1994–2012



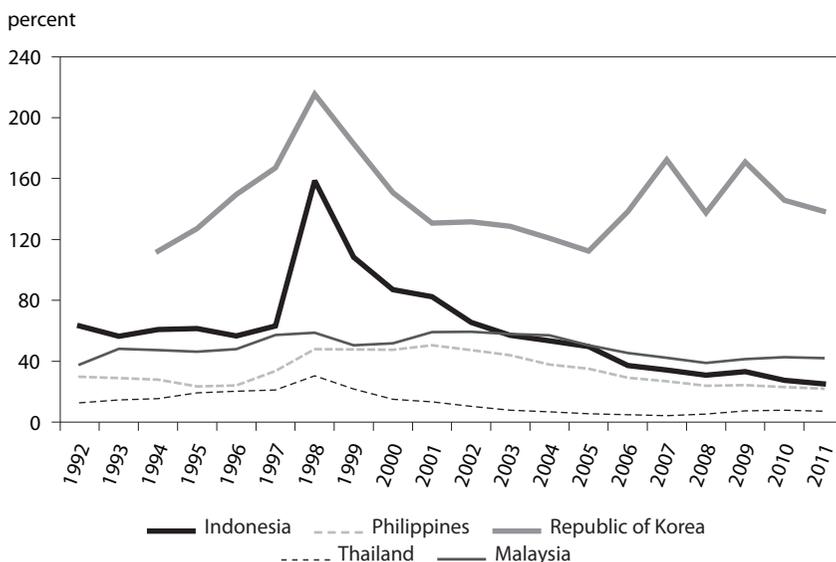
Note: The current account includes the balance of trade in goods and services as well as the net foreign income and transfers. The shaded areas indicate a 3-year window prior to each crisis.

Source: Authors' calculations based on data from the CEIC.

crises. Prior to the Asian crisis, EA-5 exchange rates tended to be overvalued and their movements were limited. In 1997–98, the currencies went through a massive correction in all these countries. Indonesia and Thailand abandoned their heavily managed exchange rate regime and moved to a more flexible regime. Overvalued currencies had made imports cheaper to the EA-5 economies in the pre-Asian crisis years. Expectations of continuous appreciation of the exchange rate also lowered the cost of borrowing overseas, which further fueled a boom in investment that relied on external debt and imported capital goods. External debts grew rapidly, reaching their peak in 1998 (figure 4.5), mainly due to private and short-term external borrowing. As a result of very high investment rates, the current account balance turned negative despite healthy export performance.

The Asian crisis saw a sharp depreciation of currencies, which represented a massive correction of misaligned exchange rates. This made imports and loans from abroad much more expensive for the EA-5 countries. Exchange rate corrections initially overshot their new but much weaker equilibrium values. The Indonesian rupiah in terms of the US dollar was about four times weaker than in 1996. Other countries saw their currencies depreciate by more than 50 percent relative to the US dollar (figure 4.6). Following these large corrections, investments plunged and exports jumped as the EA-5 gained exchange rate competitiveness amid strong global demand. On the other hand, though

Figure 4.5 Total external debt relative to GDP in the five East Asian countries, 1992–2011



Source: Authors' calculations based on data from the CEIC.

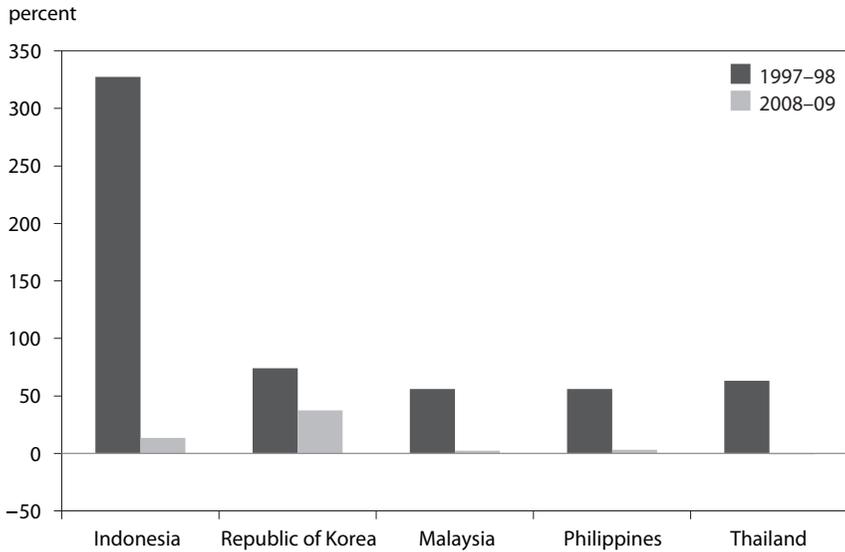
all countries except Thailand experienced currency depreciation between 2006 and 2008, the magnitude of the depreciation was muted relative to the Asian crisis.⁶

Haunted by the exchange rate collapse during the Asian crisis, the EA-5 countries have been building up international reserves despite more flexible exchange rate regimes. Partly helped by current account balance surpluses, gross international reserve holdings have accelerated rapidly since 2004 (figure 4.7). Ample international reserves provided the five countries with more ammunition to defend their currencies during the global crisis.

A more flexible regime adopted after the Asian crisis also limited pressures for exchange rate correction during the global crisis. To illustrate the point further, table 4.2 provides a measure akin to an exchange rate premium based on a residual from the uncovered interest parity condition. A negative value indicates that the maintained interest differential fell short of the actual currency depreciation and a positive value indicates the opposite. In other words, a negative value suggests that the domestic interest rate was too low to maintain the exchange rate value, and hence the country may have been prone to capital outflows. Except for the Philippines—the country least affected by

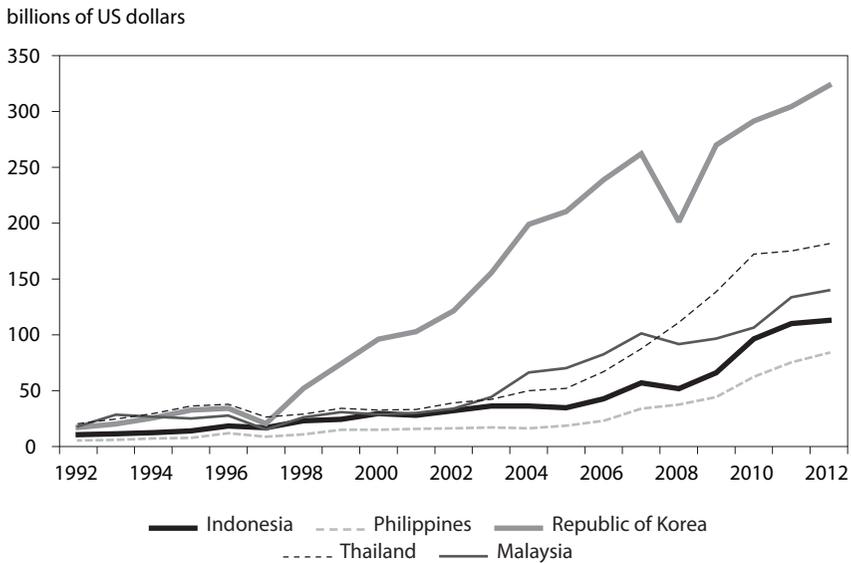
6. The only exception is the Republic of Korea, which experienced significant exchange rate depreciation after the global financial crisis.

Figure 4.6 Nominal exchange rate depreciation in the five East Asian countries, 1997–98 and 2008–09



Source: Authors' calculations based on data from the CEIC.

Figure 4.7 Gross international reserves in the five East Asian countries, 1992–2012



Source: Authors' calculations based on data from the CEIC.

Table 4.2 Residual from the interest parity condition, 1993–2012
(percent)

Year	Indonesia	Republic of Korea	Malaysia	Philippines	Thailand
1995–96	-3.63	-3.6	-5.02	2.05	-7.03
2006–07	2.52	-7.21	3.19	11.68	5.69
Noncrisis years	4.52	3.56	0.83	8.82	0.49

Notes: The residuals are computed as the difference between the domestic-US short-term interest rate differential and a change in the one-year-lead actual domestic currency versus the US dollar exchange rate. A zero value indicates the fulfillment of the interest parity condition. A negative value suggests that the domestic interest rate is too low to match changes in the exchange rate, and vice versa. “Noncrisis years” indicates the average for 1993–2012, excluding the periods of the Asian financial crisis (1997–99) and the global financial crisis (2008–09).

Source: Authors’ calculations based on data from the CEIC.

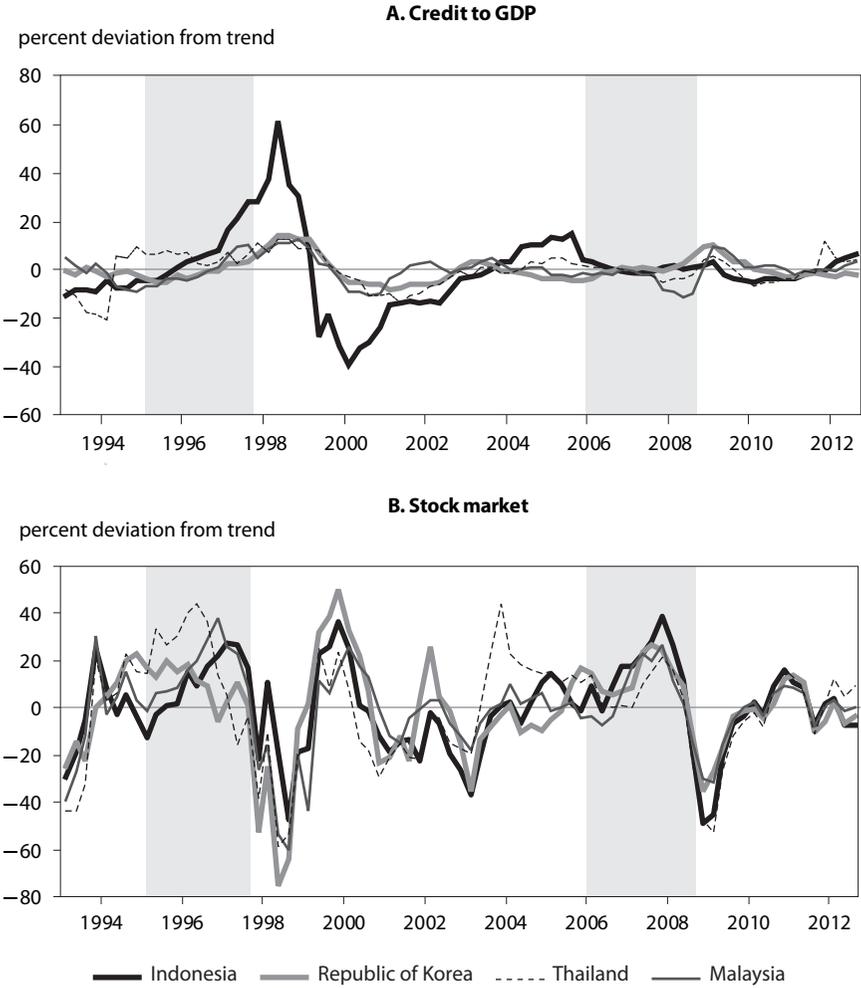
the Asian crisis—all EA-5 economies had a negative value prior to the crisis. As a result, these countries were prone to capital outflows during this time. Prior to the global crisis, the situation was reversed. Except for the Republic of Korea, other EA-5 countries had a positive value, and hence tended to attract capital inflows rather than outflows.

The condition faced by the domestic banking sector in the EA-5 also differs between the two crises. The growth of bank credit to the private sector around the global crisis episode is more in line with its trend relative to that around the Asian crisis. But does this imply more benign domestic financial imbalances during the global crisis? Claudio Borio and Philip Lowe (2002a, 2002b) argue that rapid cumulative growth in credit to the private sector and asset prices are often good leading indicators to gauge a buildup in domestic financial sector imbalances. Following their arguments, figure 4.8 examines domestic financial conditions of selected EA-5 countries.⁷ The figure shows the credit and asset price behavior around the Asian and global crises. All panels plot the percentage deviation (gap) of each of the indicators from their trend. Buildups of a positive gap in private sector credit prior to the Asian crisis were more obvious than those before the global crisis (panel A). In both cases, credit to the private sector continued to swell after the crisis started and tumbled at the peak impact of each crisis. The size of the gap, however, is somewhat smaller during the global crisis and was preceded by more stable credit conditions.

Increasing gaps in stock prices can also be seen prior to each crisis (panel B). Unlike credit, however, these buildups tumbled immediately once the crisis started. Although the sampled countries’ real economies were hardly affected by the dot-com crisis in the early 2000s, a similar buildup in stock prices was also evident prior to the dot-com bust. This suggests that the swings in stock prices in these countries may be driven more by the global market situation and

7. The Philippines is excluded from figure 4.8 due to the unavailability of consistent time series data throughout the sample.

Figure 4.8 Credit and asset price behavior in four East Asian countries around the two crises, 1994–2012

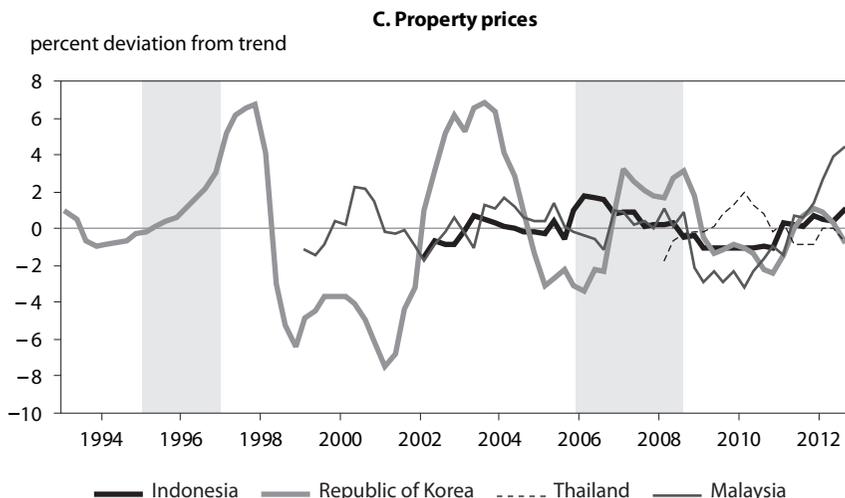


(continues on next page)

the sentiment of global investors. Unfortunately, data on property prices prior to the Asian crisis are available only for the Republic of Korea. Except for that country, however, there was no clear indication of property market stress in the other countries prior to the global crisis (panel C). This last panel supports the argument that the stress in the domestic financial sector in the run-up to the global crisis was much less than that in the run-up to the Asian crisis.

By extension, different pressures for exchange rate correction and different domestic financial sector conditions explain the situation that the EA-5 central banks faced during the two crises. Prior to the Asian crisis, there was practically

Figure 4.8 Credit and asset price behavior in four East Asian countries around the two crises, 1994–2012 (continued)



Note: Gaps are measured as a percentage deviation from the Hodrick-Prescott filtered trend. The shaded areas indicate a 3-year window prior to each crisis.

Sources: Panel A: Authors' calculations based on Bank for International Settlements (BIS) data. Panel B: Authors' calculations based on data from the CEIC. Panel C: Authors' calculations based on data from the central banks of Indonesia, Malaysia, and Thailand, and from the private sector for the Republic of Korea, as compiled by the BIS. All data were downloaded on June 6, 2013.

no scope for easing interest rates. In fact, higher interest rates were needed to stem capital outflows. This interest rate hike, however, had an adverse effect on the real economy. In contrast, prior to the global crisis, there was plenty of scope for lowering interest rates, which in turn helped boost aggregate demand. This difference offers an intuitive explanation for why interest rates behaved differently in the two crises. Monetary policy was well positioned for an expansion at the onset of the global crisis, while the opposite was true in the case of the Asian crisis.

Another major difference between the two crises was the reaction of fiscal policy. Fiscal consolidation became inevitable after the Asian crisis, when governments were forced to absorb contingent fiscal liabilities as they bailed out bankrupt firms. For example, a nationalization of major domestic banks in Indonesia reduced fiscal space and hence the scope for fiscal stimulus. Mounting external debts due to exchange rate depreciation also reduced the fiscal space available to the EA-5 governments. In contrast, the governments faced no such constraints during the global crisis. They were not forced to bail out bankrupt firms this time around. In addition, public debts were either declining or stable at relatively low shares of GDP in the EA-5 countries (Ferrarini and Ramayandi 2012). Under these conditions, the governments were equipped with enough fiscal space to decisively implement large fiscal

stimulus programs. The stimulus helped to support aggregate demand and growth at a time when private demand and external demand were imploding.

In sum, the EA-5 economies were in completely different conditions prior to the two crises. A number of structural domestic problems lay at the heart of the regional financial crisis of 1997–98. On the other hand, domestic fundamentals were sound during the global crisis, which was thus largely an external crisis for the EA-5 countries. Structural reforms and more flexible exchange rate regimes in the post-Asian-crisis period strengthened the domestic fundamentals of those countries. As a result, they were able to effectively pursue countercyclical monetary and fiscal policy, which cushioned the impact of the global crisis and laid the foundation for recovery.

Empirical Framework

This section lays out the empirical framework we use to perform a more in-depth comparative econometric analysis of the Asian currency crisis and the global financial crisis. More specifically, using quarterly data from 1990Q1 to 2011Q4, we perform three exercises in order to identify factors contributing to the different responses of the five Asian countries to the two crises.

First, we run a panel probit regression on the likelihood of a crisis. By investigating the economic fundamentals that are responsible for a crisis, we examine whether Asian countries' fundamentals were sounder during the global crisis than during the Asian crisis. The crisis is defined as a currency crisis as identified by Reinhart and Rogoff (2011).⁸

Second, we identify economic factors determining the depth of a crisis and investigate what economic fundamentals are responsible for the less severe slowdown of Asian countries around the global financial crisis.

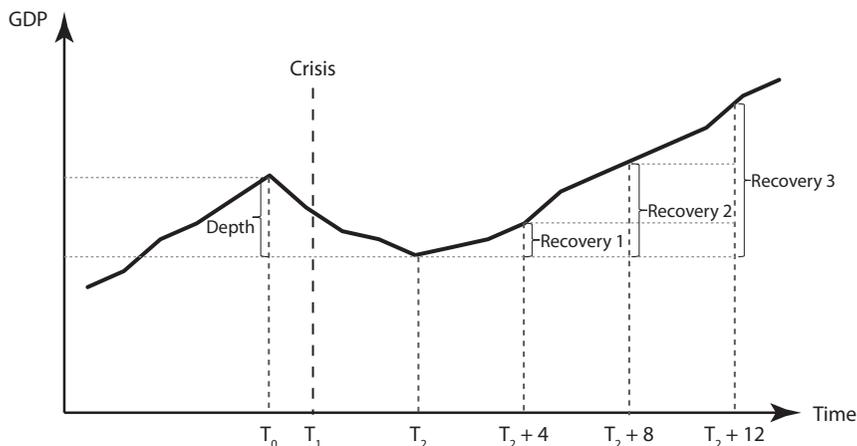
Third, we identify what economic fundamentals determine recovery from a crisis and analyze how Asian countries could rapidly recover from the global financial crisis.

How Can the Depth of a Crisis and Recovery from It Be Measured?

Figure 4.9 illustrates the measurement of the depth of a crisis and recovery from a crisis. Suppose that a crisis occurs at time T_1 . The depth is measured by the fall in real GDP from a peak before a crisis (a local maximum) to a trough after the crisis (a local minimum). The peak is a local maximum level of real GDP between $T_1 - 4$ and $T_1 + 1$ quarters. In the figure, the maximum is attained at time T_0 . The trough is a local minimum level of real GDP within three years (T_1 and $T_1 + 12$ quarters) after the crisis. The minimum is attained at time T_2 . The depth of a crisis is defined as the difference between the local maximum

8. We also defined a crisis dummy that takes one if either a currency crisis or a banking crisis as identified by Reinhart and Rogoff occurred. The results are qualitatively very similar. Results are available upon request.

Figure 4.9 Graphical representation of depth of and recovery from a crisis



Notes: A crisis occurs at time T_1 . The depth is a decrease in real GDP from a local maximum to a local minimum around the crisis. The local maximum is the maximum level of real GDP between $T_1 - 4$ and $T_1 + 1$ quarters. The local minimum is the minimum level of real GDP within three years (T_1 and $T_1 + 12$) after the crisis. In the figure, the local minimum is attained at time T_2 . The depth of a crisis is defined as the difference between the local maximum and the local minimum. We also measure three recoveries: one-, two-, and three-year recoveries. One-year recovery is an increase in real GDP for one year after the minimum (Recovery 1). Two-year recovery is an increase in real GDP for two years after the minimum (Recovery 2). Three-year recovery is an increase in real GDP for three years after the minimum (Recovery 3).

Source: Authors' illustration.

and the local minimum. We also measure one-, two-, and three-year recoveries, as described in the figure.

How Do We Choose Explanatory Variables for a Crisis?

There are a number of economic variables considered in the early warning literature that signal a crisis. For purposes here, we consider economic variables that are identified to be most significant in recent studies. Pierre-Olivier Gourinchas and Maurice Obstfeld (2012, 226), based on a discrete-choice panel analysis using 1973–2010 data, found that “domestic credit expansion and real currency appreciation have been the most robust and significant predictors of financial crises, regardless of whether a country is emerging or advanced.” By reviewing more than 80 papers, Jeffrey A. Frankel and George Saravelos (2010) find that foreign exchange reserves, the real exchange rate, and the growth rate of credit are the most frequent statistically significant indicators. The next most significant variables are GDP and the current account.

Based on the above two studies, we choose the following seven explanatory variables for probit analysis of a crisis: (1) foreign reserves/GDP, (2) five-year average of real exchange rate appreciation, (3) credit/GDP, (4) five-year average growth rate of real GDP, (5) current account/GDP, (6) five-year average

Table 4.3 Summary statistics: Full sample, 1990–2011

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Dummy for crisis	1,631	0.15	0.36	0	1
Foreign reserves/GDP	3,278	0.49	6.49	0	197.89
5-year real exchange rate depreciation	2,250	0	0.1	-1.42	0.97
5-year real GDP growth	2,944	0.02	0.04	-0.23	0.41
Credit/GDP	2,230	0.46	0.42	-0.16	3.29
Current account/GDP	3,082	-0.18	5.71	-164.57	105.41
5-year inflation rate	2,455	0.09	0.14	-0.05	1.72
Export share of GDP	3,082	0.4	0.26	0	2.35
Depth of crisis	135	0.08	0.07	0	0.27
1-year recovery	140	0.05	0.04	-0.03	0.15
2-year recovery	136	0.1	0.05	0.01	0.23
3-year recovery	129	0.13	0.07	-0.08	0.31
1-year money growth	303	0.2	0.28	-0.13	3.77
2-year money growth	286	0.2	0.21	-0.1	2.69
3-year money growth	267	0.2	0.17	-0.02	1.86
1-year interest rate difference	87	-3.5	7.82	-48.67	18.32
2-year interest rate difference	86	-3.59	8.22	-48.3	14.59
3-year interest rate difference	82	-3.85	8.41	-45.79	14.59
1-year government expenditure growth	146	0	0.14	-0.64	0.55
2-year government expenditure growth	143	0.02	0.1	-0.37	0.32
3-year government expenditure growth	135	0.02	0.08	-0.27	0.18

Source: See text for explanation.

of the inflation rate, and (7) export share of GDP. The summary statistics are reported in table 4.3 for the full 1990–2011 sample and in table 4.4 for the global crisis sample.

The real exchange rate is the real effective exchange rate against OECD countries where trade shares are used as weights. Following Gourinchas and Obstfeld (2012), domestic credit measured in domestic currency comes from the IMF's *International Financial Statistics*. Domestic credit is obtained by subtracting net claims on the central government (IFS line 32an) from total domestic claims of depository corporations (central banks and other deposi-

Table 4.4 Summary statistics: Global financial crisis

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Dummy for crisis	527	0.06	0.23	0	1
Foreign reserves/GDP	874	0.2	0.19	0	1.44
5-year real exchange rate depreciation	902	-0.02	0.11	-1.42	0.35
5-year real GDP growth	1,122	0.03	0.03	-0.09	0.18
Credit/GDP	626	0.64	0.52	0.03	3.29
Current account/GDP	808	-0.03	0.12	-0.5	0.48
5-year inflation rate	979	0.06	0.05	-0.04	0.58
Export share of GDP	794	0.44	0.28	0.01	2.3
Depth of crisis	22	0.06	0.04	0.01	0.16
1-year recovery	22	0.05	0.03	0.01	0.12
2-year recovery	19	0.09	0.05	0.01	0.23
3-year recovery	11	0.12	0.07	0.02	0.25
1-year money growth	62	0.15	0.11	-0.06	0.53
2-year money growth	45	0.14	0.09	-0.01	0.36
3-year money growth	26	0.15	0.07	0.02	0.33
1-year interest rate difference	21	-3.75	2.71	-10	2.07
2-year interest rate difference	20	-3.47	3.54	-15	0.68
3-year interest rate difference	16	-2.42	3.22	-11.5	0.62
1-year government expenditure growth	22	0.03	0.08	-0.13	0.26
2-year government expenditure growth	19	0.03	0.05	-0.07	0.15
3-year government expenditure growth	11	0.04	0.04	-0.01	0.12

Source: See text for explanation.

tory corporations, IFS line 32). Exceptions are as follows: Brazil (claims on the private sector and other financial corporations of other depository institutions, IFS lines 22d + 22g); Australia (claims on the private sector and other financial corporations of depository institutions, IFS lines 32d + 32g); and Argentina (claims on the private sector, IFS line 32d). The credit-to-GDP ratio is calculated by dividing domestic credit by nominal GDP in domestic currency. Export share of GDP is exports divided by GDP.

Table 4.5 Coefficients of bivariate regressions on each independent variable: Full sample

Variable	Dummy for currency crisis	Depth of crisis	1-year recovery	2-year recovery	3-year recovery
	(1)	(2)	(3)	(4)	(5)
Foreign reserves/GDP	-5.04*** (0.84)	-0.07 (0.06)	-0.02 (0.03)	-0.06 (0.07)	0.01 (0.07)
5-year real exchange rate appreciation	1.93* (1.09)	0.21 (0.13)	0.09 (0.06)	0.15 (0.1)	0.18 (0.13)
Credit/GDP	-2.79 (2.58)	-0.05 (0.25)	-0.01 (0.11)	-0.04 (0.2)	-0.24 (0.27)
5-year real GDP growth	2.04*** (0.52)	0.02 (0.03)	0.01 (0.02)	0.02 (0.04)	0.01 (0.05)
Current account/GDP	-2.52*** (0.92)	-0.18 (0.13)	0.03 (0.07)	0.04 (0.12)	-0.01 (0.16)
5-year inflation rate	2.76*** (0.41)	0.16*** (0.02)	0.06*** (0.01)	0.08*** (0.02)	0.10*** (0.03)
Export share of GDP	-3.02*** (0.56)	-0.06 (0.04)	-0.04* (0.02)	-0.03 (0.03)	-0.03 (0.04)
Money growth		0.00 (0.01)	0.13*** (0.02)	0.17*** (0.03)	0.23*** (0.04)
Interest rate changes		-0.00* (0.00)	-0.07* (0.04)	-0.18*** (0.07)	-0.18* (0.09)
Real government expenditure growth		-0.08*** (0.03)	0 (0.02)	0.14*** (0.04)	0.34*** (0.07)

Notes: Column (1) is a panel probit estimation with random effects. All other columns are pooled ordinary least squares regressions. Depth and recoveries are defined only for countries that experienced a crisis between 1990 and 2011. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

Empirical Results

This section reports and discusses key findings from our econometric comparative analysis. We look at the determinants of a crisis, the depth of a crisis, and recovery from a crisis.

Determinants of a Crisis

We report both bivariate (tables 4.5 and 4.6) and multivariate panel regression results (tables 4.7 to 4.11). First, we look at the bivariate results, reporting the results for panel probit regressions with random effects for the entire sample

Table 4.6 Coefficients of bivariate regressions on each independent variable: Global financial crisis

Variable	Dummy for currency crisis	Depth of crisis	1-year recovery	2-year recovery	3-year recovery	Depth of crisis, 2008	1-year recovery, 2008	2-year recovery, 2008	3-year recovery, 2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign reserves/GDP	-1.3 (0.95)	0.12 (0.1)	0.02 (0.06)	0.01 (0.13)	0.53* (0.28)	0.08 (0.29)	0.12*** (0.02)	0.17*** (0.03)	0.16*** (0.05)
5-year real exchange rate appreciation	5.25** (2.3)	0.45 (0.31)	0.12 (0.19)	0.23 (0.43)	0.79 (1.05)	2.81* (1.55)	-0.09 (0.12)	-0.18 (0.2)	-0.1 (0.31)
Credit/GDP	15.14*** (4.51)	1.03** (0.41)	0.33 (0.27)	0.84 (0.54)	3.75*** (0.88)	-0.18 (0.38)	-0.03 (0.02)	-0.19** (0.09)	-0.14 (0.16)
5-year real GDP growth	2.65** (1.16)	0.05 (0.04)	-0.01 (0.02)	-0.23 (0.29)	0.14 (0.67)	0.17 (2.13)	0.76*** (0.18)	1.65*** (0.3)	3.12*** (0.53)
Current account/GDP	-0.64 (1.33)	-0.05 (0.14)	0.06 (0.08)	0.23 (0.22)	0.56 (0.53)	0.05 (0.51)	0.13*** (0.04)	0.18*** (0.07)	0.41** (0.16)
5-year inflation rate	2.4 (2.36)	0.83*** (0.22)	0.28* (0.16)	0.62* (0.33)	1.79*** (0.5)	2.77 (1.85)	0.23 (0.17)	0.54* (0.32)	1.01 (0.71)
Export share of GDP	-1.93** (0.84)	-0.11 (0.1)	-0.10* (0.06)	-0.11 (0.13)	-0.05 (0.28)	0.02 (0.17)	0 (0.01)	0 (0.02)	0.01 (0.03)
Money growth		0.13 (0.1)	0.08 (0.06)	0.23 (0.17)	1.60*** (0.59)	2.29 (3.18)	0.27*** (0.08)	0.52*** (0.17)	0.60* (0.36)
Interest rate changes		0.75** (0.31)	-0.26 (0.22)	-0.64* (0.37)	-0.01 (0.7)	-0.87** (0.34)	0.33 (0.26)	0.22 (0.45)	-0.11 (0.73)
Real government expenditure growth		0.09 (0.17)	0.1 (0.07)	0.75*** (0.21)	1.38*** (0.45)	-0.17 (0.12)	0.13** (0.06)	0.58*** (0.17)	2.08*** (0.38)

Notes: Column (1) is a panel probit estimation with random effects. All other columns are pooled ordinary least squares regressions. In columns (2) to (5), depth and recoveries are defined only for countries that actually experienced a crisis in 2008. In columns (6) to (9), depth and recoveries are defined for all countries assuming that they experienced a crisis in 2008. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

in column (1) in table 4.5. The dependent variable is a crisis dummy. We use each variable one by one as an explanatory variable. All the dependent variables are one-year lagged to obtain precrisis values.

The first three variables are statistically significant at the 1 or 10 percent level, consistent with the previous literature. The more foreign reserves a country has, the less likely it will experience a crisis. The more the exchange rate appreciates before a crisis, the more likely a country will experience a crisis. The more domestic credit expands before a crisis, the more likely a country will experience a crisis. The second and third variables are closely related to capital inflows. A typical symptom of capital inflows is real exchange rate appreciation and domestic credit expansion. Except for the five-year real GDP growth rate, the other three remaining variables—the current account, inflation rate, and export share—are also statistically significant at the 1 percent level. The larger the current account surplus, the less likely a crisis. The higher the inflation rate, the more likely a crisis. Finally, the larger the export share, the less likely a crisis.

In order to see any difference in the causes of the global financial crisis, we restrict our sample in column (1) of table 4.6 to that crisis by setting the dependent variable to be a crisis dummy that takes the value of one if a currency crisis occurs between 2008 and 2011. We used the sample period of 2006–11. In this case, only four variables are significant: real exchange rate appreciation, domestic credit, real GDP growth rate, and export share of GDP. The results suggest that the impact of the global crisis seems to be more closely related to foreign capital inflows. Real exchange rate appreciation, a domestic credit boom, and real GDP typically surge follow foreign capital inflows.

Table 4.7 shows the results for panel probit regressions with random effects when all the explanatory variables are included together—i.e., multivariate analysis. The dependent variable is a crisis dummy that takes the value of one if a currency crisis occurs between 1990 and 2011. All explanatory variables are lagged by one year. The first three main explanatory variables are included in all columns. The remaining four variables are then included one by one. Finally in the last column, all the seven explanatory variables are included together. In this multivariate set-up, all the other variables are still significant except the real exchange rate appreciation, five-year real GDP growth rate, and current account.

Table 4.8 restricts the sample again to the global crisis and performs multivariate panel probit regressions where all the explanatory variables are included together. The dependent variable is a crisis dummy that takes the value of one if a currency crisis occurs between 2008 and 2011. We used the sample period of 2006–11. All explanatory variables are lagged by one year.

Now foreign reserves and the inflation rate are no longer significant. Instead, real exchange rate appreciation is highly significant at the 1 or 5 percent levels. The five-year real GDP growth rate and the current account are not significant. Again, the results in table 4.8 strongly suggest that the impact of the global crisis is closely related to foreign capital inflows. Real exchange

Table 4.7 Random effects panel probit regression for a currency crisis: Full sample

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Foreign reserves/GDP	-3.94*** (1.23)	-4.12*** (1.23)	-3.69*** (1.23)	-2.46** (0.99)	-3.24** (1.27)	-2.21** (1.00)
5-year real exchange rate appreciation	1.42 (1.32)	2.07 (1.42)	1.4 (1.33)	1.06 (1.26)	1.19 (1.34)	1.93 (1.39)
Credit/GDP	1.65*** (0.61)	1.58*** (0.6)	1.57** (0.62)	1.96*** (0.63)	1.75*** (0.62)	1.96*** (0.65)
5-year real GDP growth		0.45 (4.02)				2.73 (3.88)
Current account/GDP			-0.64 (1.4)			0.39 (1.24)
5-year inflation rate				2.43*** (0.49)		2.41*** (0.5)
Export share of GDP					-1.28** (0.58)	-0.89* (0.47)
Pseudo R ²	0.05	0.05	0.05	0.09	0.06	0.11
Observations	610	600	597	610	604	581
Countries	91	90	88	91	86	82

Notes: The dependent variable is a crisis dummy that takes a value of one if a currency crisis occurs between 1990 and 2011. All the explanatory variables are lagged by one year. The estimation is based on a panel probit regression with random effects. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

Table 4.8 Random effects panel probit regression for a currency crisis: Global financial crisis

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Foreign reserves/GDP	-1.16 (1.56)	-2.13 (1.75)	-1.26 (1.57)	-1.31 (1.56)	-0.69 (1.52)	-2.12 (1.92)
5-year real exchange rate appreciation	9.93*** (3.73)	7.93** (3.42)	10.12*** (3.79)	8.49** (3.74)	9.56*** (3.7)	7.45** (3.79)
Credit/GDP	2.39** (1.13)	2.53** (1.15)	2.51** (1.17)	2.48** (1.12)	2.45** (1.14)	2.96** (1.29)
5-year real GDP growth		19.03** (7.42)				22.29** (9.45)
Current account/GDP			0.93 (2.07)			2.04 (2.22)
5-year inflation rate				4.47 (3.83)		-0.11 (4.39)
Export share of GDP					-1.88* (1.11)	-1.94* (1.18)
Pseudo R ²	0.11	0.16	0.11	0.12	0.14	0.2
Observations	286	286	283	286	280	277
Countries	90	90	87	90	85	82

Notes: The dependent variable is a crisis dummy that takes one if a currency crisis occurs in 2008 or afterwards. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

rate appreciation, a domestic credit boom, and strong GDP growth are typically associated with a surge in foreign capital inflows. While only significant at the 10 percent level, the export share coefficient is negative.

Determinants of the Depth of a Crisis

First, we examine bivariate regression results for the depth of a crisis, which are reported in column (2) of table 4.5 for the entire sample and column (2) of table 4.6 for the global crisis sample. In addition to the same seven explanatory variables as in the probit equation, we incorporate monetary and fiscal policy measures. Monetary policy is measured by (1) M2 growth rate or (2) interest rate changes one year after the peak defined in figure 4.9. Fiscal expansion is measured by the growth rate of real government expenditures one year after the peak.

In table 4.5 (column 2), only the inflation rate and the two policy variables are significant at the 1 or 10 percent level. The higher the inflation rate before the crisis, the deeper the crisis. If the interest rate increases during the crisis, then the crisis becomes deeper. If the growth rate of real government expenditures increases, then the crisis becomes less deep.

In table 4.6 (column 2), credit/GDP is significant. Hence the larger the domestic credit expansion before a crisis, the deeper the crisis. While the coefficient of monetary policy measured by interest rate changes continues to be statistically significant, the coefficient of fiscal policy is no longer significant.

Column (6) of table 4.6 examines determinants of the depth of a crisis under the assumption that all countries experienced the global crisis in 2008. In other words, we calculated the depth of crises for all countries whether or not they are classified as crisis countries. In this case, the real exchange rate appreciation is significant; the greater the precrisis appreciation of the real exchange rate, the deeper the crisis. In addition, interest rate increases during the crisis deepen the crisis.

Multivariate regression results for the depth of the crisis are shown in table 4.9, which reports three cases. Columns (1) to (3) consider all the crises experienced between 1990 and 2011. Columns (4) to (6) restrict the sample to the countries that experienced a crisis in 2008. Finally, in columns (7) to (9), the dependent variable is the depth of the global crisis given that all countries are assumed to experience a crisis in 2008. The estimation is based on pooled ordinary least square regressions.

According to column (1), precrisis domestic credit expansion, the precrisis real GDP growth rate, and the precrisis inflation rate are positively related to the depth of crisis. Columns (2) and (3) suggest that government policies during the crisis also affect its depth. Consistent with the results in table 4.2, column (3) indicates that if the interest rate increases during the crisis, then the crisis becomes deeper. In addition, if the growth rate of real government expenditures increases, then the crisis becomes less deep.

Table 4.9 Determinants of depth of crisis

Variable	All crises			Global financial crisis			All countries in 2008		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign reserves/GDP	-0.01 (0.08)	0.02 (0.12)	-0.04 (0.1)	-0.21 (0.14)	-0.13 (0.2)	-0.19 (0.16)	0.24 (0.78)	0.01 (0.14)	-0.09 (0.09)
5-year real exchange rate appreciation	0.02 (0.12)	0.15 (0.13)	0.15 (0.13)	0.23 (0.43)	-0.24 (0.75)	-0.27 (0.47)	3.77* (2.17)	-0.19 (0.31)	-0.11 (0.28)
Credit/GDP	0.09** (0.04)	0.02 (0.04)	0.07 (0.04)	0.08** (0.04)	0.06 (0.07)	0.05 (0.07)	-0.24 (0.41)	0.03 (0.06)	0.04 (0.04)
5-year real GDP growth	0.93*** (0.32)	0.4 (0.37)	0.78** (0.39)	0.49 (0.72)	0.7 (0.96)	0.42 (0.84)	-5.9 (4.38)	1.91*** (0.74)	1.32** (0.67)
Current account/GDP	0 (0.15)	0.05 (0.17)	-0.02 (0.18)	0.13 (0.19)	0.13 (0.27)	0 (0.28)	-0.1 (0.9)	-0.02 (0.16)	-0.03 (0.13)
5-year inflation rate	0.20*** (0.03)	0.03 (0.06)	0.24*** (0.04)	1.35** (0.56)	1.13 (0.86)	1.35** (0.62)	3.81 (2.92)	-0.18 (0.46)	-0.11 (0.43)
Export share of GDP	0 (0.04)	-0.01 (0.05)	0 (0.05)	0.1 (0.16)	0.09 (0.25)	0.13 (0.18)	0.26 (0.39)	0.01 (0.07)	0.04 (0.05)
Money growth		0.15*** (0.05)			0.08 (0.21)			0.16 (0.14)	
Interest rate changes			0.15** (0.06)			0.29 (0.64)			0.31* (0.18)
Real government expenditure growth		-0.11 (0.08)	-0.14** (0.07)		0.12 (0.24)	0.15 (0.18)		-0.14 (0.15)	-0.02 (0.13)
Adjusted R ²	0.433	0.3	0.465	0.473	0.119	0.395	-0.011	0.278	0.329
Observations	66	44	55	16	14	16	54	28	35

Notes: The dependent variable is depth of crisis. All the explanatory variables are values one year before the crisis. Column (1) includes all crises experienced between 1990 and 2011. Column (2) includes only the global crisis in 2008 and afterwards. For column (3), the dependent variable is depth of the global financial crisis given that all countries are assumed to experience a crisis in 2008. The estimation is based on a pooled ordinary least square regression. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

However, for the global crisis, as shown in columns (4) to (6), the precrisis real GDP growth and government policy variables are no longer significant. In columns (7) to (9), when we assume that all the countries experienced a crisis in 2008, only real exchange rate appreciation, the real GDP growth rate, and interest increases are significant.

Overall, the depth of a crisis is determined by both economic fundamentals and policy variables. The findings thus suggest that unsound fundamentals such as excessive credit expansion and high inflation rates, as well as policy mistakes, might have been responsible for the severe recession inflicted upon Asian countries in 1997.

Determinants of Recovery from a Crisis

First, we examine bivariate regression results in tables 4.5 and 4.6. We also consider two policy variables as additional explanatory variables. Monetary policy is measured by the (1) M2 growth rate or (2) interest rate changes during the period for which each recovery is measured. For example, we used the one-year M2 growth rate for the one-year recovery equation, the two-year M2 growth rate for the two-year recovery equation, and so on. Fiscal expansion is measured by the growth rate of real government expenditure during each recovery period. Again, we used the one-year growth rate of real government expenditure for the one-year recovery equation, the two-year growth rate for the two-year recovery equation, and so on.

We consider the entire sample in columns (3), (4), and (5) in table 4.5 for one-, two-, and three-year recoveries. For recovery, policy variables are much more significant.⁹ The higher the money growth rate (or the lower the interest rate level), or the higher the growth rate of real government expenditures, the faster the recovery. In addition, the inflation rate and sometimes the export share are significant.

We consider the recovery from the global crisis in columns (3), (4), and (5) in table 4.6 for one-, two-, and three-year recoveries. Again, policy variables are quite significant.

In columns (7), (8), and (9) in table 4.6, assuming that all countries experienced a crisis in 2008, we consider the recovery of all countries in 2008. Policy variables continue to be significant. Interestingly, other economic variables are also significant. For example, higher foreign reserves, a higher real GDP growth rate, and a current account surplus lead to faster recovery. These results suggest that Asian countries' quick and robust recovery from the 2008 crisis may have been due to their sounder fundamentals as well as better policies.

Next, we examine the results when we use multivariate regressions in tables 4.10 to 4.13. Table 4.10 considers all recoveries from crises between 1990 and 2011; table 4.11 restricts the sample to the countries that experienced a

9. Yong Chul Park and Jong Wha Lee (2003) also emphasize that expansionary macroeconomic policies were critical for Asian countries after the Asian financial crisis.

Table 4.10 Determinants of recoveries from crisis: Full sample

Variable	1-year recovery			
	(1)	(2)	(3)	(4)
Money growth	0.12*** (0.02)		0.13*** (0.02)	
Interest rate changes		-0.06 (0.04)		-0.06 (0.04)
Real government expenditure growth	-0.01 (0.04)	-0.04 (0.04)	-0.01 (0.04)	-0.06 (0.04)
Real GDP			0 (0.01)	-0.01 (0.00)
Export share of GDP			0.02 (0.02)	0.05*** (0.02)
Adjusted R ²	0.414	0.024	0.401	0.119
Observations	75	72	75	72
Variable	2-year recovery			
	(5)	(6)	(7)	(8)
Money growth	0.17*** (0.03)		0.18*** (0.03)	
Interest rate changes		-0.19*** (0.07)		-0.19*** (0.07)
Real government expenditure growth	0.15 (0.11)	0.33*** (0.12)	0.14 (0.12)	0.26** (0.12)
Real GDP			0 (0.01)	0 (0.01)
Export share of GDP			0.04 (0.04)	0.08** (0.03)
Adjusted R ²	0.327	0.161	0.324	0.204
Observations	73	70	73	70

(continues on next page)

crisis in 2008; and table 4.12 considers the recovery of all countries in 2008 under the assumption that all countries experienced a crisis in 2008.

Table 4.10 reports determinants of recovery from crises in a multivariate setup for the entire sample. The dependent variable is one-year recovery (columns 1 to 4), two-year recovery (columns 5 to 8), and three-year recovery (columns 9 to 12) from crises between 1990 and 2011—i.e., the entire sample. We found earlier in a bivariate setup in tables 4.5 and 4.6 that policy variables are mainly responsible for recovery. Therefore, we use our two policy variables as the main explanatory variables. We use the money growth rate as a proxy for monetary expansion in columns (1) and (3) and interest rate increases in

Table 4.10 Determinants of recoveries from crisis: Full sample
(continued)

	3-year recovery			
	(9)	(10)	(11)	(12)
Money growth	0.18*** (0.04)		0.19*** (0.04)	
Interest rate changes		-0.18* (0.09)		-0.18** (0.09)
Real government expenditure growth	0.62*** (0.16)	0.43** (0.19)	0.66*** (0.17)	0.22 (0.2)
Real GDP			0.01 (0.01)	-0.01 (0.01)
Export share of GDP			0.01 (0.05)	0.11** (0.04)
Adjusted R ²	0.412	0.098	0.404	0.171
Observations	65	62	65	62

Notes: The dependent variable is 1-year recovery (columns 1 to 4), 2-year recovery (columns 5 to 8), and 3-year recovery (columns 9 to 12) from crises between 1990 and 2011. The estimation is based on a pooled ordinary least squares regression. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

columns (2) and (4). In columns (3) and (4) we add additional control variables: per capita real GDP and export share of GDP. We repeat the same estimation for a two-year recovery in columns (5) to (8) and for a three-year recovery in columns (9) to (12). Generally, money growth is highly significant. If we use interest rate changes, it always has the right sign and is significant for two- and three-year recoveries. The growth rate of real government expenditures is also generally significant for two- and three-year recoveries. There is some evidence that the recovery is faster when the export share is higher.

Table 4.11 reports determinants of recovery from the global crisis by restricting the sample to the countries that experienced a crisis in 2008. When we compare the results in table 4.11 with those in table 4.10, the money growth rate is less significant, while real government expenditure is more significant.¹⁰ For example, the money growth rate is significant only for the three-year recovery in table 4.11. On the other hand, the growth rate of real government expenditure is always significant for any specification for the two-year recovery. The evidence that the recovery is fast when the export share is higher is much weaker. This is intuitively plausible because global trade collapsed during the

10. IMF (2009, chapter 3) also found that while countercyclical monetary policy can help shorten recessions, its effectiveness is limited in financial crises. By contrast, the IMF argued that expansionary fiscal policy is particularly effective in shortening recessions associated with financial crises and in boosting recoveries.

Table 4.11 Determinants of recoveries from crisis: Global financial crisis

Variable	1-year recovery			
	(1)	(2)	(3)	(4)
Money growth	0.08 (0.06)		0.05 (0.07)	
Interest rate changes		-0.32 (0.21)		-0.37 (0.22)
Real government expenditure growth	0.06 (0.09)	0.12* (0.07)	0.11 (0.12)	0.05 (0.09)
Real GDP			0.02 (0.02)	-0.01 (0.01)
Export share of GDP			-0.12 (0.09)	-0.03 (0.06)
Adjusted R ²	-0.008	0.116	-0.031	0.135
Observations	17	21	17	21
Variable	2-year recovery			
	(5)	(6)	(7)	(8)
Money growth	0.17 (0.15)		0.13 (0.19)	
Interest rate changes		-0.56** (0.28)		-0.60** (0.3)
Real government expenditure growth	0.77** (0.31)	0.72*** (0.2)	0.89** (0.42)	0.57** (0.28)
Real GDP			0.02 (0.03)	-0.02 (0.02)
Export share of GDP			-0.09 (0.18)	0.03 (0.1)
Adjusted R ²	0.317	0.479	0.206	0.435
Observations	15	19	15	19

(continues on next page)

global crisis. As a result, in contrast to the Asian crisis, Asian countries could not export their way out of the recession.

Finally, we examine recovery for every country under the assumption that all countries experienced a crisis in 2008, and report the determinants of recovery in tables 4.12 and 4.13. Compared with the results in table 4.11, we find that the money growth rate is much more significant, while the evidence for interest rate changes is much weaker. The evidence for fiscal policy continues to be highly significant. There is some evidence that the recovery is faster when the export share is higher.

Table 4.11 Determinants of recoveries from crisis: Global financial crisis (continued)

	3-year recovery			
	(9)	(10)	(11)	(12)
Money growth	1.44** (0.62)		2.33*** (0.38)	
Interest rate changes		-0.35 (0.52)		-0.58 (0.61)
Real government expenditure growth	0.64 (0.69)	1.45*** (0.48)	2.85*** (0.73)	1.18 (1.25)
Real GDP			0.11*** (0.03)	-0.02 (0.05)
Export share of GDP			0.24* (0.13)	0.19 (0.24)
Adjusted R ²	0.502	0.418	0.882	0.324
Observations	7	11	7	11

Notes: The dependent variable is 1-year recovery (columns 1 to 4), 2-year recovery (columns 5 to 8), and 3-year recovery (columns 9 to 12) from the global financial crisis. The estimation is based on a pooled ordinary least squares regression. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

Summary of Findings and Their Implications for the Five Asian Countries

A number of interesting and significant results emerge from the econometric analysis. Some of the most salient findings are the following:

- All seven explanatory variables are statistically quite significant as early indicators of a crisis.
- For the global crisis, only four variables—real exchange rate appreciation, domestic credit expansion, the real GDP growth rate, and the export share of GDP—are significant. This suggests that the impact of the global crisis seems to be more closely related to capital inflows.
- In general, a crisis is deeper if the precrisis inflation rate is higher, precrisis domestic credit expansion is larger, the precrisis real GDP growth rate is higher, the interest rate increases during the crisis, and/or the growth rate of real government expenditures decreases during the crisis.
- For the global crisis, besides the policy variables, higher credit expansion, higher real exchange rate appreciation before a crisis, and a higher precrisis real GDP growth rate make the recession deeper.
- In general, policy variables such as monetary and fiscal expansions are quite significant in explaining quick recovery from a crisis. There is some evidence that the recovery is faster when the export share is higher.

Table 4.12 Determinants of recoveries from the global financial crisis: All countries

Variable	1-year recovery			
	(1)	(2)	(3)	(4)
Money growth	0.25*** (0.08)		0.22*** (0.08)	
Interest rate changes		0.07 (0.25)		-0.06 (0.2)
Real government expenditure growth	0.04 (0.09)	0.15** (0.07)	-0.04 (0.08)	0.04 (0.06)
Real GDP			0 (0.01)	-0.02** (0.01)
Export share of GDP			0.02 (0.02)	0.02 (0.01)
Adjusted R ²	0.16	0.074	0.208	0.13
Observations	37	45	36	44
Variable	2-year recovery			
	(5)	(6)	(7)	(8)
Money growth	0.49*** (0.19)		0.49*** (0.15)	
Interest rate changes		0.23 (0.41)		-0.06 (0.27)
Real government expenditure growth	0.46** (0.23)	0.66*** (0.19)	0.13 (0.16)	0.25* (0.13)
Real GDP			0 (0.01)	-0.03*** (0.01)
Export share of GDP			0.03 (0.02)	0.04* (0.02)
Adjusted R ²	0.233	0.193	0.292	0.325
Observations	34	43	33	42

(continues on next page)

- For the global crisis, policy variables continue to be significant in explaining the fast recovery. We also found some evidence that higher foreign reserves, a higher real GDP grow rate, and a current account surplus led to a faster recovery.

Table 4.14 compares the average values of seven fundamental economic variables and policy variables for the five countries in the Asian crisis versus the global crisis. It shows that the fundamentals were much stronger during the global crisis than during the Asian crisis in the sense that the ratio of foreign

Table 4.12 Determinants of recoveries from the global financial crisis: All countries (continued)

	3-year recovery			
	(9)	(10)	(11)	(12)
Money growth	-0.25 (0.64)		0.15 (0.59)	
Interest rate changes		-0.72 (0.5)		-0.51* (0.3)
Real government expenditure growth	2.48*** (0.76)	2.28*** (0.41)	0.94 (0.84)	1.22*** (0.46)
Real GDP			0.01 (0.04)	0 (0.02)
Export share of GDP			0.02 (0.04)	0.04* (0.02)
Adjusted R ²	0.434	0.561	-0.053	0.49
Observations	18	24	17	23

Notes: The dependent variable is 1-year recovery (columns 1 to 4), 2-year recovery (columns 5 to 8), and 3-year recovery (columns 9 to 12) from the global financial crisis. We assume that all countries experienced a crisis in 2008. The estimation is based on a pooled ordinary least squares regression. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

reserves to GDP was higher, precrisis real exchange rate appreciation was lower, credit expansion was lower, the current account surplus was larger, the precrisis inflation rate was lower, and the export share was larger. This helps to explain why Asian countries responded better to the shocks during the more recent global crisis. Policy variables were more appropriate for reviving aggregate demand and growth, and the interest rate fell and real government expenditure rose after the 2008 crisis. Monetary and fiscal policy thus reduced the severity of the recession and laid the foundation for recovery. Recovery was faster and more robust as a result of aggressive fiscal expansion, particularly in the first year (as shown in the fourth line from the bottom of table 4.14). This was possible because the Asian countries were in a healthy budget situation.

Concluding Observations

Asia fared much better during the global financial crisis than during the Asian financial crisis. The central question this chapter has tried to address is why. There is a limit to the usefulness of such a comparative analysis because no two crises are completely alike and each crisis has its own unique set of underlying causes. Given the uniqueness of each crisis, an exhaustive comparative analysis is not feasible and cannot be comprehensive. Nevertheless, it is possible to meaningfully analyze and compare the performance of the East Asian coun-

Table 4.13 Determinants of recoveries from the global financial crisis: All countries, additional specifications

Variable	1-year recovery			
	(1)	(2)	(3)	(4)
Money growth	0.21*** (0.06)		0.20*** (0.07)	
Interest rate changes		-0.13 (0.2)		-0.28 (0.2)
Real government expenditure growth	-0.04 (0.07)	0.07 (0.05)	-0.04 (0.08)	-0.02 (0.06)
Real GDP			0 (0.01)	-0.02** (0.01)
Export share of GDP			-0.01 (0.02)	-0.01 (0.02)
Foreign reserves/GDP	0.06** (0.03)	0.07** (0.03)	0.08* (0.04)	0.06 (0.05)
Current account/GDP	0.07 (0.05)	0.08 (0.05)	0.07 (0.06)	0.12** (0.05)
Adjusted R ²	0.374	0.172	0.34	0.249
Observations	36	44	36	44
Variable	2-year recovery			
	(5)	(6)	(7)	(8)
Money growth	0.44*** (0.11)		0.43*** (0.14)	
Interest rate changes		0.04 (0.3)		-0.18 (0.29)
Real government expenditure growth	0.05 (0.16)	0.30* (0.15)	0.05 (0.16)	0.15 (0.16)
Real GDP			0 (0.01)	-0.03*** (0.01)
Export share of GDP			0 (0.03)	0.03 (0.04)
Foreign reserves/GDP	0.08 (0.05)	0.11** (0.05)	0.08 (0.07)	0.02 (0.08)
Current account/GDP	0.12 (0.09)	0.03 (0.09)	0.12 (0.09)	0.11 (0.09)
Adjusted R ²	0.404	0.172	0.359	0.316
Observations	33	42	33	42

(continues on next page)

Table 4.13 Determinants of recoveries from the global financial crisis: All countries, additional specifications
(continued)

	3-year recovery			
	(9)	(10)	(11)	(12)
Money growth	0.17 (0.41)		0.28 (0.5)	
Interest rate changes		-0.59** (0.27)		-0.75** (0.32)
Real government expenditure growth	0.63 (0.58)	1.18*** (0.25)	0.67 (0.88)	0.66 (0.54)
Real GDP			0.01 (0.04)	-0.02 (0.02)
Export share of GDP			-0.06 (0.05)	-0.03 (0.06)
Foreign reserves/GDP	0.08 (0.1)	0.08 (0.06)	0.16 (0.14)	0.12 (0.13)
Current account/GDP	0.26 (0.29)	0.18 (0.15)	0.24 (0.35)	0.33 (0.2)
Adjusted R ²	0.279	0.547	0.245	0.527
Observations	17	23	17	23

Notes: The dependent variable is 1-year recovery (columns 1 to 4), 2-year recovery (columns 5 to 8), and 3-year recovery (columns 9 to 12) from the global financial crisis. We assume that all countries experienced a crisis in 2008. The estimation is based on a pooled ordinary least squares regression. *, **, and *** represent statistical significance at the 10, 5, and 1 percent level, respectively. Standard errors are in parentheses.

Source: Authors' calculations.

tries during the global crisis and the Asian crisis by limiting the analysis to a common set of factors that play a major role in explaining any crisis. This was the analytical approach adopted in this chapter. While the empirical approach cannot address all dimensions of the countries' performances during the two crises, it does help to shed light on perhaps the most significant dimensions for which a comparison is feasible.

Overall, the empirical analysis yields a number of important and interesting findings. First, economic fundamentals exert a significant influence on the likelihood of crisis. Foreign exchange reserves, real exchange rate appreciation, domestic credit, precrisis real GDP growth, the current account, inflation, and export shares all help to explain the likelihood of a crisis. Second, economic fundamentals significantly affect the depth of a crisis. The fundamentals that seem to matter the most are the inflation rate, domestic credit expansion, and the precrisis GDP growth rate. Third, the policy stance during the crisis matters. While monetary and fiscal tightening have an adverse impact, countercyclical expansionary monetary and fiscal policy can mitigate the impact of a crisis and

Table 4.14 Average values of economic variables for the five Asian countries around the two crises

Variable		Asian financial crisis	Global financial crisis
Crisis	Foreign reserves/GDP	0.12	0.26
	Five-year real exchange rate appreciation	0.02	0.01
	Credit/GDP ^a	0.37	-0.1
	5-year real GDP growth	0.05	0.04
	Current account/GDP	-0.03	0.04
	5-year inflation rate	0.06	0.04
	Export share of GDP	0.5	0.59
Depth	Money growth	0.24	0.09
	Interest rate difference	0.29	-1.94
	Real government expenditure growth	-0.13	0.05
Recovery	1-year money growth	0.12	0.11
	2-year money growth	0.1	0.1
	3-year money growth	0.09	0.1
	1-year interest rate difference	-5.18	-1.18
	2-year interest rate difference	-5.34	-1.35
	3-year interest rate difference	-4.42	-0.76
	1-year real government expenditure growth	0.07	0.12
	2-year real government expenditure growth	0.08	0.05
	3-year real government expenditure growth	0.08	0.05
	Per capita real GDP	8.71	8.93

a. Detrended value.

Source: Authors' calculations.

contribute to a more robust recovery. To sum up, the evidence strongly suggests that economic fundamentals and macroeconomic policy matter a lot in staving off a crisis, cushioning its blow, and laying the foundation for recovery.

The overarching policy implication for Asian policymakers is to do more of the same—pursue the sound policies and robust fundamentals that have served the region well in the past. Asia's fundamentals have strengthened further as a consequence of the painful lessons learned during the Asian crisis. Asia's healthy current account balances and foreign exchange reserve levels are a response to the severe shortage of US dollar liquidity, which crippled the region during the Asian crisis. Other fundamentals have also improved since the Asian crisis. Furthermore, the expansionary stance of both fiscal and monetary policy during the global crisis was far more appropriate than the contractionary stance during the Asian crisis. So the central answer to the central question is that Asia fared much better during the global crisis due to stronger fundamentals and better macroeconomic policies.

References

- Blanchard, Olivier, Hamid Faruqee, and Mitali Das. 2010. The Initial Impact of the Crisis on Emerging Market Countries. *Brookings Papers on Economic Activity* (Spring): 263–307. Washington, DC: Brookings Institution.
- Borio, Claudio, and Philip Lowe. 2002a. *Asset Prices, Financial and Monetary Stability: Exploring the Nexus*. BIS Working Paper 114 (July). Basel: Bank for International Settlements.
- Borio, Claudio, and Philip Lowe. 2002b. Assessing the Risk of Banking Crises. *BIS Quarterly Review* (December). Basel: Bank for International Settlements.
- Cho, Dongchul. 2012. Responses of the Korean Economy to the Global Crisis: Another Currency Crisis? In *Global Economic Crisis: Impacts, Transmission, and Recovery*, ed. Maurice Obstfeld, Dongchul Cho, and Andrew Mason. Cheltenham, UK: Edward Elgar.
- Ferrarini, Benno, and Arief Ramayandi. 2012. Public Debt Sustainability Assessments for Developing Asia. In *Public Debt Sustainability in Developing Asia*, ed. Benno Ferrarini, Raghendra Jha, and Arief Ramayandi. London: Routledge.
- Frankel, Jeffrey A., and George Saravelos. 2010. *Are Leading Indicators of Financial Crises Useful for Assessing Country Vulnerability? Evidence from the 2008-09 Global Crisis*. NBER Working Paper 16047. Cambridge, MA: National Bureau of Economic Research.
- Furman, J., and J. E. Stiglitz. 1998. Economic Crises: Evidence and Insights from East Asia. *Brookings Papers on Economic Activity* 2: 1–135. Washington, DC: Brookings Institution.
- Goldstein, Morris, and Daniel Xie. 2009. *The Impact of the Financial Crisis on Emerging Asia*. Working Paper 09-11. Washington, DC: Peterson Institute for International Economics.
- Gourinchas, Pierre-Olivier, and Maurice Obstfeld. 2012. Stories of the Twentieth Century for the Twenty-First. *American Economic Journal: Macroeconomics* 4 (January): 226–65.
- IMF (International Monetary Fund). 2009. *World Economic Outlook* (April). Washington, DC. Available at www.imf.org/external/pubs/ft/weo/2009/01/pdf/c3.pdf (accessed on July 1, 2013).
- Lee, Hangyong, and Changyong Rhee. 2012. Lessons from the 1997 and the 2008 Crises in Korea. *Asian Economic Policy Review* 7, no. 1: 47–64.
- Park, Yong Chul, and Jong Wha Lee. 2003. Recovery and Sustainability in East Asia. In *Managing Currency Crises in Emerging Markets*, ed. Michael P. Dooley and Jeffrey A. Frankel. Chicago: University of Chicago Press.
- Radelet, S., and J. D. Sachs. 1998. The East Asian Financial Crisis: Diagnosis, Remedies, Prospects. *Brookings Papers on Economic Activity* 1: 1–74. Washington, DC: Brookings Institution.
- Ramayandi, Arief, and Aleli Rosario. 2010. *Monetary Policy Discipline and Macroeconomic Performance: The Case of Indonesia*. ADB Economics Working Paper 238. Manila: Asian Development Bank.
- Reinhart, Carmen M., and Kenneth S. Rogoff. 2011. From Financial Crash to Debt Crisis. *American Economic Review* 101, no. 5: 1676–706.