

Asia Crisis Postmortem: Where Did the Money Go and Did the United States Benefit?

- In the crisis years of 1997-98, the hardest-hit Asian countries experienced net capital outflows of more than \$80 billion.
- Almost all of the outflows originated as banking flows. The majority went first to offshore center banks and then to banks in Europe.
- Much of the capital eventually reached the United States, but in the form of foreign direct investment or portfolio investment rather than banking flows.
- An equilibrium analysis of supply- and demand-side channels suggests that the overall effect of the crisis on U.S. GDP was positive but small.

The recent currency crises in Asia have raised important questions about the sensitivity of industrialized-country economies to financial turmoil in emerging markets. In late 1997 and in 1998, Indonesia, Korea, Malaysia, the Philippines, and Thailand experienced net capital outflows of more than \$80 billion, plunging them from “growth-miracle” status into their worst recessions in decades. GDP growth rates in Korea and Malaysia in 1998 were -5.8 percent and -7.5 percent, respectively, and in Indonesia and Thailand the rates were worse than -10 percent. By comparison, GDP growth in the United States was a healthy 4.3 percent that year.

These contrasting experiences are puzzling at first glance, because it was widely believed that the downturn in Asia would have a negative effect on the U.S. economy.¹ Recessions in the crisis countries, according to this logic, in conjunction with sharply depreciated currencies, would reduce the countries’ demand for U.S. exports. In addition, the depreciated currencies would lead to a surge in U.S. imports from these countries. Hence, through these international trade channels, the Asia crisis was expected to contribute negatively to U.S. growth. The U.S. net export deficit did, in fact, increase, contributing -1.2 percentage points to U.S. GDP growth in

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1998. However, the increase in the deficit was more than offset by increased spending on consumer goods and producers' durable equipment, so that employment and production rose. Quarter by quarter, U.S. GDP growth in 1998 consistently exceeded projections.

In our view, this apparently surprising immunity of the U.S. economy to the Asia crisis reflects the fact that the original way of thinking about the crisis was flawed. First, it focused only on demand-side channels and ignored the supply side. Second, the depreciation of the Asian currencies against the dollar and the recessions in the crisis countries represented endogenous responses to a large and sharp reallocation of capital out of the Asia crisis region. From the point of view of the United States, this reallocation of capital is the appropriate starting point—rather than the depreciations and recessions—for considering the implications of the crisis.

What, then, precipitated the large and sharp reallocation of capital out of Asia? We believe that increased expectations of private sector bankruptcies and currency depreciations are

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likely forces. These expectations could have been grounded in fundamental information about conditions in the private sector. They could also have been influenced by nonfundamental forces such as rational or irrational herding behavior. As we indicate below, it is immaterial to our framework whether the change in expectations was driven by fundamentals or nonfundamentals. In either case, there was a large decline in demand for Asian assets. A large capital outflow occurred, and all the macroeconomic consequences for the United States ensued from this outflow.

The reallocation of capital toward the United States generated the above-mentioned negative trade effects on the country's GDP. But the capital inflows also created a positive effect by financing a rise in U.S. spending, directly through increased financing for liquidity-constrained firms and consumers as well as indirectly through a drop in interest rates. The capital inflows also led to an appreciating dollar, which made imported inputs cheaper. These cheaper inputs

generated a positive effect on GDP similar to that of a positive productivity shock.²

As the crisis proceeded and U.S. growth remained strong, a new scenario along the lines sketched above—with capital inflows to the United States as the centerpiece—became increasingly popular.³ Yet surprisingly little quantitative research has examined this scenario. This article aims to at least partially fill that gap. Specifically, we begin by attempting to document the trail of capital out of Asia and into the United States.⁴ We then discuss and quantify the implications for short-run U.S. GDP growth of the direct and indirect reallocation of capital from Asia to the United States. Our quantification employs an “equilibrium” approach in which both supply- and demand-side channels are calculated.

It is not difficult to document the “beginning” and the “end” of the money trail insofar as it involves the Asian countries and the United States. Capital outflows from Indonesia, Korea, Malaysia, the Philippines, and Thailand from the start of the crisis in 1997:2 to the end of 1998 amounted to more than \$80 billion. The U.S. current account deficit in 1998 was \$221 billion, which represented an increase of \$77 billion from 1997, financed by a rise in capital inflows.

It is difficult, however, to document the precise money trail from these Asian countries to the United States. In particular, it is hard to ascertain in exactly what form (banking, portfolio, or direct investment flows) and from exactly which countries the funds entered. We assume that the initial “round” of bilateral international money flows arises directly from the crisis, but subsequent rounds of flows could be due to other causes. Also, the net errors and omissions component of the U.S. balance of payments is typically large and, more importantly, it tends to spike during crises. At times, the change in errors and omissions is often large enough to cancel out even the largest change in reported capital flows.

Nevertheless, using Bank for International Settlements (BIS) data and data drawn from the U.S. Treasury Department's Treasury International Capital (TIC) system, we can follow the trail to a certain extent. Accordingly, we find that banking flows were the major source of the outflows, and that these outflows were dispersed all over the world, to such places as Japan, Europe, the United States, and to offshore banking centers. The majority of the flows went to the offshore centers. Our findings also suggest that most of the offshore centers funneled their funds to European banks. Although the trail runs cold from there, we conclude that banks clearly played an important role at the beginning of the reallocation process and that the money clearly came to the United States in a roundabout fashion.

To analyze the impact of the crisis on short-run U.S. GDP growth, we consider three channels. The first is the trade

channel, which has a negative impact on growth. The second is a domestic demand channel, in which capital inflows finance an increase in domestic demand. The counterpart to the two demand channels is our third channel: the supply channel. The appreciation of the dollar against the Asian currencies leads to a decrease in prices of imported inputs. We provide evidence consistent with each of these channels and quantify their impact on U.S. GDP growth. We find that the net effect of the Asia crisis on U.S. growth was small but positive—+0.2 percentage point—confirming the newer wisdom.

The Outflow of Capital from the Asia Crisis Countries

The sharp and sudden net capital outflow from the “Asia-4” crisis countries of Indonesia, Korea, the Philippines, and Thailand is evident in Chart 1.⁵ These countries experienced positive net capital inflows throughout the 1990s. Then, in 1997:3, a sharp outflow began. In the six quarters from 1997:3 through 1998:4, the countries experienced a net outflow of \$77.9 billion. By contrast, in the six quarters prior to the crisis, the Asia-4 countries experienced a cumulative net *inflow* of \$86.8 billion. Even today, three years after the beginning of the crisis, these countries continue to experience net capital outflows.

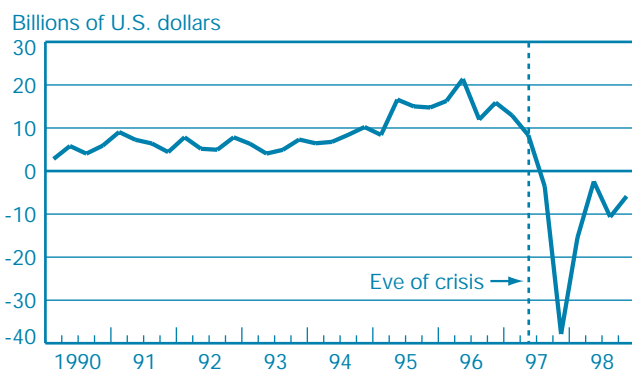
If we divide the financial account (we use this term and capital account interchangeably) into portfolio flows, foreign direct investment (FDI) flows, and “other” flows, we see that the bulk of outflows since the onset of the crisis consisted of

other flows (Chart 2).⁶ Indeed, other flows accounted for more than 100 percent of the total net outflows, with a cumulative outflow of \$84.9 billion from 1997:3 through 1998:4. During this period, \$46.2 billion—equivalent to 59.3 percent of the total outflows—represented Asia-4 bank flows.

Chart 3 suggests that the counterparties to the capital flows involving the Asia-4 countries were almost surely BIS reporting banks, a group that includes banks from most of the Organization for Economic Cooperation and Development countries as well as several offshore centers in the Caribbean, Hong Kong, and elsewhere.⁷ The chart shows exchange-rate-adjusted net lending flows from the BIS reporting banks to the Asia-4. The increase in net lending in the years preceding the crisis, as well as the sharp reduction in net lending by these banks after 1997:2, closely mirrors the overall capital inflows and outflows from the Asia-4 depicted in Charts 1 and 2.⁸ The cumulative net lending flows from 1997:3 through 1998:4 equal a net outflow of \$105.3 billion. This amount is equal to about one-third of the total stock of claims against these countries in 1997:2. Taken together, Charts 2 and 3 suggest that most of the capital outflows involved banks on both sides—Asia-4 banks on the one hand and BIS reporting country banks on the other hand.

Which countries were the largest sources of the reduction in net bank lending to the Asia-4? There are two ways to address this question. One way views countries as locations, the other views them as representing nationalities. For example, a Swiss bank subsidiary operating in the United States would count as a U.S. bank based on geography and a Swiss bank based on nationality. The two ways are complementary because the geographic approach is consistent with balance-of-payments

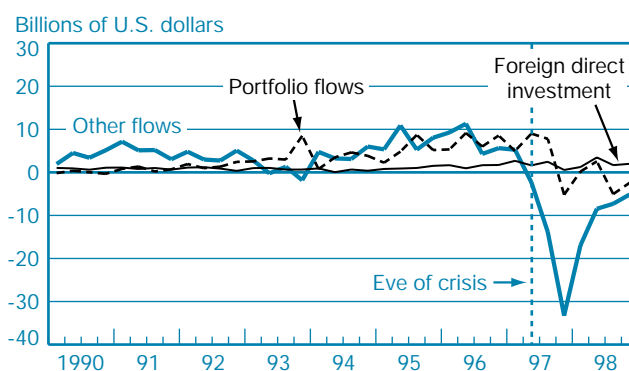
Chart 1
Financial Account of the Asia-4 Countries



Source: See Appendix 1.

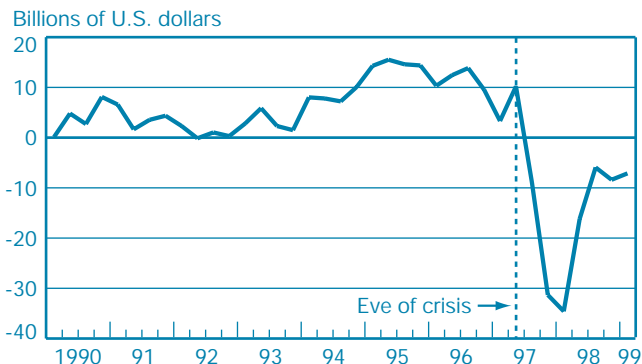
Note: The financial account is net capital inflows—that is, the net sum of direct, portfolio, and other investment balances.

Chart 2
Breakdown of the Asia-4 Countries' Financial Account



Source: See Appendix 1.

Chart 3
BIS Reporting Banks' Net Lending
to the Asia-4 Countries

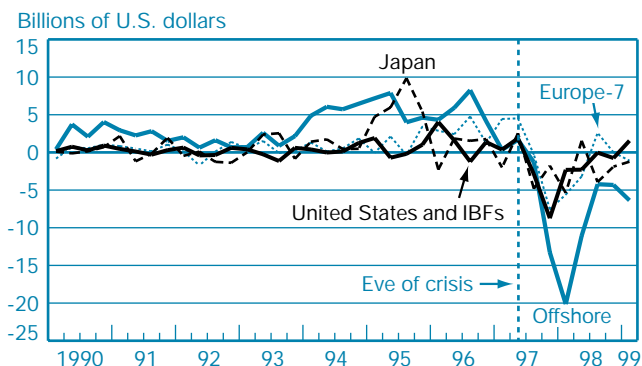


Source: See Appendix 1.

data on capital flows, while the nationality approach helps control for the fact that many cross-border banking flows involve borrowing and lending by banks with their subsidiaries in other countries. This is especially true for banks that have branches or subsidiaries in offshore centers.

We begin by examining the geographic approach (Chart 4). Here, net bank lending flows to the Asia-4 are reported by location of the BIS reporting bank. The chart focuses on four regions: Japan, the "Europe-7" countries, the United States and its international banking facilities (IBFs), and the offshore centers. Europe-7 comprises France, Germany, Italy, the Netherlands, Spain, Switzerland, and the United Kingdom.

Chart 4
Net Bank Lending to the Asia-4 Countries
by Location of BIS Reporting Bank



Source: See Appendix 1.

Note: IBFs are international banking facilities.

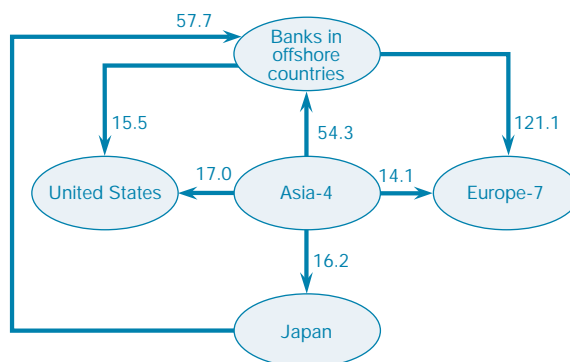
Although banks in all four regions reduced their net lending to the Asia-4, the reductions by banks in Japan, the Europe-7, and the United States typically were on the order of several billion dollars per quarter. The chart clearly shows that the majority of outflows from the Asia-4 was accounted for by the offshore centers: \$54.3 billion of the total net outflow of \$105.3 billion.

Because the economies of the offshore centers are relatively small, we presume that most of their inflows must generate corresponding outflows. To a large extent, one can therefore view these centers as "pass-through stations."⁹ The exhibit depicts this in the form of a flow process. It presents net cumulative bank lending of BIS reporting countries over the 1997:3-1998:4 period. Banks in offshore centers experienced \$112 billion in net inflows from the Asia-4 and Japan between June 1997 and December 1998. Most of this money went to banks in the Europe-7, which experienced a \$121.1 billion net inflow from the offshore centers.

What is also striking is the small amount of banking inflows to the United States originating directly from the Asia-4 or mediated through the offshore centers. The funds associated with the Asia-4 capital outflow could have reached the U.S. banks via more indirect channels, such as through Europe or even from Japan by way of the offshore centers and Europe. Once the flows become so indirect, however, it is difficult to follow the original source of the funds. This phenomenon

Net Lending of BIS Country Banks:
June 1997 to December 1998

Billions of U.S. dollars



Source: Bank for International Settlements.

Notes: The flows out of the Asia-4 correspond to an increase in net liabilities vis-à-vis the Asia-4 of BIS reporting banks in the offshore countries, the United States, the Europe-7, and Japan. The flows of the offshore countries vis-à-vis the United States, the Europe-7, and Japan correspond to net lending by banks in the offshore countries to both banks and nonbanks in the United States, the Europe-7, and Japan.

already is apparent in the exhibit. More funds entered the offshore centers from Japan than from the Asia-4, so we cannot conclude that the funds exiting the offshore centers are directly connected to the Asia-4 outflows. This exiting offshore money could also be the result of net capital outflows from Japan connected to its own economic downturn.

Of the \$105.3 billion reduction in lending, \$98.5 billion represented declines in claims on the Asia-4 (Table 1, top row). Hence, we find that most of the adjustment is on the claims side. We also find that, even though a not-insignificant share of the BIS bank loans was denominated in domestic currencies,

Table 1
Change in Assets and Liabilities of BIS Reporting Banks vis-à-vis the Asia-4 Countries:
June 1997 to December 1998

	Assets	Liabilities	Net Claims
Geographic Breakdown			
Cumulative exchange-rate-adjusted flows	-98.5	6.8	-105.3
Change in stocks			
All BIS countries	-99.4	6.9	-106.3
Offshore countries	-51.3	2.8	-54.1
United States	-14.9	2.1	-17.1
Europe-7	-11.4	2.6	-14.0
Japan	-18.4	-0.8	-17.6
Nationality Breakdown			
Change in stocks			
All nationalities	-79.7	—	—
United States	-7.6	—	—
Europe-6	-11.2	—	—
Japan	-28.6	—	—
Other non-offshore			
BIS nationalities	-7.0	—	—
Other nationalities	-25.3	—	—

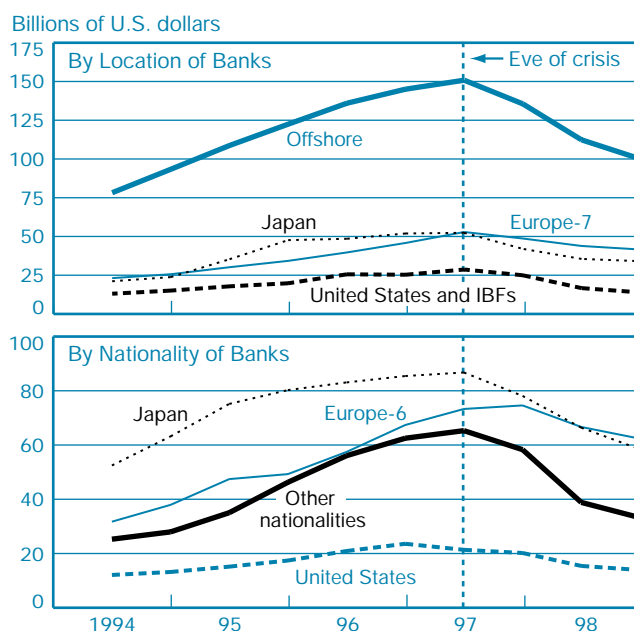
Source: Bank for International Settlements.

Notes: The geographic breakdown refers to all banks located in Bank for International Settlements (BIS) reporting countries. The nationality breakdown refers to all banks located in non-offshore BIS reporting countries, plus the foreign affiliates of these banks if they have the nationality of one of the non-offshore BIS reporting countries. This means that banks in offshore countries with nationalities other than those of the non-offshore BIS countries are not included in the nationality breakdown, even though they are included in the geographic breakdown. This accounts for the small discrepancy between the totals based on the geographic and nationality breakdowns. The nationality data are available only for claims. Europe-7 includes France, Germany, Italy, the Netherlands, Spain, Switzerland, and the United Kingdom. Europe-6 excludes Switzerland. Banks of Swiss nationality in Switzerland are included in the total for the nationality breakdown, but are not included in the European nationality subcategory.

the exchange-rate-adjusted flows are almost identical to the change in the stock of claims less liabilities (Table 1, second row). The reduction in stocks was \$106.3 billion and the reduction in claims was \$99.4 billion. These two findings are useful, because they suggest that comparisons can be made between the geographic-based and nationality-based data. The nationality-based data are available only for claims and not liabilities, and they are available only for stocks of claims rather than for exchange-rate-adjusted flows.

A summary of bank lending to the Asia-4 by nationality can be found in the bottom panel of Table 1. Time series of both the geographic and nationality data are presented in Chart 5 as well. First, note that the total reduction in assets based on the nationality data (\$79.7 billion) is \$19.7 billion less than that based on the geographic breakdown. The reason is that the nationality data exclude banks in the offshore centers with nationalities other than those of the non-offshore BIS countries. Examples are banks of Hong Kong or Saudi Arabian nationality operating in Hong Kong. Of the \$79.7 billion reduction in assets that can be assigned to nationalities, only \$47.4 billion involves the United States, the “Europe-6” countries (the Europe-7 excluding Switzerland), and Japan. Banks whose nationalities are the same as that of one of the

Chart 5
Source of BIS Reporting Banks' Claims
on the Asia-4 Countries



Source: See Appendix 1.

Note: IBFs are international banking facilities.

smaller non-offshore BIS countries account for an additional \$7 billion.¹⁰ This leaves \$25.3 billion that is accounted for by banks of other nationalities operating in the BIS countries, such as Thai and Korean banks in the United States. Therefore, a total of \$45 billion in outflows from the Asia-4 to banks located in BIS countries (\$19.7 billion plus \$25.3 billion)

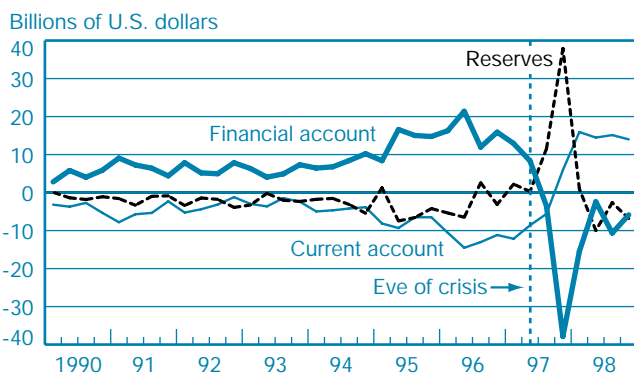
Banks played a large role in the immediate outflows from Asia, most of which went to offshore center banks.

involves nationalities other than those of the non-offshore BIS countries. This amount is almost half of the total outflows from the Asia-4. Only \$7.6 billion is associated with banks of U.S. nationality.

We note parenthetically that the Asia-4 current account was initially buffered against the large capital outflows by International Monetary Fund (IMF) credit and a rundown of reserves (Chart 6). It is worthwhile to recall that from a balance-of-payments perspective, a rundown of central bank foreign exchange reserves is a net official capital inflow, which is about half of the rise in reserves in Chart 6. The other half is associated with the increase in IMF credit. The chart shows that the full current account adjustment did not take place until 1998:1.

To summarize, banks played a large role in the immediate outflows from Asia, most of which went to offshore center

Chart 6
Asia-4 Current Account versus
the Financial Account



Source: See Appendix 1.

Note: The financial account is net capital inflows—that is, the net sum of direct, portfolio, and other investment balances.

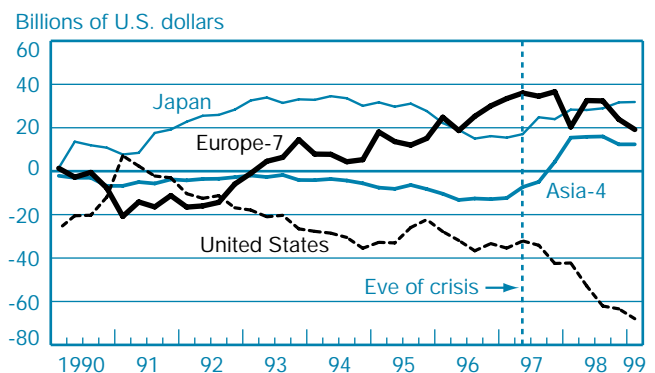
banks. These banks, in turn, played a large role in funneling the outflows to banks in Europe. Once the money reached Europe, it became part of a vast pool of capital, rendering the trail difficult to follow from there. Consequently, we now focus on how the capital flows entered the United States.

Capital Flows to the United States in the Wake of the Crisis

Turning our attention from Asia-4 outflows to U.S. inflows, we examine the seasonally adjusted quarterly current account balances of Japan, the Europe-7, the Asia-4, and the United States (Chart 7). Here we see that the United States experienced a large, \$31.3 billion deterioration of its quarterly current account from 1997:2 to 1998:4. By comparison, the Asia-4 current account improved by \$19.7 billion during this period. If we include Malaysia, the improvement was \$26 billion. Japan also experienced an improvement in its current account.

The chart gives the impression that most, if not all, of the capital outflows from Asia went to the United States. However, this impression is not completely warranted. Since 1991, the U.S. current account has been trending downward, while the Europe-7 current account has been trending upward. Because U.S. GDP growth rates throughout this period have been higher than European growth rates, it is entirely possible that these trends would have continued in the absence of the crisis. Accordingly, we fit a simple linear time trend to the two current accounts using data from 1990:1 to 1997:2. Extrapolating forward, we find that the actual Europe-7 current account decreased by \$22 billion relative to trend between 1997:2 and

Chart 7
Current Accounts



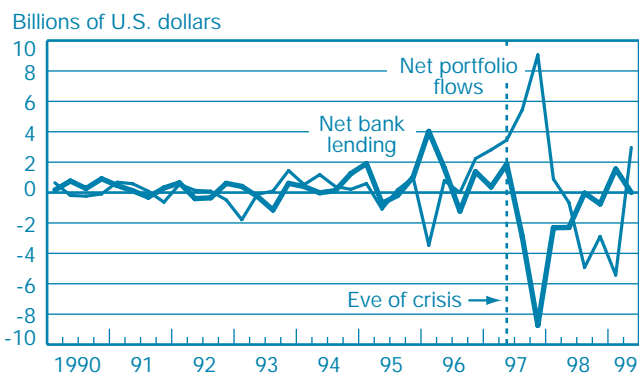
Source: See Appendix 1.

1998:4. The actual U.S. current account decreased by \$25 billion relative to trend during this period. Hence, relative to trend, both regions' current accounts deteriorated by similar magnitudes. This evidence, coupled with the evidence presented earlier, suggests that both the United States and Europe experienced substantial capital inflows connected to the Asia crisis.¹¹

We also showed earlier that very little of the Asia crisis capital flows to the United States took the form of direct flows from the Asia-4 to the United States. This point is illustrated in Chart 8. U.S. banks' net lending to the Asia-4 fell by about \$10 billion from 1997:2 to 1997:4, but the reduction in net lending was relatively short-lived, as negative net lending was less than \$2 billion from 1998:1 onward. By comparison, total net U.S. capital inflows averaged \$68 billion per quarter between 1997:3 and 1998:4. The chart also depicts net portfolio flows during this period. These flows include both long-term portfolio flows and changes in the holdings of U.S. Treasury bills by the Asian countries. Interestingly, the portfolio flows move in the opposite direction of the bank flows. The net portfolio outflow from the United States to the Asia-4 in the midst of the crisis, at the end of 1997, is likely the result of the sale of Treasury securities by central banks in the Asian countries.

Our evidence, then, indicates that there were large capital flows to the United States (and Europe) as a result of the Asia crisis, but it also shows that the flows reached the United States in a roundabout fashion, going through several countries before eventually winding up there. To the extent that these flows were intermediated through banks, we would expect to see a surge in net flows to U.S. banks (or, equivalently, a decrease in net external lending by U.S. banks). As we see from

Chart 8
Net Lending by the United States to the Asia-4 Countries



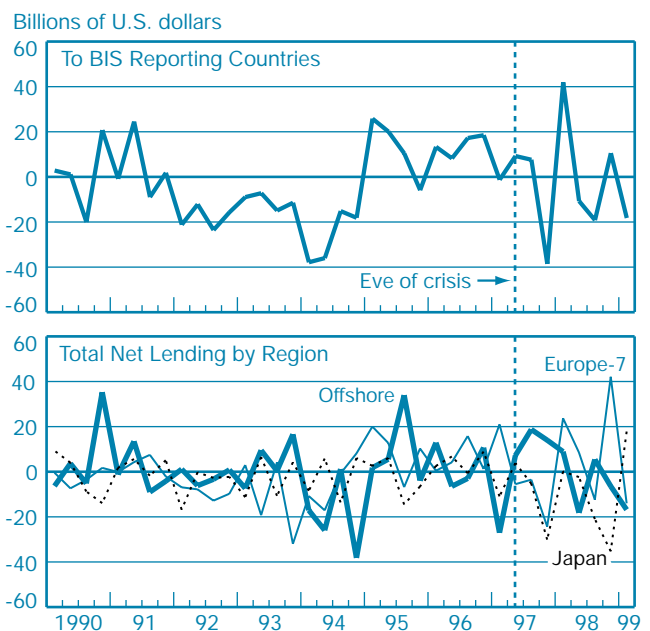
Source: See Appendix 1.

the top panel of Chart 9, this was not the case. Although inflows to the United States increased by about \$40 billion in 1997:4, there was an equally large outflow in 1998:1. The cumulative net inflow over the entire 1997:3-1998:4 period was only \$8.4 billion. The bottom panel of the chart breaks down net lending by region (Europe-7, offshore, and Japan). Although there was an increase in net flows from Japan to U.S. banks from the beginning of the crisis, there was also a similarly large increase in net flows from U.S. banks to Europe.

Hence, while BIS banks accounted for virtually all of the net outflows from Asia, we also know that the net capital flows into the United States were not intermediated through U.S. banks. Other intermediation channels existed. European banks, for example, could have shifted lending from Asia to local institutions, which then could have used the money for foreign direct investment or portfolio investment in the United States. Indeed, cumulative net inflows to the United States from 1997:3 through 1998:4 associated with FDI and portfolio investment totaled \$326.9 billion. Of course, given the large U.S. current account deficits, much of these flows would have occurred anyway.

A key difficulty with using the U.S. balance-of-payments data is that errors and omissions (the statistical discrepancy) were very large and volatile after the crisis. Between 1997:2 and 1998:4, cumulative errors and omissions were -\$92.6 billion, implying that net capital inflows were \$92.6 billion less than

Chart 9
Net Lending by U.S. Banks



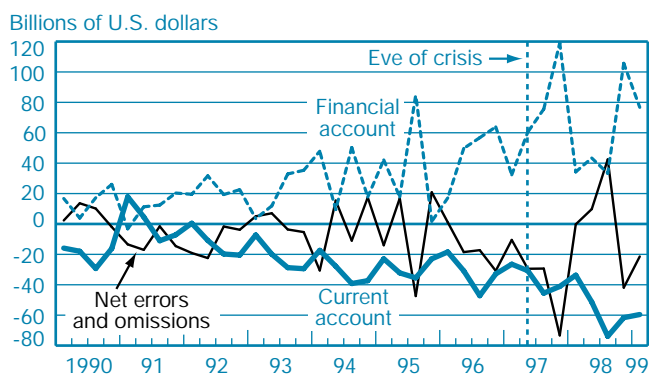
Source: See Appendix 1.

what was actually reported during this period.¹² Also, from 1997 to 1998, the current account deficit increased by \$76.7 billion, but reported capital inflows decreased by \$70.8 billion. Put differently, net errors and omissions rose by \$152.7 billion between 1997 and 1998; this suggests that actual capital inflows rose by \$152.7 billion more than reported.

Changes in net errors and omissions were also very important in many of the key quarters (Chart 10). For example, in 1997:4, the United States experienced a net capital inflow of \$114 billion, which represented an increase of about \$40 billion from the previous quarter. The current account deficit was \$41 billion, representing a \$4 billion decrease from the 1997:3 deficit. Errors and omissions, then, were -\$73 billion, representing a change of -\$44 billion relative to the previous quarter. This suggests that the increase in U.S. capital inflows in 1997:4 might not have occurred. Similarly, the data show a sharp drop in capital inflows in 1998:1, but this drop is again offset by a movement in errors and omissions in the opposite direction. There are several other episodes—for example, during the Mexican crisis in 1994 and 1995—in which changes in errors and omissions were the opposite of changes in the financial account. It is therefore difficult to infer much from the U.S. capital flows data.

Finally, we consider the possibility that the United States functioned as a “safe haven” during this period. In this scenario, foreign investors shifted their capital—including capital from other industrialized countries—en masse to the United States during the crisis. In that case, we would expect a real dollar appreciation against the currencies of other industrialized countries. Real exchange rates versus the dollar and the yen are presented in Chart 11.¹³ The dollar did

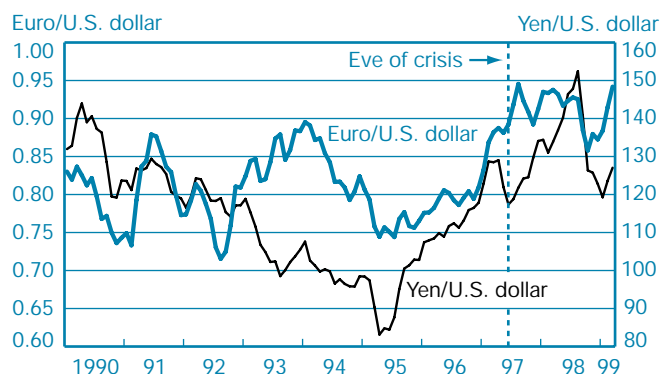
Chart 10
U.S. Balance of Payments



Source: See Appendix 1.

Note: The financial account is net capital inflows—that is, the net sum of direct, portfolio, and other investment balances.

Chart 11
Euro/U.S. Dollar and Yen/U.S. Dollar
Real Exchange Rates



Source: See Appendix 1.

appreciate against the yen, but the appreciation was short-lived and, by the end of 1998, the dollar's yen value had fallen to pre-Asia crisis levels. The euro/dollar rate was fairly stable during the first five quarters after the crisis. This evidence suggests that there was not a significant safe-haven effect in response to the Asia crisis. It is also consistent with our earlier evidence indicating that both the United States and Europe experienced large capital inflows connected to the crisis.

Did U.S. GDP Increase?

Having documented, to the extent possible, capital flows from Asia and into the United States, we turn to the consequences of those flows for the U.S. economy. As we noted earlier, there are at least three important channels through which the crisis in the Asian emerging markets could have affected U.S. GDP:

- the net export demand channel (negative),
- the domestic demand channel (positive),
- the supply channel (positive).

The three effects are interrelated because the total demand for U.S. goods (net exports plus domestic demand) must equal supply. Appendix 2 presents two simple models that include these three channels. One is a partial-equilibrium model of the United States, the other is a two-country model of the United States and Asia. We briefly describe the intuition behind these models. Assume for simplicity that the world consists of two countries: the United States and Asia, with investors holding financial assets in both countries. Then, increased expectations

of private sector bankruptcies, a sharp local currency depreciation, and/or a stock market collapse cause them to shift their capital from Asia to the United States. These expectations could be driven by deteriorating fundamentals in Asia or they could be self-fulfilling and not based on fundamentals at all. Either way, the changed expectations lead to a fall in desired holdings of Asian assets.¹⁴

The capital outflows from Asia lead to a depreciation of Asian currencies—that is, an appreciation of the dollar. Asia’s output declines because there is less financing of its economic activity. Both the dollar appreciation and the decline in Asian output lead to lower U.S. net exports. At the same time, the capital inflow to the United States lowers U.S. interest rates, which leads to an increase in U.S. domestic demand by

Our interpretation of the crisis differs from the standard scenarios because of the central role assigned to the (net) capital outflows.

stimulating consumption and investment.¹⁵ In equilibrium, the total effect on demand for U.S. goods (the sum of lower net exports and higher domestic demand) is equal to the effect on the supply of those goods. The dollar appreciation leads to lower prices of imported inputs, which increases output supply in a manner analogous to the way an increase in productivity raises supply. Because the effect on output supply is positive, the total effect on demand is also positive.

Our interpretation of the crisis differs from the standard scenarios because of the central role assigned to the (net) capital outflows. The outflows are what leads to the currency depreciation and recession in Asia. In the standard scenarios, the currency depreciation and recession occur first, and the net capital outflow is just the passive counterpart to the recession-induced improvement in the current account surplus.

In our scenario, the declining future fundamentals or nonfundamentals that give rise to the increased expectations of default, sharp currency depreciations, and/or stock market collapses have no effect other than their impact on desired net capital flows. It is possible that these declining forces could also have had a direct negative effect on current domestic demand in the Asian countries, independent of the decline in demand resulting from the cutoff of foreign inflows.¹⁶ When Asian domestic demand declines in this way, we show in Appendix 2 that our findings of reduced output in Asia, higher output in the United States, a dollar appreciation, and lower U.S. interest rates are reinforced. This additional transmission channel, in

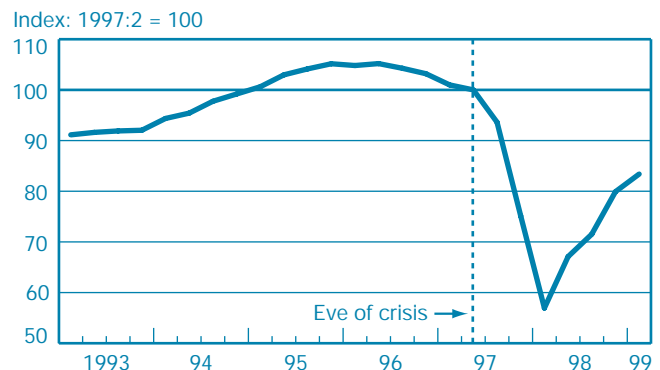
other words, does not overturn the implications of our basic scenario. However, we also show that the decline in Asian domestic demand leads Asian real interest rates to fall relative to U.S. real interest rates, a finding that is inconsistent with the evidence. We therefore conclude that our basic “capital flow” scenario, which implies a rise in Asian interest rates, is more empirically relevant.

Evidence on the Three Channels

We now examine several macroeconomic indicators that provide evidence on the three channels. Together, Charts 12–18 show that the evidence is broadly in line with the models.

The negative trade (net exports) channel is illustrated in Charts 12 and 13. Chart 12 presents the real exchange rate of the dollar against a GDP-weighted average of the Asia-4. We use GDP deflators as proxies for the price levels. The chart shows a 40 percent real appreciation of the dollar from 1997:2 to 1998:1. Together with the immediate and sharp recession in the Asia-4 following the crisis, the appreciation led to a large drop in net exports to the Asia-4 economies. Chart 13 shows that U.S. merchandise net exports to the Asia-4 fell from about \$3 billion per quarter before the crisis to -\$6 billion per quarter soon after it. Summing over the four quarters preceding the crisis (1996:3–1997:2) and over 1998, we find that net exports fell by about \$30 billion after the onset of the crisis. For a broader group of “Asia-8” countries—which also includes mainland China, Hong Kong, Malaysia, and Singapore—U.S.

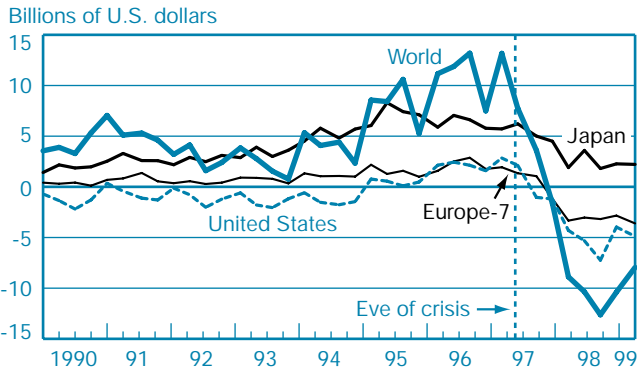
Chart 12
U.S. Dollar/Asia-4 GDP-Weighted
Real Exchange Rate



Source: See Appendix 1.

Notes: The real exchange rate is the GDP deflator of Asian countries relative to the U.S. GDP deflator, both in U.S. dollars. GDP weights are 1994–96 average GDP shares.

Chart 13
Net Exports to the Asia-4 Countries

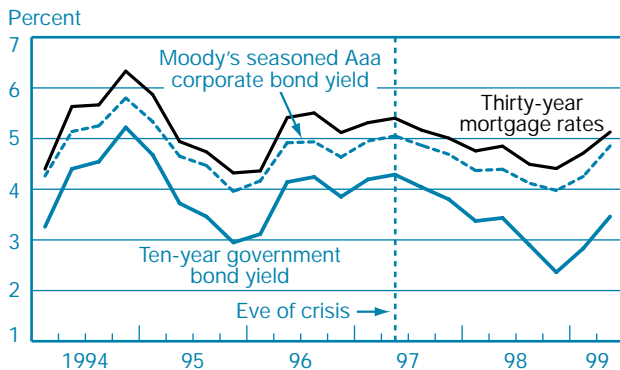


Source: See Appendix 1.

net merchandise exports fell by \$46 billion after the crisis. Chart 13 also shows that the United States was not alone in the export decline: net exports from Japan and Europe to the Asia-4 also fell sharply following the crisis.

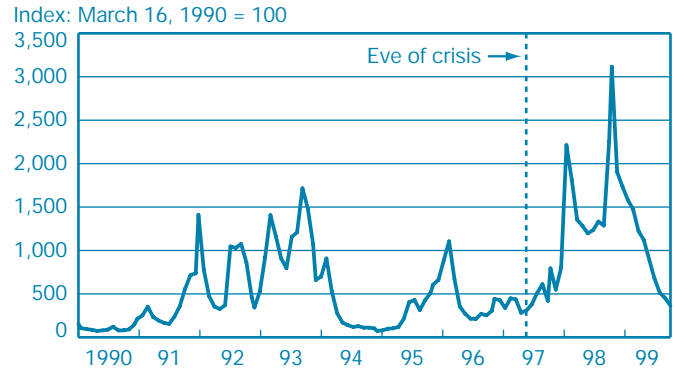
Evidence of the second channel's importance can be found in Charts 14-16. Chart 14 shows that real interest rates declined considerably after the crisis.¹⁷ The ten-year real government bond yield fell by close to 100 basis points from 1997:2 to 1998:1. The thirty-year mortgage yield and Moody's Aaa Seasoned Corporate Bond Yield fell by similar magnitudes. Interest rates slid even further toward the end of 1998, and the nominal thirty-year mortgage yield reached its lowest level in thirty years. This drop in mortgage rates led to a sharp increase in mortgage refinancings (Chart 15). A significant share of the

Chart 14
U.S. Interest Rates less the Core CPI



Source: See Appendix 1.

Chart 15
Number of U.S. Mortgage Refinancings

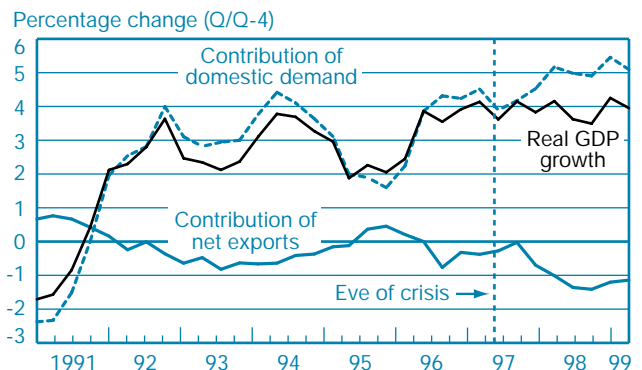


Source: See Appendix 1.

mortgages refinanced during 1998 involved cash-outs, which increased the overall size of the mortgages.

Our framework implies that we would expect to see a drop in the contribution to GDP growth coming from net exports (the first channel) while we would expect to see a rise in the contribution from domestic demand. Chart 16 indicates that this is exactly what occurred. Although the GDP growth rate of 4 percent in 1998 remained virtually unchanged from the 1997 growth rate, the contribution from domestic demand rose from about 4 percent precrisis to about 5 percent postcrisis. At the same time, the contribution from net exports went from being slightly negative to about -1 percent. Europe responded to the crisis similarly to the United States, as we see from Chart 17. Here, we have separated the United Kingdom from

Chart 16
Composition of U.S. Growth

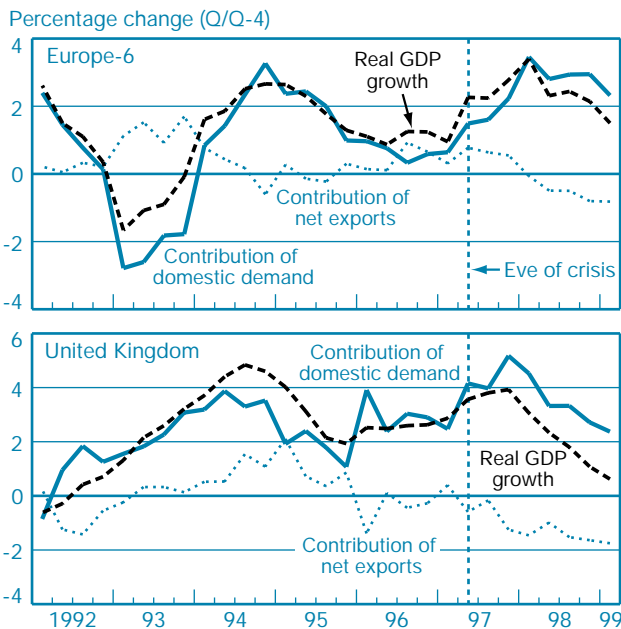


Source: See Appendix 1.

the Europe-6. The United Kingdom is a special case because significant fiscal consolidation and a tightening of monetary conditions dampened domestic demand growth. In the Europe-6, we see that the contribution of domestic demand growth rose from about 1 percent precrisis to a level between 2 and 3 percent postcrisis. At the same time, the contribution of net exports to GDP growth went from slightly below 1 percent to slightly above -1 percent.

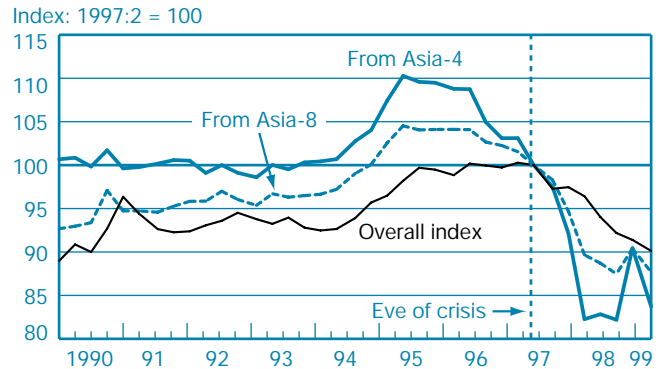
The third channel depends on both the change in the relative price of imports (the reciprocal of the real exchange rate) and on the elasticity of supply with respect to the relative price of imports. Here, we provide evidence on the relative price of imports; in the next section, we derive the elasticity of supply. The import price index for total imports as well as for merchandise imports from the Asia-4 and the Asia-8 appears in Chart 18.¹⁸ All import price indexes are shown relative to the U.S. GDP deflator, and all are indexed to 100 in 1997:2. The Asia-8 index represents a broader view of the impact of the Asia crisis on U.S. import prices. The import price indexes show a sharp decrease for both sets of countries: from the precrisis period of 1996:3-1997:2 to 1998, the relative import price index dropped by 18 percent for the Asia-4 and by 12 percent for the Asia-8.¹⁹

Chart 17
Composition of European Growth



Source: See Appendix 1.

Chart 18
Real U.S. Import Price Indexes Relative to the GDP Deflator



Source: See Appendix 1.

Quantifying the Three Channels

We now quantify the effect on GDP growth of each of the three channels. By doing so, we impose only minimal assumptions, in contrast to the strong structure imposed by the models in Appendix 2. We consider both the Asia-4 countries and the broader set of Asia-8 countries. By looking at the Asia-8, we can

The import price indexes show a sharp decrease for both sets of countries: . . . the relative import price index dropped by 18 percent for the Asia-4 [countries] and by 12 percent for the Asia-8 [countries].

account for spillovers from the crisis to some important neighboring countries. However, we do not consider indirect supply channels operating through oil or commodity prices. The recessions in the Asia-8 countries clearly had some negative effect on oil prices in 1998. These indirect channels would tend to raise the estimates of our supply channel effect.

We define the pre- and postcrisis periods as we did earlier: 1996:3-1997:2 and 1998:1-1998:4, respectively. It is not appropriate simply to compare 1997 with 1998 because the crisis had already started in 1997. It is also not appropriate to compare the four quarters before the crisis with the four quarters following the start of the crisis—1996:3-1997:2 and 1997:3-1998:2, respectively—because the crisis did not take

effect fully until 1998. As shown in Chart 13, it took two or three quarters for U.S. and Europe-7 net exports to decline to their lower postcrisis levels. Also, as we noted, the effect of the capital outflows on the current account of the Asian countries was initially buffered by IMF credit and a drop in reserve assets. The full adjustment in the current account did not occur until 1998:1.

We compute the trade effect without making any model-specific assumptions. We do not need to know the exact causes of the decline in net exports to the Asia crisis countries. Rather, we employ bilateral trade data to calculate how much the contribution of net exports to U.S. GDP growth fell as a result of the crisis. We focus on merchandise trade because it accounted for 79 percent of total U.S. trade in 1998; it is also considerably more volatile than services trade. The contribution to real GDP growth of net exports can be written as

$$(1) \quad \frac{P_X X}{Y} \frac{\Delta X}{X} - \frac{P_M M}{Y} \frac{\Delta M}{M} = \frac{\Delta(P_X X - P_M M)}{Y} - \left(\frac{P_X X}{Y} \frac{\Delta P_X}{P_X} - \frac{P_M M}{Y} \frac{\Delta P_M}{P_M} \right),$$

where Y is nominal GDP, P_M and P_X are import and export price indexes vis-à-vis the Asian countries, and X and M are quantities of bilateral exports and imports. The first term on the lower part of the equation measures the change in the nominal trade balance relative to GDP. The second term measures the price effects. The price effects are subtracted from the nominal trade effect to get the overall real trade effect. We approximate the U.S. export price index to the Asian countries by the overall U.S. export price index. The import price index is approximated by using an import-weighted index of the Asian country export price indexes.

Supply is determined by the production of firms, which are assumed to maximize profits by choosing optimal levels of labor input and imported intermediate goods. This approach ensures that output is not determined only by demand. To facilitate our calculations of the supply effect, we make two auxiliary assumptions. First, we hold the capital stock constant. This assumption is not restrictive, because it merely reflects the fact that our analysis focuses on the short-term effects. Second, we assume that the real wage rate is constant. This assumption implies that the labor supply schedule is perfectly elastic. We argue below that this assumption is not essential to our main findings. As long as the labor supply schedule is not perfectly inelastic, we will obtain qualitatively similar results.

The details of the firms' profit-maximization problem that underlies our calculation are presented in the box. Firms maximize the difference between revenues (the value of output) and costs. The variable costs are labor costs and the costs of imported inputs. With no loss of generality, we

aggregate the entire domestic production process; hence, we do not include domestic intermediate goods. Our goal is to quantify the effect of a decrease in imported input prices on supply.

After computing the first-order conditions for imported inputs and labor, the supply effect can be written as

$$(2) \quad \frac{\Delta GDP}{GDP} = \frac{\beta}{1-\beta} \frac{\alpha}{\alpha-1} \frac{\Delta(P_M/P)}{P_M/P},$$

where β is the share of imported inputs in total production costs in the precrisis period and α is the share of labor income in domestic value-added. P_M/P is the price of imported inputs relative to the price of output. Real GDP is equal to the total value of domestic output, minus imported inputs, measured at precrisis price levels. Notice that the supply effect is independent of the elasticity of substitution between imported inputs and domestic value-added. Notice also that as long as import prices fall, the supply effect is positive.²⁰

We compute the change in the overall P_M/P as the merchandise import share from the Asia-4 or the Asia-8 multiplied by the percentage change of P_M/P for the Asia-4 or the Asia-8. In the Asia-8 case, the change in the overall P_M/P is about -2.3 percent.²¹ The labor income share of GDP in 1997 was 58 percent, so we set α equal to 0.58. We set β equal to U.S. imports of intermediate and capital goods in 1998 (about 60 percent of total merchandise imports) divided by the sum of those imports and U.S. GDP. This calculation yields approximately 0.06.

Firms' Profit-Maximization Problem

Maximize $P\tilde{Y} - WL - P_M M$,

where

\tilde{Y} = output

L = labor

K = capital = constant

M = imported intermediates and imported capital goods

P = price of gross output

W = nominal wage rate (W/P assumed constant)

P_M = price of imported inputs

$\tilde{Y} = F(\phi(K, L), M)$ (production function)

$\phi(K, L)$ = Cobb-Douglas index of K and L (labor share = α)

$F(., .)$ = CES index with elasticity of substitution ε .

Although the net effect can be computed from the supply effect alone, it is still useful to know how the demand side breaks out into the net exports effect and domestic demand effect. We estimate the domestic demand effect as the residual—that is, we compute the effect as the difference between the supply effect and the net exports effect. It would be difficult to calculate the domestic demand effect directly. For example, we would have to know the size of the increase in capital flows to the United States that can be traced to the crisis, the effect of these inflows on the interest rate, and the elasticity of investment demand and savings demand with respect to the interest rate. To know the savings demand and investment demand elasticities, we would require a model of consumption behavior and of investment behavior, with the corresponding set of assumptions. Therefore, by treating the domestic demand effect as the residual, we avoid making the large number of assumptions necessary to calculate it.

The results of these computations are reported in Table 2. If we interpret the Asia crisis broadly as corresponding to developments in the Asia-8 countries, U.S. GDP fell by 0.8 percentage point as a result of a drop in net exports to those countries, while it rose by 1.0 percentage point as a result of the increase in domestic demand. The net effect, which is also the supply effect, is +0.2 percentage point of GDP. The numbers are slightly smaller for the Asia-4. Our supply effect calculations suggest that the net effect of the Asia crisis is small, but positive.

These results do not change in a major way if labor supply is not perfectly elastic. In this case, the increased demand for labor (which results from lower prices of imported goods) leads to a rise in real wages. In the extreme case where labor

supply is completely inelastic, the supply effect is zero. Although the lower prices of imported inputs lead to an increase in demand for the inputs, which raises gross output, domestic value-added remains unaltered because both the capital stock and labor input are unchanged. In general, when labor supply's elasticity is finite, the supply effect will be somewhere between 0 percent and 0.2 percent.²²

Our findings correspond well with Chart 16, which shows that real GDP growth remained virtually unchanged following the crisis. The negative effect from lower net exports was almost exactly offset by the rise in domestic demand. The

The fact that the pickup in domestic demand took place soon after the crisis—and that it occurred both in Europe and in the United States—is highly suggestive of a causal link to the crisis.

increase in the contribution of domestic demand to GDP growth from the pre- to the postcrisis period was about 1 percent. Hence, while mindful of the fact that we have calculated the domestic demand effect as a residual, we suggest that the Asia crisis could have accounted for all of the increase in U.S. domestic demand.

There are other explanations for the increase in U.S. domestic demand during the crisis. However, to the extent that these explanations involve developments specific to the United States, such as the rise in the U.S. stock market, we believe that they are not very plausible.²³ If, for whatever reason, there is a substantial increase in domestic demand specific to the United States, we would have expected to see a rise in U.S. real interest rates and a real dollar appreciation relative to other major currencies. We have seen neither of these developments. Real interest rates actually fell rather than rose. Moreover, we saw that the increase in the contribution of domestic demand to GDP growth in Europe was similar in magnitude to that for the United States.

It is possible that a worldwide event, such as the improved growth outlook, led to a rise in domestic demand on both sides of the Atlantic at the same time. This possibility also seems dubious, because the growth forecasts fell in Europe and in the United States after the crisis. The fact that the pickup in domestic demand took place soon after the crisis—and that it occurred both in Europe and in the United States—is highly suggestive of a causal link to the crisis.

Table 2
The Growth Effect of the Asia Crisis
Percent

	Asia-4	Asia-8
Trade effect	-0.5	-0.8
Domestic demand effect	0.6	1.0
Total effect	0.1	0.2

Source: Authors' calculations.

Notes: The table reports the contribution to GDP growth of lower trade and higher domestic demand as a result of the Asia crisis, as well as the total effect on GDP growth (which is also the supply effect). Results are reported based on one associating the Asia crisis narrowly with four countries: Indonesia, Korea, the Philippines, and Thailand, as well as with a broader set of eight countries that also includes mainland China, Hong Kong, Malaysia, and Singapore.

Conclusion

In the 1990s, many emerging market countries facilitated foreign investor access to their financial markets by liberalizing controls on international capital flows. This action has been beneficial for the emerging markets as well as for investors from industrialized countries. However, because capital inflows can easily be reversed in a short period of time, there have also been risks associated with the increased exposure of foreign investors to these new markets. To date, much of the literature on the Asia crisis has focused on assessing the causes and consequences for the crisis countries. In this article, we have shifted the focus by examining the implications for industrialized countries—and for the United States in particular—of such economic turmoil.

Although the negative trade effects for industrialized economies were emphasized early in the crisis, it soon became clear that the trade channel was not the only transmission channel. By definition, a capital outflow from Asia is a capital inflow somewhere else. Capital inflows can finance an increase in domestic demand, which leads to an increase in GDP. One goal of this article, therefore, was to follow the trail of money out of Asia to ascertain its final destination. We have found it difficult to follow the trail very far, and to determine exactly how much of the funds ended up in the United States. We have also found that large errors and omissions in the U.S. balance of payments complicate the documentation of capital inflows to the United States.

Nevertheless, several stylized facts have emerged:

- The Asia crisis countries experienced net capital outflows of more than \$80 billion from the start of the crisis to the end of 1998.
- The counterparties to the Asia outflows essentially were BIS reporting country banks.
- The majority of the outflows went to offshore center banks, which funneled the capital to banks in Europe.

- Almost half of the outflows went to banks whose nationalities were not American, Japanese, or European.
- The United States and Europe were the final destinations for most of the outflows from the crisis countries and from Japan.
- Very little money reached the United States directly from the crisis countries or through the offshore centers.

These facts highlight the importance of banks as the initial propagation mechanisms of the Asia crisis as well as the “roundaboutness” of the banking flows.

A second goal of this article was to analyze and quantify the short-run effect of the crisis on U.S. GDP growth. We identified three channels through which U.S. growth was affected. In the first channel, the recessions in the Asian countries and the depreciated Asian currencies imply fewer U.S. exports and more U.S. imports. In the second, the lower U.S. interest rates that result from the increased inflows imply greater domestic demand. And in the third, dollar appreciation implies lower prices for imported intermediates and imported capital goods, which reduces the cost of production. In equilibrium, the sum of the first two demand channels equals the third: the supply channel. Our calculations suggest that the negative trade response is -0.8 percent of GDP, while the positive supply response is +0.2 percent of GDP. The domestic demand response, which we calculate as a residual, is about +1 percent of GDP. The overall effect on the U.S. economy in 1998, therefore, is about +0.2 percent of GDP, or \$15 billion to \$20 billion.

Going forward, we can expect these effects to move in the opposite direction as the Asian economies recover. If our findings are correct, however, a reversal of capital flows to the Asian countries will generate only a small net effect on U.S. growth. Yet such a reversal could still generate large compositional effects on domestic demand and net exports.

Charts

Chart 1: Sum across Korea, Thailand, Indonesia, and the Philippines (henceforth the “Asia-4”) of the financial account as reported by the International Monetary Fund’s (IMF) International Financial Statistics (IFS) database. IFS had not yet reported the Korean financial account for 1998:4, so we use McGraw-Hill’s DRI Asia CEIC database.

Chart 2: Sum across Asia-4 of portfolio investment (liabilities - assets), direct investment abroad - direct investment in the reporting economy, and other investment (liabilities - assets), respectively, reported in IFS. Because of missing 1998:4 Korean data, the CEIC database is used to complete the direct investment, portfolio investment, and other investment series.

Chart 3: Exchange-rate-adjusted flows and assets - liabilities (including nonbank) are from the Bank for International Settlements (BIS). The “vis-à-vis” area is Asia-4; the reporting area is the “grand total” of BIS reporting countries.

Chart 4: Exchange-rate-adjusted flows and assets - liabilities (including nonbank) are from the BIS. The “vis-à-vis” area is Asia-4; the reporting areas are Japan, the offshore centers, and the United States and international banking facilities (IBFs), as well as France, Germany, Italy, the Netherlands, Spain, Switzerland, and the United Kingdom (henceforth the “Europe-7”).

Chart 5: The top panel is the stock of total assets vis-à-vis Asia-4, with the geographic origin of a bank being the reporting area. The BIS is the source. The bottom panel is also the stock of total assets vis-à-vis Asia-4, but by nationality of ownership. The BIS’ *Consolidated International Banking Statistics* is the source. Because of data unavailability, we exclude Switzerland from the Europe series in the bottom panel.

Chart 6: The financial account series is the same as in Chart 1. Other series: sum across Asia-4 of “reserves and related items” and the current account as reported by International Financial Statistics. IFS had not yet reported the Korean financial or current account for 1998:4, so we use the Bank of Korea’s External Economic Indicators Table P.F.2b for Korean current account data. For changes in reserve assets, we use the CEIC database for Korea for 1998:4.

Chart 7: With some exceptions in the most recent quarters, current account balance data for France, Germany, the Netherlands, Spain, Switzerland, and the United Kingdom are from the BIS; Italian data are from Banca d’Italia; Indonesian, Japanese, Korean, Philippine, Thai, and U.S. data are from IFS. The exceptions are the Spanish current account for 1999:1, which is from Bloomberg, and Korean data for 1998:4 and 1999:1, which are from J. P. Morgan International Data Watch, as is the Indonesian value for 1999:1. Data from the BIS are converted to U.S. dollars using period-average exchange rates. All series are seasonally adjusted using the X11 additive filter in Eviews 3.0.

Chart 8: The net bank lending series is the same as in Chart 4. The net portfolio flows series is derived from Treasury International Capital data. Long-term net sales by foreigners to U.S. residents is calculated from the TIC’s U.S. Transactions with Foreigners in Long-Term Securities Table. Short-term Treasury obligations from the TIC’s Liabilities to Foreigners Reported by Banks in the U.S. Table are also included. Quarterly data are calculated using monthly sums.

Chart 9: These data are exchange-rate-adjusted flows, assets - liabilities (including nonbank), as reported by the BIS. The top panel is the United States and IBFs reporting vis-à-vis all BIS reporting countries; the bottom panel is the United States and IBFs reporting vis-à-vis Japan, the offshore centers, and Europe-7.

Chart 10: The U.S. financial account, current account, and net errors and omissions are from IFS.

Chart 11: Monthly averages of the daily BIS nominal exchange rate series for Europe and Japan are multiplied by the ratio of the U.S. and European consumer price indexes (CPIs) and the ratio of the U.S. and Japanese CPIs, respectively. The U.S. CPI is from Haver Analytics’ USECON database. The European and Japanese CPIs are from the BIS. All CPIs are indexed to 1995=100.

Chart 12: Quarterly average exchange rates for the Asia-4 are from IFS. GDP deflators are calculated using nominal and real GDP series from the CEIC database. After indexing all series to 1997:2=100, we use a GDP-weighted (1994-96 average GDP shares) average of the real exchange rates to yield the Asia-4/ U.S. real exchange rate.

Appendix 1 (Continued)

Chart 13: Data are from the IMF's Direction of Trade Statistics database. Asia-4 countries are the primary countries—that is, they report data on exports and imports—while secondary countries are the world, the United States, Japan, and Europe-7. To construct each series, we sum the quantity (net exports * -1) across the Asia-4 countries and across Europe-7.

Chart 14: Ten-year government bond yields are from the European Central Bank's Euro Area Statistics Monthly Data Table 3.2 and its web site (<http://www.ecb.int/stats/mb/eastats.htm>). The Moody's Seasoned Aaa Corporate Bond Yield series and thirty-year mortgage rate series ("Contract Rates on Commitments: Conventional Thirty-Year Mortgages, FHLMC (percent)") are both from USECON. All interest rates are quarterly averages of daily rates minus the Q/Q-4 growth rate of the CPI, excluding food and energy. The CPI series is from USECON.

Chart 15: This series is the refinancing index from the Mortgage Bankers Association's weekly survey. Data are seasonally adjusted, and weekly observations have been converted to monthly averages.

Chart 16: All data are from USECON. Contribution of domestic demand = [nominal DD(Q-4)/nominal GDP(Q-4)]*real DD growth Q/Q-4. Nominal domestic demand is the sum of the C, I, and G (consumption, investment, and government) series. Real domestic demand is the sum of the CH, IH, and GH (1992 chain-weighted dollars of the C, I, and G series) series. Nominal GDP is simply the series GDP. The real GDP growth series is GDPH (seasonally adjusted, 1992 chain-weighted dollars). The contribution of net exports series is the difference between real GDP growth and contribution of domestic demand.

Chart 17: For the top panel, contribution of domestic demand = (sum nominal domestic demand(Q-4) across Europe-6/sum nominal GDP(Q-4) across Europe-6)*(Europe-6 real domestic demand growth (Q/Q-4)).

In the above formula, the nominal domestic demand and nominal GDP series are from the BIS, where nominal domestic

demand is reported in the local currency and nominal GDP is reported in dollars. Nominal domestic demand is converted to dollars (for the purpose of summing) using the period-average quarterly exchange rates from IFS. Real domestic demand growth for the individual Europe-6 countries of France, Germany, Italy, the Netherlands, Spain, and Switzerland is from the BIS. The BIS had not yet reported Italy's 1998:4 real domestic demand growth, so we use Bloomberg (the original source is ISTAT). Europe-6 real domestic demand growth for each quarter is constructed as the weighted average (a country's weight is its nominal domestic demand four quarters ago) of the individual countries' real (Q/Q-4) domestic demand growth rates.

Europe-6 real GDP growth is calculated as the weighted average (a country's weight is its nominal GDP four quarters ago) of the individual countries' real (Q/Q-4) GDP growth rates. The nominal GDP data used in the weighting are the same as those used in the construction of contribution of domestic demand (see above). The individual countries' real GDP data are from the BIS.

For the bottom panel, the United Kingdom's contribution of domestic demand = [nominal DD(Q-4)/nominal GDP(Q-4)]*real DD growth Q/Q-4. In the above formula, the nominal domestic demand and nominal GDP series are from the BIS, where nominal domestic demand is reported in British pounds and nominal GDP is in U.S. dollars. Nominal domestic demand is converted to dollars (for the purpose of summing) using IFS quarterly period-average exchange rates. Real domestic demand growth and U.K. real GDP growth are from the BIS.

In both panels, contribution of the net exports series is the difference between real GDP growth and contribution of domestic demand.

Chart 18: U.S. import price indexes from the Asian countries are approximated using export price indexes of the Asian countries (from Oxford Economics) in dollar terms. Indexes are deflated using the U.S. GDP deflator. After we calculate real import price indexes for the eight Asian countries, 1995 U.S. import shares yield weighted averages for Asia-4 and Asia-8.

Two Models

Here we present two models that deliver the implications discussed in the text. The first is a partial-equilibrium model for the United States, the second is a two-country general-equilibrium model for the United States and Asia. The first has a goods-market equilibrium condition and a balance-of-payments equilibrium condition:

$$(A1) \quad Y(RER)^+ = DD(r, Y)^- + NX(RER, Y)^- ,$$

$$(A2) \quad NX(RER, Y)^- + KA(r, \gamma)^+ = 0 .$$

$Y(RER)$ is output supply. It is a positive function of the real exchange rate: a real appreciation (a rise in RER) lowers the relative price of imported goods, which stimulates production. On the right-hand side of the goods-market equilibrium equation (A1) is total demand for U.S. goods, which is the sum of domestic demand (DD) and net exports (NX). Domestic demand is a positive function of income Y and a negative function of the real interest rate r . Net exports fall in response to both a real appreciation and a rise in domestic income, which raises imports.

The second equation (A2) represents balance-of-payments equilibrium: the sum of net exports and net capital inflows (KA) must be zero. A rise in the real interest rate raises capital inflows. Capital flows also depend on the shift parameter, γ , which represents a desire by investors to reallocate their capital to the United States based on concerns of increased risks of default in Asia as well as increased probabilities of currency depreciations and stock market collapses. In our framework, it does not matter whether these concerns are based on fundamentals, are rational self-fulfilling beliefs, or are irrational altogether.

It is easily verifiable from these two equations that an increase in γ , which leads to a shift of capital to the United

States, implies a real dollar appreciation, a drop in the real interest rate, and a rise in output.

The second model extends the first to a general-equilibrium model for the United States and Asia:

$$(A3) \quad Y(RER)^+ = DD(r, Y)^- + NX(RER, Y, Y^*)^- ,$$

$$(A4) \quad Y(RER)^- = DD^*(r^*, Y^*)^- - NX(RER, Y, Y^*)^- ,$$

$$(A5) \quad NX(RER, Y, Y^*)^- + KA(r - r^*, \gamma)^+ = 0 .$$

Asia is indicated by $*$. This model adds a goods-market equilibrium condition for Asia and makes U.S. net exports also a function of income in Asia. Moreover, net capital flows now depend on the interest rate differential. It is easily verifiable that an increase in γ has the same implications for the United States as in the first model. Now the model also has implications for the Asian economy: its real interest rate rises and its output falls.²⁴

We can extend the two-country model to include a shift parameter, θ , in the Asia domestic demand function. A decrease in θ corresponds to a decrease in government purchases or to a decrease in consumption or investment demand resulting from, say, increased pessimism about future macroeconomic prospects. θ captures the idea that other forces could lead to a reallocation of capital from Asia to the United States independent of changes in γ . It is easily verifiable that a decrease in θ has the same implications for the United States: a lower interest rate, a real dollar appreciation, and a rise in output. These implications, therefore, reinforce the effect of a rise in γ . We believe that the latter effect likely was more important in the Asia crisis, because a rise in γ leads to higher Asian interest rates, consistent with the evidence, while a fall in θ results in the opposite.

Endnotes

1. A reasonable consensus was reported in the *New York Times*: “Many forecasters estimate that the Asian crisis will in time shave half a percentage point from the nation’s economic growth” (January 30, 1998). For example, between September and November, J. P. Morgan revised its forecast of the net export contribution to GDP growth in 1998 from -0.1 percentage point to -0.6 percentage point. Most forecasts of the impact of the crisis were based only on international trade channels.

2. We therefore believe that the demand-oriented Mundell-Fleming type of model is not sufficient for considering the implications of the crisis.

3. The first hints that market forecasters were aware of the positive effects of the crisis through lower interest rates came as early as January 1998. See, for example, J. P. Morgan’s “U.S. Economic Outlook” (January 16) or *New York Times* (January 30).

In addition, Jeffrey Frankel, then at the Council of Economic Advisors, indicated in a November 17, 1999, speech at the Institute of International Finance that the negative effect of the crisis through trade could be mitigated “if one takes into account that the likely effect would be interest rates lower than they otherwise would be, thereby replacing demand lost in the trade sector with output in producers’ durable equipment, construction, and consumer durables.” However, Frankel also pointed out that at the time “many of the estimates of the East Asian crisis are just the effect on U.S. net exports.” Even analysts who understood the positive effects through lower interest rates generally still considered the overall effects of the crisis to be negative. Only as 1998 proceeded did it become increasingly clear that the U.S. economy did not suffer a negative hit from the crisis in Asia.

4. Related research includes Ito (1999), Bonti et al. (1999), and Fornari and Levy (1999). These studies, however, tend to focus on the flows/stocks of financial assets into or out of emerging Asia. None of them attempts to trace the flow of capital from emerging Asia to the United States during the recent currency crisis.

5. Although Malaysia is often included as one of the crisis countries, we do not include it in our main calculations because of incomplete data, particularly in terms of the breakdown of the financial account into portfolio investment, foreign direct investment, and other investment. For 1998, however, we know that Malaysia experienced at least a \$5 billion net outflow of short-term capital alone. We include Malaysia in a broader set of eight Asian countries when we consider the effect of the crisis on U.S. growth.

6. Direct investment refers to international flows of “equity capital, reinvested earnings, and other capital associated with various intercompany transactions between affiliated enterprises” (International Monetary Fund 1999). It generally refers to greenfield investment and to mergers and acquisitions. Portfolio investment refers to international flows of equity (except equity counted as direct investment) and debt securities of any maturity. “Other” investment involves bank and nonbank intermediaries on either side of the transaction.

7. The offshore centers include the Bahamas, Bahrain, the Cayman Islands, Hong Kong, the Netherlands Antilles, and Singapore.

8. The only difference of note is that in 1998:1 the extent of the capital outflow from the Asia-4 was less than it was in the previous quarter, while the reduction in net lending by BIS reporting banks was slightly larger.

9. In other words, we assume that these countries typically have small current accounts and small net changes in central bank reserves. This is a reasonable assumption for all of the offshore centers except Hong Kong and Singapore. Total net cumulative external lending of the offshore centers was \$29 billion during this period. However, this amount is a relatively small fraction of the gross flows in and out of the centers. By contrast, during the crisis, the gross flows of the Asia crisis countries were similar in magnitude to the net flows.

10. Data for Switzerland were not available.

11. Applying a linear trend to Japan as well, we find that the country’s current account surplus increased by \$12 billion relative to trend in this period. This increase is less than one-half of the increase in the Asia-4 and Malaysian current accounts. Hence, it seems clear that most of the decrease in the Europe-7 and U.S. current accounts can be attributed to the emerging market crisis in Asia.

12. This figure assumes that all the errors occur because of misreporting of the capital account data. In other words, we assume that the current account data are represented accurately.

13. Real exchange rates are normalized to equal nominal exchange rates for the average of 1995.

14. See, for example, Corsetti, Pesenti, and Roubini (1999) for a “fundamentals”-based explanation of the Asia crisis and Radelet and

Endnotes (Continued)

Note 14 continued

Sachs (1998) for a self-fulfilling-expectations explanation. In our framework, it does not matter for the U.S. economy whether or not the expectations are driven by fundamentals. However, the source of the changed expectations does matter, of course, for the Asian countries, particularly from a policy standpoint.

15. Empirical documentation of the textbook linkages from lower interest rates to higher consumption and investment is not widespread. Campbell and Mankiw (1989), for example, conclude that there is virtually no link between real interest rates and consumption. However, evidence of such linkages does exist. See Barro and Sala-i-Martin (1990) for evidence that ties interest rates to investment. See Mankiw (1985) and Beaudry and van Wincoop (1996) for evidence that ties interest rates to consumption.

16. An expected drop in future income could similarly lower consumption.

17. We subtract the Q/Q-4 core inflation rate from nominal interest rates as a proxy for inflation expectations. Core inflation rates are considered a good indicator of long-term inflation trends. Inflation survey data are available only up to one year ahead.

18. We have proxied the U.S. import price index from each Asian country by each country's overall export price index, expressed in U.S. dollars.

19. These figures are consistent with those reported in Barth and Dinmore (1999).

20. It therefore might seem that we have "rigged" our approach to guarantee a positive net impact of the crisis on the United States. This

assumption is incorrect for several reasons. First, it is possible (although not probable) that the crisis in Asia could have led to higher U.S. import prices, to the extent that financing difficulties severely disrupted Asian production. If higher prices induced by lower production more than offset the effects of exchange rate depreciation, U.S. import prices could have risen. Second, it is hard to see how lower import prices could have a negative effect on supply, just as it is hard to see how lower oil prices or higher productivity would lower supply. Third, as discussed below, our estimates of the supply effect and the net exports effect imply a domestic demand effect that is consistent with what is observed in the data.

21. We approximate P with the GDP deflator, as in Chart 12. This is not exactly correct, because P is the price of value-added plus imported inputs, not just value-added. But it is a close approximation, as β is quite small.

22. As noted earlier, we abstract from indirect supply effects, such as those resulting from oil prices. If the decline in oil prices in 1998 is entirely attributable to declining demand in the Asia-8 countries, then the supply effect would be considerably larger, close to 1 percentage point of GDP. In addition, as noted earlier, supply also could have been affected through the profits channel. Although corporate profits rose somewhat following the crisis, it is hard to say how much this rise could have affected the supply effect.

23. Although European stock markets appreciated as well, these markets are much smaller in scale—in total and in per capita—than the U.S. stock markets.

24. This model is very similar to the flexible-price model in Abel and Bernanke (1995). One difference is that we include an additional supply-side channel from imported inputs to output.

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