Asian crisis post-mortem: where did the money go and did the United States benefit?

Eric van Wincoop and Kei-Mu Yi[1]

1. Introduction

The recent currency crises in Asia have raised important questions about the sensitivity of industrialized economies to financial crises in faraway emerging markets. In late 1997 and 1998, Indonesia, Korea, Malaysia, the Philippines and Thailand (Asia-5) experienced net capital outflows of about $80 billion, plunging them from "growth miracle" status into the worst recession they had seen in decades. GDP growth rates for 1998 in Korea and Malaysia were –5.8% and –7.5%, respectively, and in Indonesia and Thailand the GDP declines exceeded 10%. In the United States, however, 1998 turned out to be a strong year, with GDP growth coming in at +4.1%.

Is there a connection between the crisis in Asia and the strong US growth performance? Sequential correlation, of course, does not imply causation. The US economy could have been robust for many reasons, including the "new" productivity revolution and the reductions in the federal funds rate in late 1998. In addition, most economists thought the downturn in Asia would exert a *negative* effect on the US economy. Recessions in the crisis countries, in conjunction with sharply depreciated currencies, would reduce their demand for imports from the United States. Moreover, the currency depreciations would lead to an export surge to the United States. Hence, through this international trade channel, US net exports were predicted to contribute more negatively to growth than had been expected prior to the crisis. Indeed, the US trade deficit did increase, contributing –1.1% to US GDP growth in 1998. However, the increase in the deficit was more than offset by continued strong increases in employment and production, in conjunction with continued robust spending on consumer goods and on producers' durable equipment. Quarter by quarter, US GDP growth in 1998 consistently exceeded projections.

In our view, these (apparently) surprising outcomes reflect the fact that the original way of thinking about the crisis was flawed. First, the depreciation of the Asian currencies against the dollar and the recessions in the Asian crisis countries were endogenous responses to a large and sharp reallocation of capital out of the Asian crisis region. From the point of view of the United States, this reallocation of capital is the appropriate starting point – not the depreciations and recessions – when thinking about the implications of the crisis for the US economy.[2] Second, the original way of thinking focused only on demand-side channels, ignoring the supply side.

While the reallocation of capital towards the United States generated the above-mentioned negative trade effects on US GDP, the capital inflows also generated a positive effect on US GDP by financing an increase in US spending, both directly and indirectly by generating 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 the effect of a positive productivity shock. For these two reasons then, rather than viewing the strong US growth performance in 1998 as having

[2] One can of course go a step further and say that the analysis should start with the factors that led to the capital outflow from Asia in the first place. But from the point of view of the US economy, the exact cause of the reallocation of capital is not critical.

occurred despite the Asian crisis, we view the strong performance as having occurred because of the Asian crisis.

As the crisis proceeded, and US growth remained strong, a new story along the lines sketched above, with capital inflows into the United States as the centerpiece, became increasingly popular. Yet surprisingly, there is very little documentation of this story. This paper aims to at least partially fill that gap. Specifically, we first attempt to document the trail of capital out of Asia and into the United States. We then analyze and quantify the implications for short-run US GDP growth of the (direct and indirect) reallocation of capital from Asia to the United States.

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 the Asia-5 from the start of the crisis (1997Q2) to the end of 1998 amounted to about $80 billion. The United States ran a current account deficit in 1998 of $221 billion, an increase of $77 billion over the 1997 current account deficit. The increased deficit was obviously financed by increased capital inflows.

It is more difficult, however, to document the precise trail of money from these Asian countries to the United States. Using Bank for International Settlements (BIS) data, and data drawn from the US Treasury Department's Treasury International Capital (TIC) system, we are able to follow the trail to a certain extent. We find that banking flows were the major source of the outflows, and that these outflows were dispersed all over the world, including Japan, Europe, the United States and 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 money to European banks. From there the trail runs cold, but we do conclude that banks clearly played an important role at the beginning of the reallocation process, and the money clearly came to the United States in a roundabout fashion.

It is difficult to ascertain exactly in what form (banking, portfolio or direct investment) and from exactly what countries the Asian crisis money entered the United States. We assume that the initial "rounds" of bilateral international money flows – the flows from the Asian crisis countries to the rest of the world and from the offshore centers to the rest of the world – arise directly from the Asian crisis, but this assumption clearly becomes more untenable as the money trail gets longer. In addition, the net errors and omissions component of the US 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 changes in reported capital flows.

In analyzing the impact of the crisis on short-run US 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. The capital inflows finance an increase in domestic demand. The third is a supply channel. The appreciation of the dollar against the Asian currencies leads to a decrease in prices of imported inputs. We illustrate these effects in the context of a simple model of goods market and balance of payments equilibrium. We then provide evidence consistent with each of these channels and quantify their impact on US GDP growth. We find that the net effect of the Asian crisis on US growth was small but positive, +0.2 percentage points, confirming the newer wisdom.

The remainder of the paper is organized as follows. Section 2 documents the trail of money out of the Asian crisis countries. Section 3 examines the inflow of capital to the United States. Section 4 analyzes and quantifies the impact of the crisis on US growth. Section 5 concludes.

2.   Outflow of capital from Asian crisis countries

Figure 1 illustrates the sharp and sudden net capital outflow from the "Asian-4" crisis countries, which are Indonesia, Korea, the Philippines and Thailand.[3] The Asia-4 countries experienced positive net

---

[3]   Although Malaysia is often included as one of the crisis countries, we do not include it in the figures because of incomplete data, particularly the breakdown of the financial account into portfolio investment, foreign direct investment

capital inflows throughout the 1990s. Then in 1997Q3, a sharp outflow began. In the six quarters from 1997Q3 to 1998Q4, these countries experienced a net outflow of $77.9 billion. By contrast, in the six quarters prior to the crisis, they experienced a cumulated net inflow of $86.8 billion. Even today, these countries continue to experience net capital outflows.

Figure 1: Financial account of the Asia-4
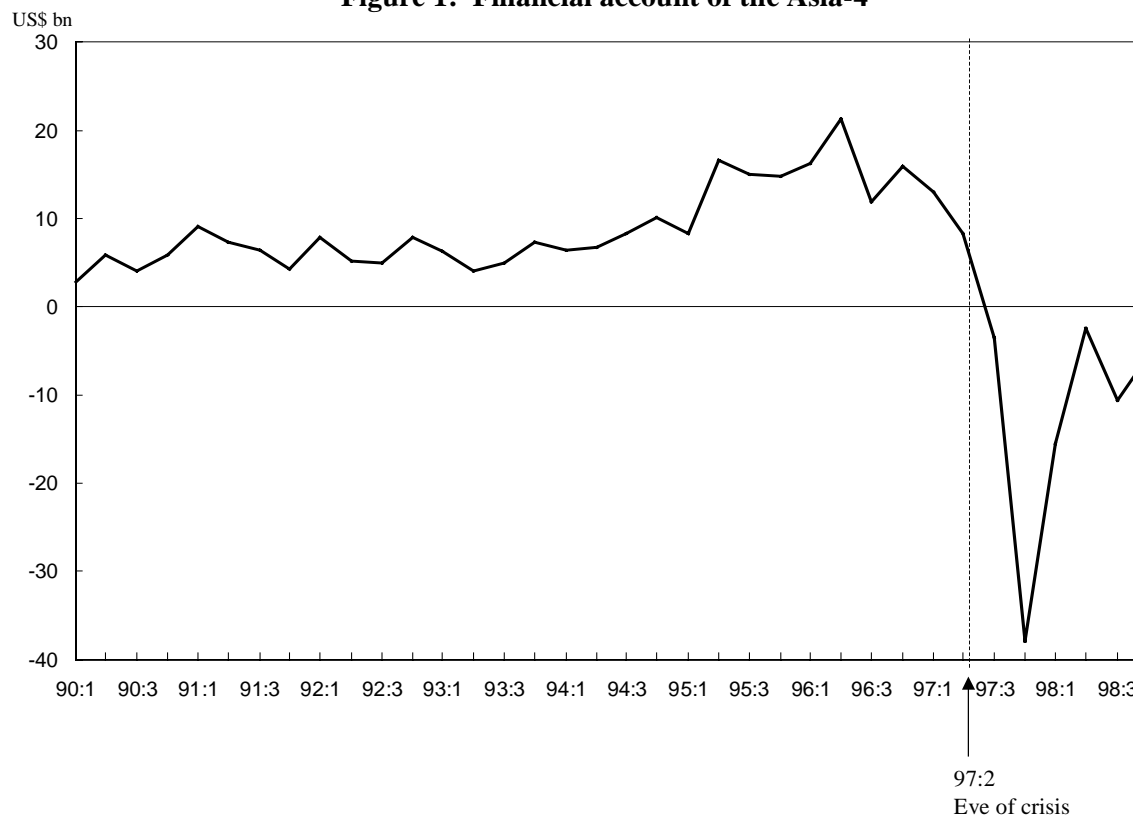
If the financial account (we will use the terms "financial account" and "capital account" interchangeably) is broken down into portfolio flows, foreign direct investment (FDI) flows and "other" flows, Figure 2 shows that the bulk of the outflows since the onset of the crisis consisted of other flows.[4] Indeed, other flows account for more than 100% of total net outflows, with a cumulative outflow of $84.9 billion from 1997Q3 to 1998Q4. During this period, $46.2 billion, equivalent to 59.3% of total outflows, were bank flows, that is, flows involving Asia-4 banks. Most of the remaining other flows appear to involve non-bank financial institutions.

Figure 3 suggests that the counterparties to the flows involving Asia-4 banks were almost surely BIS reporting banks, which include banks from most of the OECD countries as well as several offshore centers in the Caribbean, Hong Kong and elsewhere.[5] The figure shows exchange rate adjusted net lending flows from the BIS reporting banks to the Asia-4. Both the increase in net lending in the years preceding the crisis and the sharp reduction in net lending by these banks after 1997Q2 closely mirrors

---

and other investment. We do include Malaysia in a broader set of eight Asian countries when we consider the effect of the crisis on US growth in Section 4.

[4]   Direct investment refers to international flows of "equity capital, reinvested earnings, and other capital associated with various inter-company transactions between affiliated enterprises" (IMF (1999)). It generally refers to both greenfield investment and mergers and acquisitions. Portfolio investment refers to international flows of debt and equity (except equity counted as direct investment) securities of any maturity. Other investment primarily involves financial transactions with non-residents by banks and non-bank intermediaries.

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

the overall capital inflows and outflows from the Asia-4 depicted in Figures 1 and 2.[6] The cumulative net lending flows from 1997Q3 to 1998Q4 equal a net outflow of $105.3 billion. This is equivalent to about one third of the total stock of claims against these countries in 1997Q2! Figures 2 and 3 taken together 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.

Figure 2: Breakdown of the financial account of the Asia-4

US$ bn
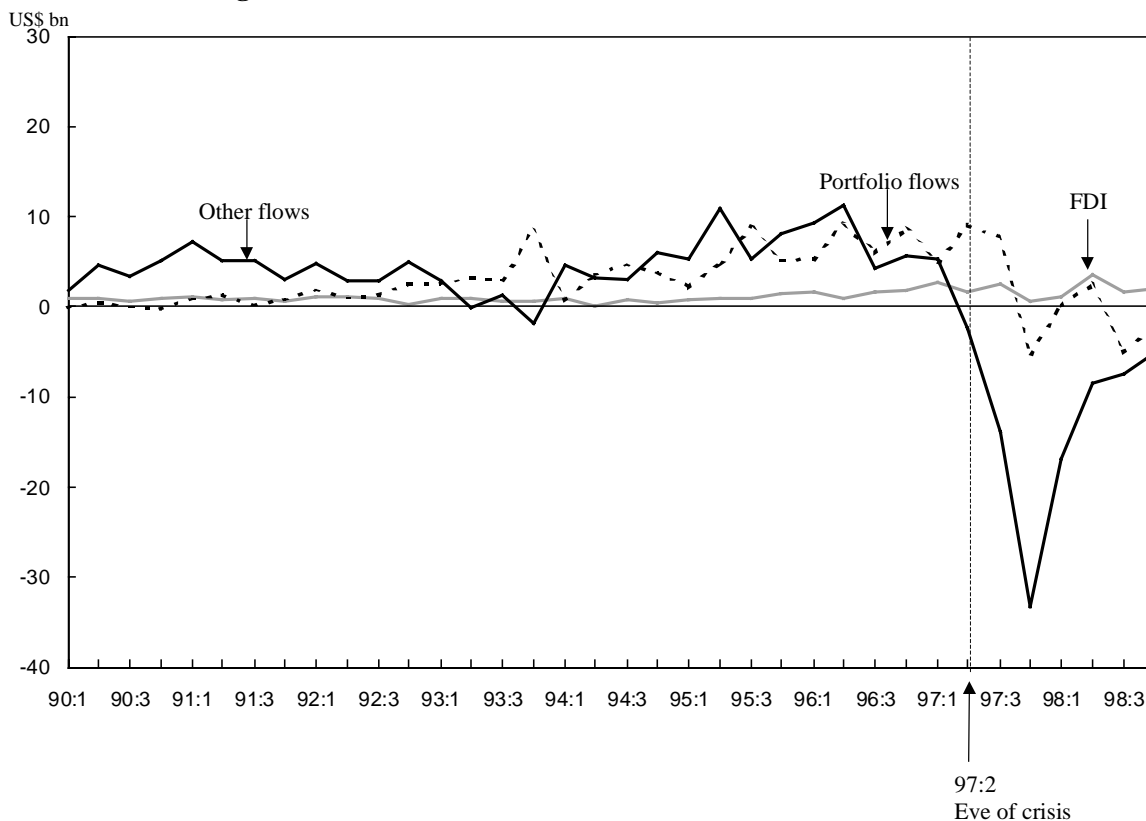
Which countries were the largest sources of the reduction in net bank lending to the Asia-4? There are two ways to address this question. One way views countries as geographical locations. The other way views countries as representing nationalities. For example, a Swiss bank subsidiary operating in the United States would count as a US bank based on geography, and as a Swiss bank based on nationality. The two ways complement each other because the geographic approach is consistent with balance of payments 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 with the geographical approach. Figure 4 reports net bank lending flows to the Asia-4 by geographical location of BIS reporting bank. It focuses on four regions: Japan, Europe-7, the United States and its International Banking Facilities (IBFs), and offshore centers. Europe-7 comprises France, Germany, Italy, the United Kingdom, Switzerland, the Netherlands and Spain. While banks in all four regions reduced their net lending to the Asia-4, the reductions in Japan, Europe-7 and the United States were typically of the order of several billion dollars per quarter. The figure shows clearly that the majority of the outflows from the Asia-4 were accounted for by the offshore centers, with $54.3 billion out of the total net outflow of $105.3 billion.

---

[6]   The only difference of note is that in 1998Q1 the extent of the capital outflow from the Asia-4 was lower than in the previous quarter, while the reduction in net lending by BIS reporting banks was slightly larger.

Figure 3: BIS reporting banks' net lending to the Asia-4*
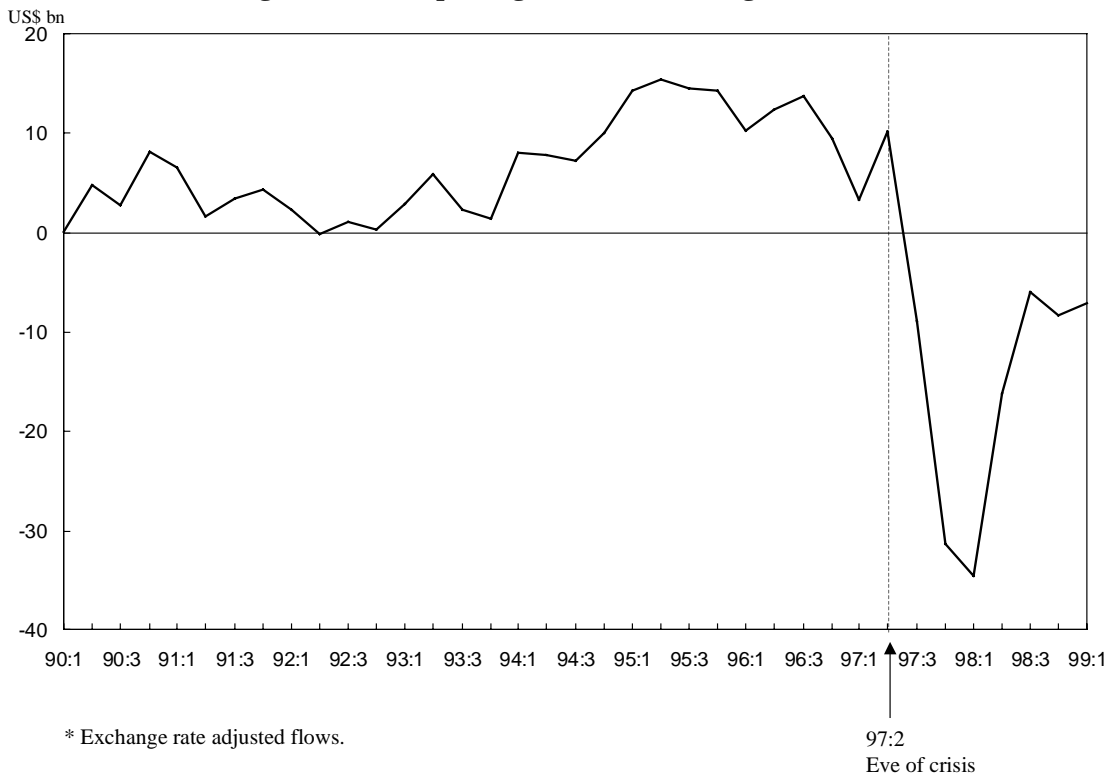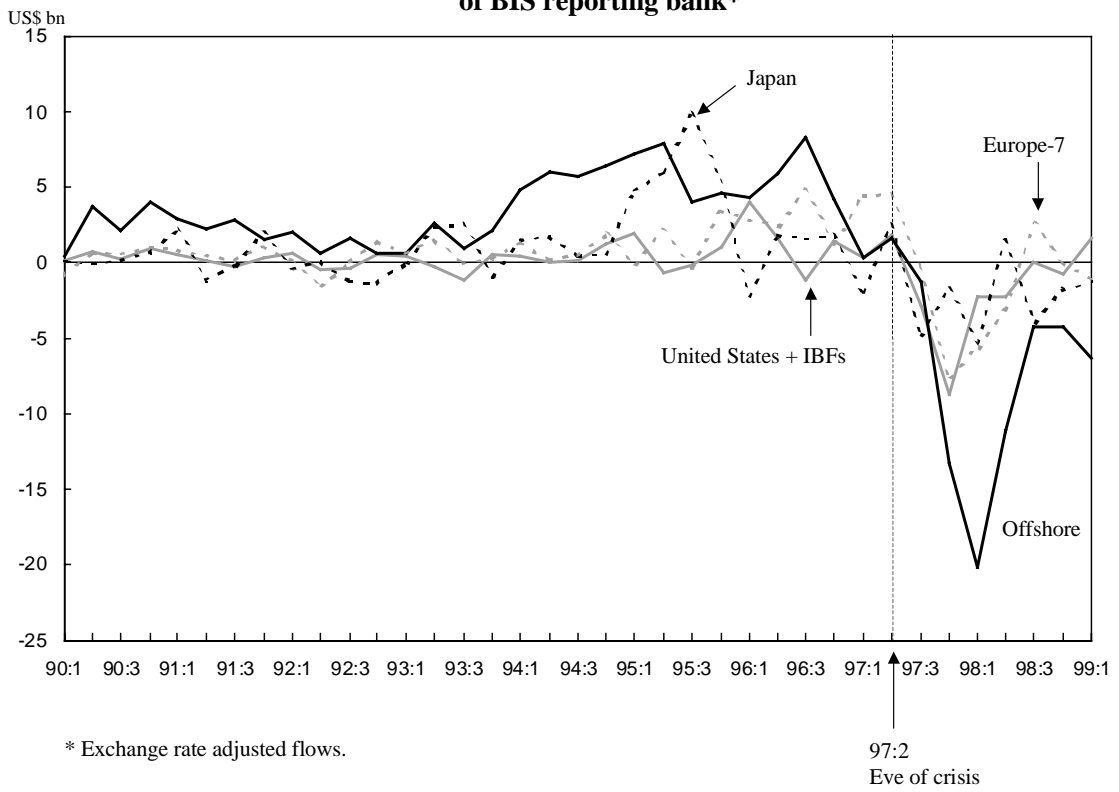
US$ bn

* Exchange rate adjusted flows.

97:2
Eve of crisis

**Figure 4: Net bank lending to the Asia-4 by geographic location
of BIS reporting bank***

US$ bn

* Exchange rate adjusted flows.

97:2
Eve of crisis

285

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".[7] Figure 5 illustrates this in the form of a flow diagram. The figure reports net cumulative bank lending of BIS reporting countries over the 1997Q3-1998Q4 period. Banks in offshore centers received $112.0 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.

**Figure 5: Flow diagram of net lending of BIS reporting banks:
June 1997 to December 1998**
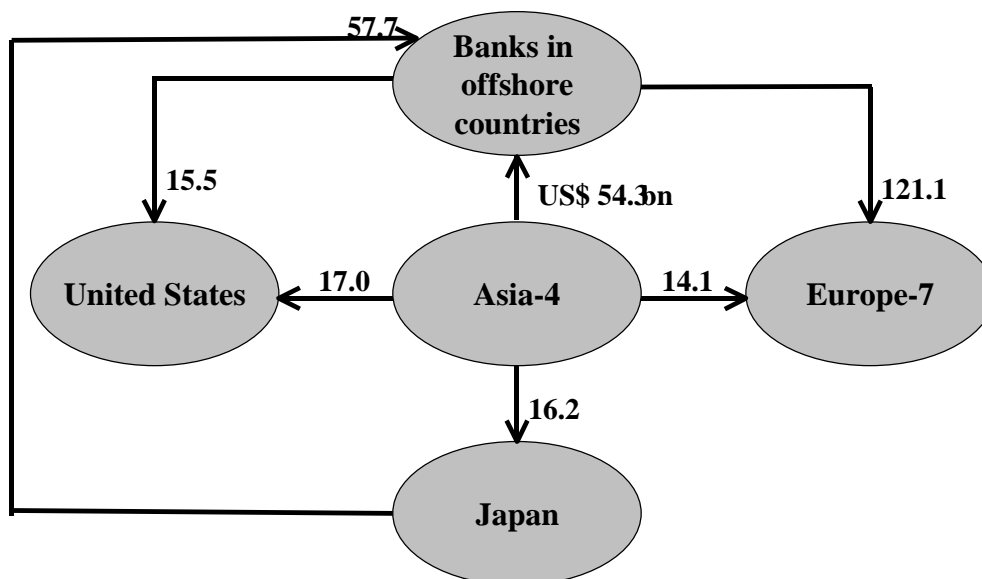
Notes: The flows out of Asia-4 correspond to an increase in net liabilities vis-à-vis Asia-4 of the BIS
reporting banks in the offshore countries, the United States, Europe-7 and Japan. The flows of the
offshore countries vis-à-vis the United States, Europe-7 and Japan correspond to net lending by
banks in the offshore countries to both banks and non-banks in the United States, Europe-7 and Japan.

What is also striking from Figure 5 is the minimal amount of banking inflows to the US originating directly from the Asia-4 or mediated through the offshore centers. The money associated with the Asia-4 capital outflow could of course have reached the US 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 becomes difficult to trace the original source of the money. This is already apparent in Figure 5. More money entered the offshore centers from Japan than from the Asia-4. Therefore, we cannot conclude that the money exiting the offshore centers is 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.

The top row of Table 1 shows that of the $105.3 billion reduction in lending, $98.5 billion represented declines in claims on the Asia-4. Hence, we find that most of the adjustment is on the claims side. We also find that, even though a not insignificant fraction of the BIS bank loans were denominated in domestic currencies, the exchange rate adjusted flows are almost identical to the change in the stock of

---

[7] 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 is a relatively small fraction of the gross flows in and out of these centers. By contrast, during the crisis, the Asian crisis-country gross flows were similar in magnitude to the net flows.

claims less liabilities. This is shown in the second row of Table 1. The reduction in stocks was $106.3 billion and the reduction in claims was $99.4 billion. These two findings are useful, because they allow comparisons to be made between the geography-based data and the nationality-based data. The nationality-based data are only available for claims (not liabilities) and are only available for stocks of claims (rather than exchange rate adjusted flows).

Table 1
Change in assets and liabilities of BIS reporting banks vis-à-vis the Asia-4
(June 1997 to December 1998; in billions of US dollars)

		Assets	Liabilities	Net claims
		Geographical 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 nationalities	−32.3	-	-

Notes: The geographical breakdown refers to all banks located in 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 geographical breakdown. This accounts for the small discrepancy between the totals based on the geographical and nationality breakdowns. The nationality data are only available for claims. Europe-7 comprises the United Kingdom, Germany, France, Italy, the Netherlands, Spain and Switzerland. 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 bottom panel of Table 1 provides a summary of bank lending to the Asia-4 by nationality. Time series of both the geographical and nationality data are shown in Figure 6 as well. Of the $79.7 billion reduction in assets that can be assigned to nationalities, only $47.6 billion involves the United States, the Europe-6 (Europe-7 less Switzerland) and Japan. This is surprising. The remaining $32.3 billion is accounted for by banks of other nationalities operating in the BIS countries, which would include Thai and Korean banks operating in the United States, for example. A detailed breakdown of this remainder is unavailable. Note that the outflows based on the nationality data are $19.7 billion less than the outflows based on the geographical breakdown. The reason is that banks operating in the offshore centers are not included in the nationality breakdown if their nationality is not that of one of the non-offshore BIS reporting countries. For example, banks of Hong Kong nationality operating in Hong Kong are not included in the nationality breakdown, while they are included in the geographical breakdown. The same is true for a Saudi Arabian bank operating in Hong Kong. In summary, less than half of the total banking outflow from the Asia-4 is accounted for by US, Japanese or Europe-6-owned banks. Only $7.6 billion is associated with banks of US nationality.

We note parenthetically that the Asia-4 current account was initially buffered from the large capital outflows by IMF credit and a rundown of reserves. This is illustrated in Figure 7. It is worthwhile recalling that from a balance of payments perspective, a rundown of central bank foreign exchange reserves is a net official capital inflow, which accounts for about half of the rise in reserves. The other

half is associated with the increase in IMF credit. Figure 7 shows that the full current account adjustment did not take place until the first quarter of 1998.

Figure 6: Source of BIS reporting bank claims on the Asia-4

By geographic location of banks

US$ bn

Offshore

Japan

Europe-7

United States + IBFs

Eve of crisis

By nationality of banks

US$ bn

Japan

Europe-6

Other nationalities

United States

Eve of crisis
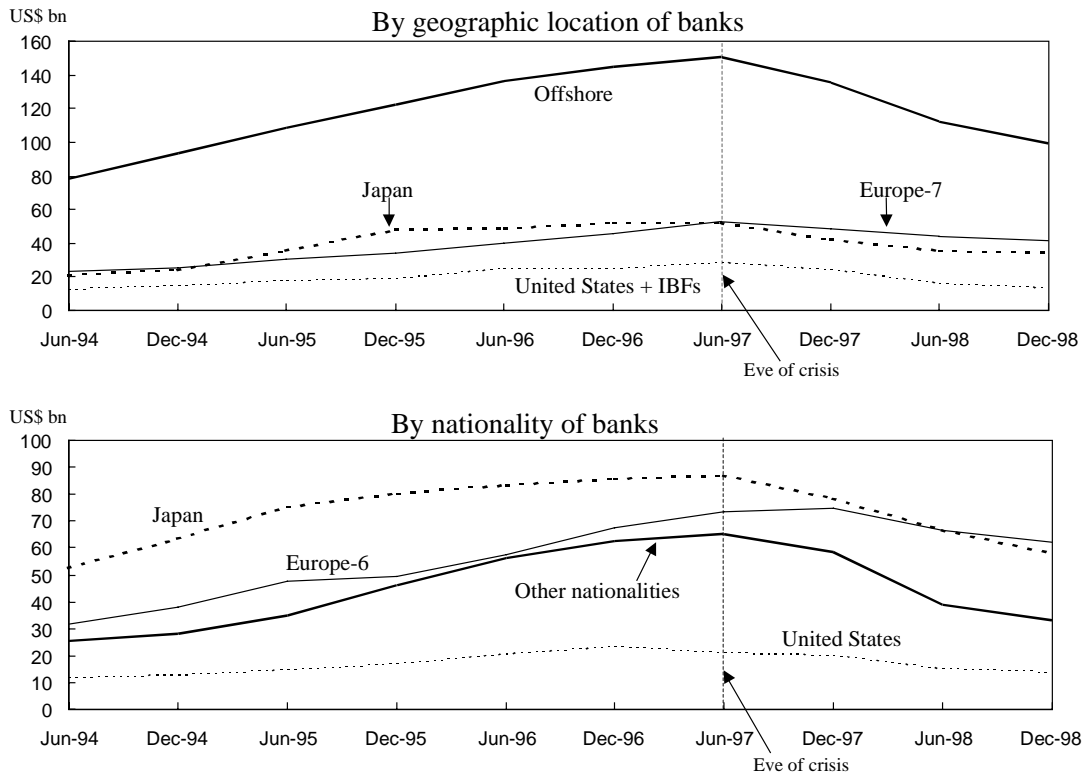
Figure 7: The Asia-4 current account versus the financial account

US$ bn

Financial account

Reserves

Current account

97:2
Eve of crisis

288
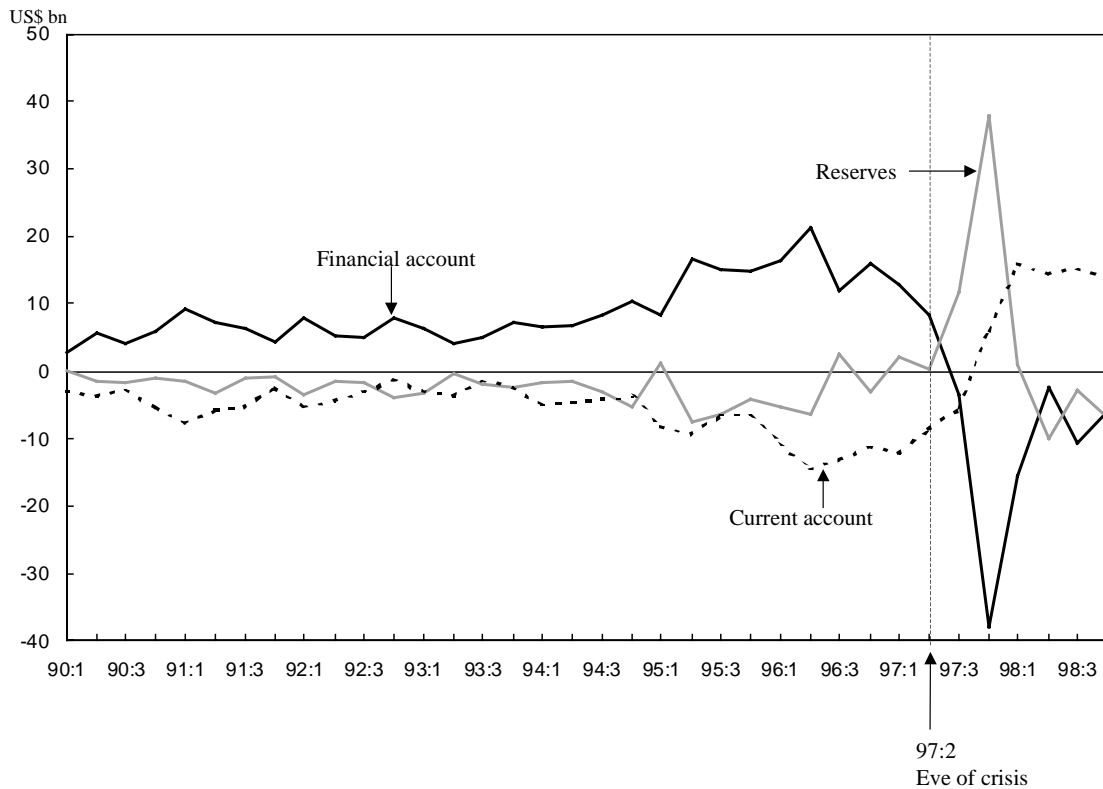
To summarize, banks played a large role in the immediate outflows from Asia. Most of the immediate outflows went to offshore center banks. The offshore center banks, in turn, played a large role in funneling these outflows to banks in Europe. Once the money reached Europe it became part of a vast pool of capital. We would expect that it is difficult to follow from there. Consequently, in the next section we focus on how the capital flows entered the United States.

3. Capital flows to the United States in the wake of the crisis

Turning our attention from the Asia-4 outflows to the US inflows, Figure 8 illustrates the seasonally adjusted quarterly current account balances of Japan, the Europe-7, the Asia-4 and the United States. The figure shows that the United States experienced a large deterioration of its current account. From 1997Q2 to 1999Q1, the quarterly US current account deteriorated by $35.1 billion. The Asia-4 current account improved by $19.7 billion during this period. Including Malaysia, the improvement was $26 billion.[8] Japan also experienced an improvement in its current account.

The figure gives the strong impression that most, if not all, of the capital outflows from Asia went to the United States. This impression is not completely warranted. Since 1991, the US current account has been trending downwards and the Europe-7 current account has been trending upwards. Because US 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. We fit a simple linear time trend to the two current accounts using the data from 1990Q1 to 1997Q2. Extrapolating forward to 1999Q1, we find that the actual Europe-7 current account was about $20 billion below trend and the actual US current account was about $25 billion below trend. Hence, relative to trend, both regions' current accounts deteriorated by similar magnitudes. This evidence, coupled with the evidence of the previous section, suggests that both the United States and Europe experienced substantial capital inflows connected to the Asian crisis.

Figure 8: Current account balance*

* Seasonally adjusted.

97:2
Eve of crisis

---
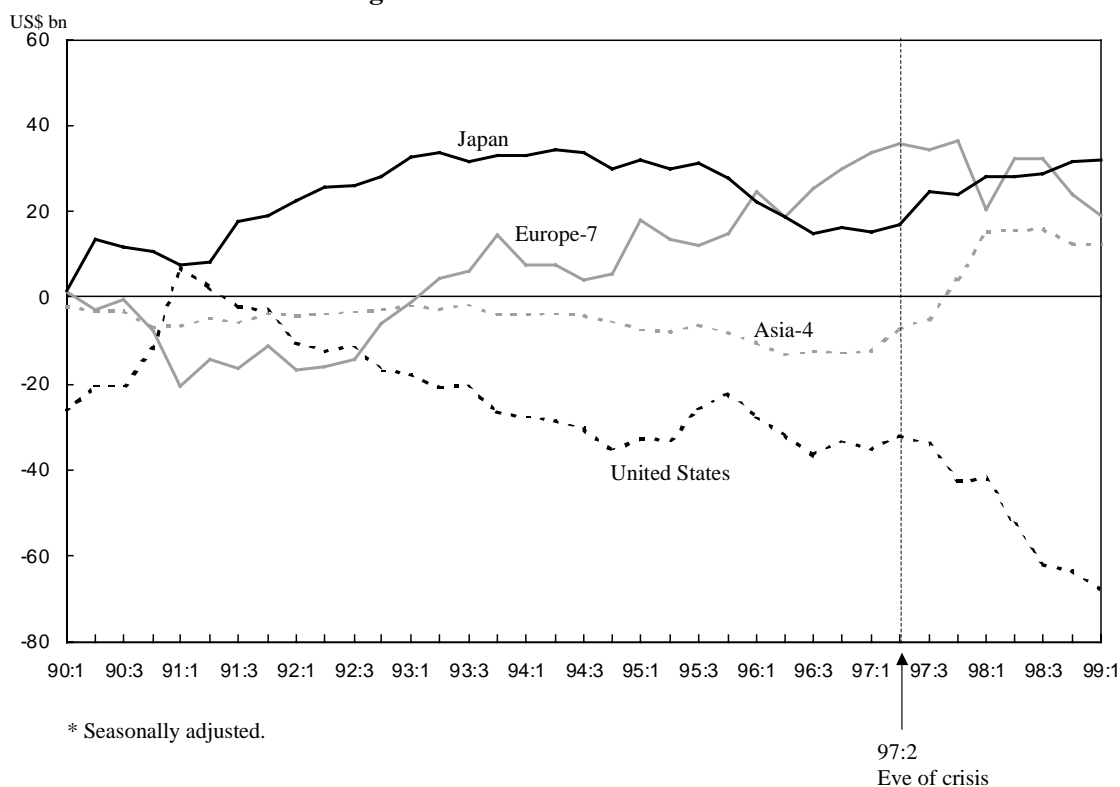
[8]   The Malaysia figure is for 1998Q4.

From the previous section, we also know that very little of the Asian crisis-related capital flows to the United States took the form of direct flows from the Asia-4 to the United States. This is further illustrated in Figure 9. US banks' net lending to the Asia-4 fell by about $10 billion from 1997Q2 to 1997Q4, but the reduction in net lending was relatively short-lived as negative net lending was less than $2 billion from 1998Q1 onwards. By contrast, total net US capital inflows averaged $68 billion quarterly between 1997Q3 and 1998Q4. Figure 9 also illustrates net portfolio flows during this period. The portfolio flows include both long-term portfolio flows and changes in the holdings of US Treasury bills by the Asian countries. Interestingly, the portfolio flows move in the opposite direction to 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 probably 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 Asian crisis, but that they reached the United States in a roundabout fashion, going through several countries before eventually ending up in the United States. To the extent that these flows were intermediated through banks, we would expect to see a surge in net flows to US banks (or equivalently, a decrease in net external lending by the US banks). The top panel of Figure 10 shows that this was not the case. While inflows to the United States increased by about $40 billion in 1997Q4, there was an equally large outflow in 1998Q1. The cumulative net inflow over the entire period between 1997Q3 and 1998Q4 was only $8.4 billion. The bottom panel of the figure breaks down the net lending by region (Europe-7, offshore and Japan). Although there was an increase in net flows from Japan to US banks from the beginning of the crisis, there was also a similarly large increase in net flows from US 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 US banks. Other intermediation channels exist. European banks, for example, could have shifted lending from Asia to local institutions, which could then have used the money for foreign direct investment or portfolio investment in the United States. Indeed, cumulative net inflows to the United States from 1997Q3 to 1998Q4 associated with foreign direct investment and portfolio investment were $326.9 billion. Of course, given the large US current account deficits, a substantial portion of these flows would have occurred anyway.

A key difficulty with using the US balance of payments data is that errors and omissions (the statistical discrepancy) were very large and volatile subsequent to the crisis. Between 1997Q2 and 1998Q4, cumulative errors and omissions were –$92.6 billion, implying that net capital inflows were $92.6 billion less than actually reported during this period.[9] Also, from 1997 to 1998, net errors and omissions rose by $152.7 billion, suggesting that actual capital inflows increased by $152.7 billion more than reported. Because the current account deficit increased by $76.7 billion from 1997 to 1998, capital inflows should have shown a similar increase. Instead, reported capital inflows showed a decrease of $70.8 billion.

Figure 11 shows that changes in net errors and omissions were also very important in many of the key quarters. For example, in 1997Q4 the United States experienced a net capital inflow of $114 billion dollars, an increase of about $40 billion from the previous quarter. The current account deficit was $41 billion, a $4 billion decrease over the 1997Q3 deficit. The errors and omissions of –$73 billion thus represented a change of –$44 billion relative to the previous quarter. This suggests that the increase in US capital inflows in 1997Q4 might not have happened. Similarly, the data show a sharp drop in capital inflows in 1998Q1, but this drop is again offset by a movement in errors and omissions in the opposite direction. There are several other episodes, such as during the Mexican crisis in 1994 and 1995, where changes in errors and omissions are of the opposing sign to changes in the financial account. It is difficult to infer much from the US capital flows data.

---

[9] This 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 accurately represented.

Figure 9: Net lending of the United States to the Asia-4*

US$ bn

Net portfolio flows

Net bank lending

90:1 90:3 91:1 91:3 92:1 92:3 93:1 93:3 94:1 94:3 95:1 95:3 96:1 96:3 97:1 97:3 98:1 98:3 99:1

* Exchange rate-adjusted flows.

97:2
Eve of crisis
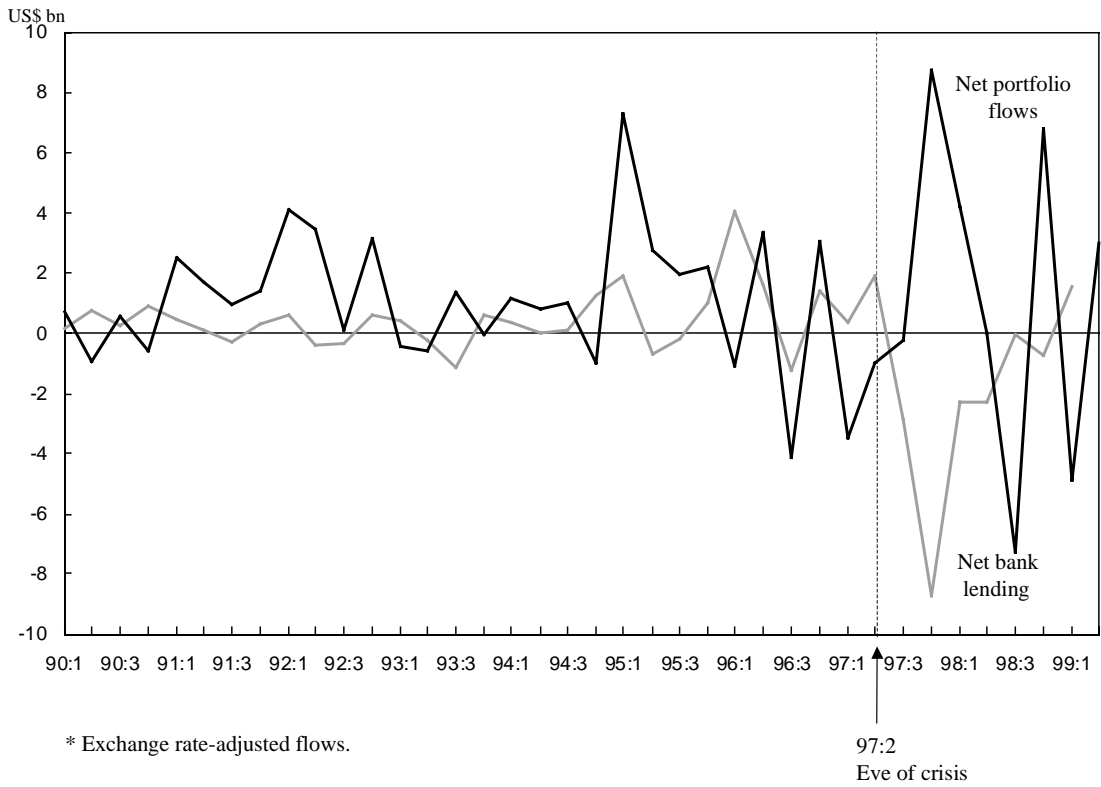
Figure 10: Net lending by US banks*

US$ bn

To BIS reporting countries

90:1 90:3 91:1 91:3 92:1 92:3 93:1 93:3 94:1 94:3 95:1 95:3 96:1 96:3 97:1 97:3 98:1 98:3 99:1

Eve of crisis

US$ bn

Total net lending by region

Europe-7

Offshore

Japan

90:1 90:3 91:1 91:3 92:1 92:3 93:1 93:3 94:1 94:3 95:1 95:3 96:1 96:3 97:1 97:3 98:1 98:3 99:1

Eve of crisis

* Exchange rate-adjusted flows.

291
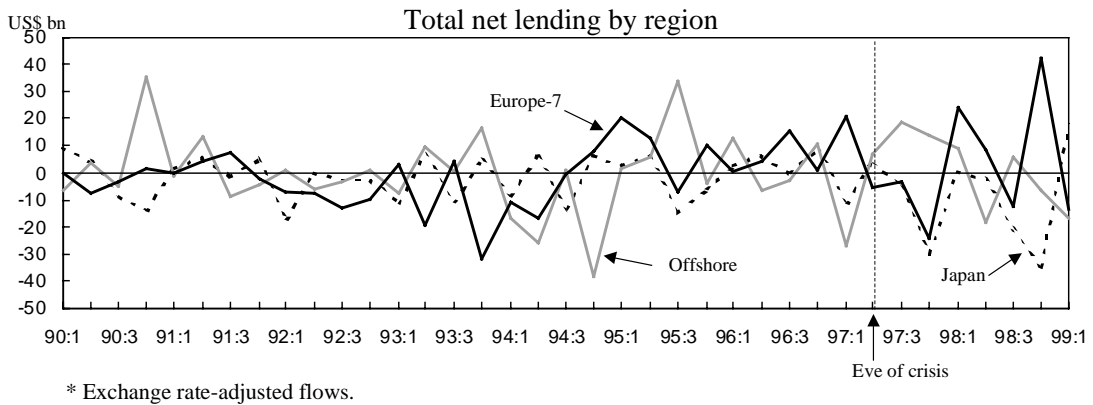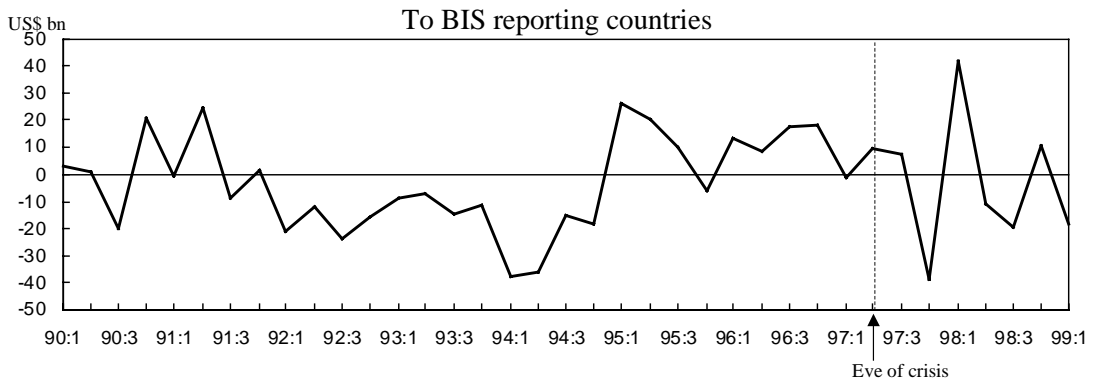
Figure 11: US balance of payments*

US$ bn

Financial account

Net errors
& omissions

Current account

* Not seasonally adjusted.

97:2
Eve of crisis

Figure 12: Euro/$ and Yen/$

Euro/$

Yen/$

Yen/$

Euro/$

97:2
Eve of crisis

292
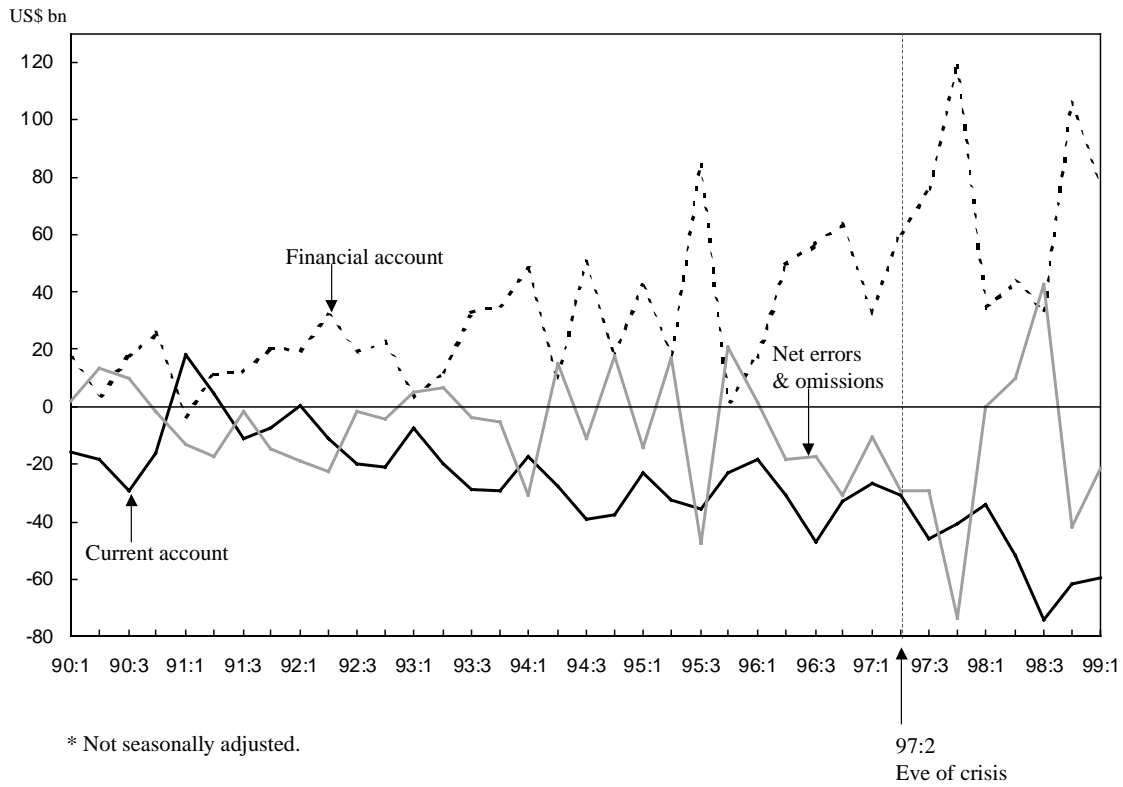
Figure 13: Interest rate differentials

Three-month money market rates

Per cent

Ten-year government bond yields

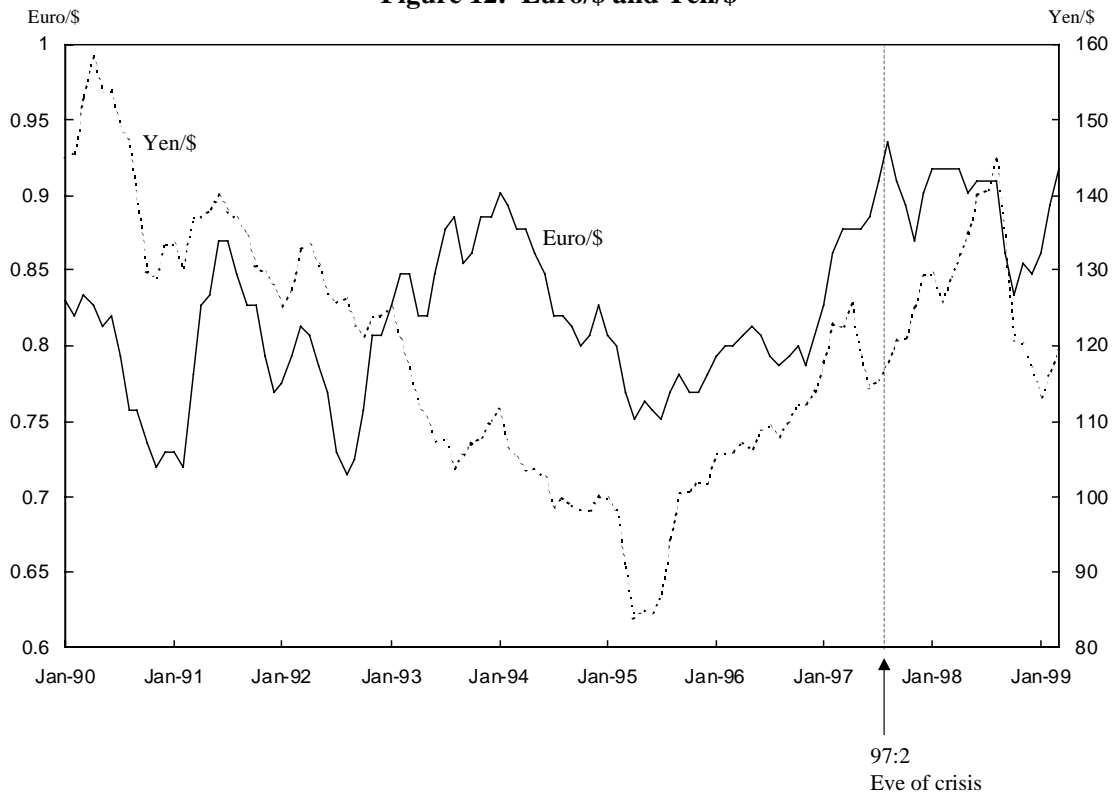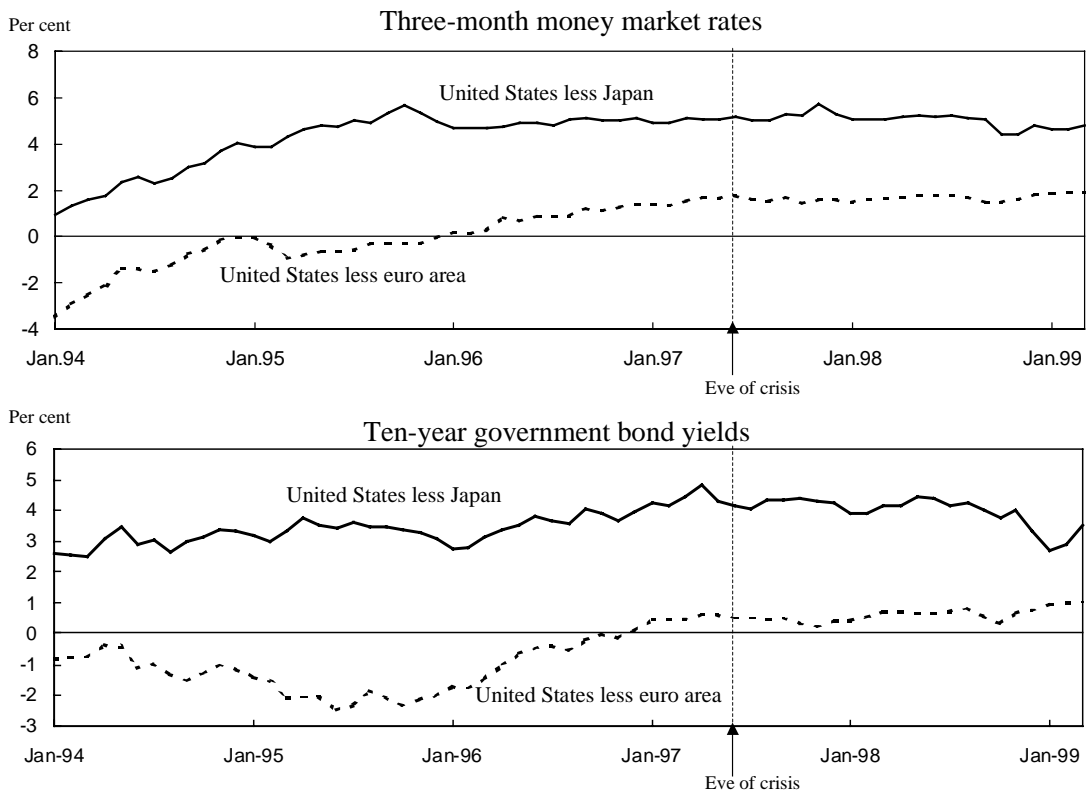Per cent

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 time of crisis. Two simple implications arise from the safe haven scenario. First, we would have expected the dollar to have significantly appreciated against other industrialized country currencies and, second, we would have expected the US interest rate to have dropped relative to those in other industrialized countries. Figures 12 and 13 show that neither implication is the case. The dollar did 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-Asian crisis levels. The euro/dollar rate was fairly stable in the first five quarters after the crisis. Both short-term and long-term interest rate differentials showed no sign of change either. This evidence suggests that there was not a significant safe haven effect in response to the Asian crisis. This evidence is also consistent with our earlier evidence that both the United States and Europe experienced large capital inflows connected to the Asian crisis.

4.   Did the United States GDP increase?

As discussed in the introduction, there are at least three important channels through which the crisis in the Asian emerging markets could have affected the US economy:

1. Net export demand channel (negative)

2. Domestic demand channel (positive)

3. Supply channel (positive)

The outflow of capital from the Asian emerging markets leads to an appreciation of the dollar and a recession in the affected countries. Both forces lead to a reduction in US net exports (channel 1). Second, to the extent that the capital that is pulled out is reinvested in the United States, it can be used

to finance an increase in US consumption and investment (channel 2). In the process, US interest rates are likely to fall. Finally, the dollar appreciation and the emerging markets' recessions lead to lower US import prices for intermediate and capital goods, which exerts a positive supply effect (channel 3).

These three effects are obviously interrelated. The capital inflow that leads to a lower interest rate also leads to the exchange rate appreciation that is responsible for lower exports. Moreover, supply must equal demand, so that the third channel cannot be examined in isolation from the other two. We begin with a miniature model that illustrates the forces at work within the context of equilibrium in the goods market and the balance of payments. For illustrative purposes, the model is extremely simple. However, we argue that the model's implications generalize under a variety of extensions. After discussing the model, we record that the evidence is broadly consistent with the model, and then we quantify the effect on GDP growth of each of the three channels. In the quantification, we make only minimal assumptions, much less strong than those of the model (and even its generalizations).

4.1 A miniature model

The model is illustrative and is designed to capture the essence of the response to the capital inflows. The open economy, which can be thought of as either the United States or all non-Asian crisis countries, is characterized by two equations:

(1) $$Y^s(R\overset{+}{E}R) = DD(\bar{r}) + NX(R\bar{E}R)$$

(2) $$NX(R\bar{E}R) + KA(\overset{+}{r}, \overset{+}{\gamma}) = 0$$

where Y^s = supply = GDP, DD = domestic demand, NX = net exports, KA = capital account (net capital inflows), RER = real exchange rate, r = real interest rate, and γ = a balance of payments shift variable. The first equation represents goods market equilibrium, while the second represents balance of payments equilibrium. In equation (1), the supply of goods is written as a positive function of the real exchange rate. A real appreciation (rise in RER) implies that the prices of imported inputs fall, which has a positive supply effect. Supply is equated to demand, which is the sum of domestic demand and net exports. Domestic demand decreases in response to a rise in the real interest rate, and net exports decrease in response to a real exchange rate appreciation.

Equation (2) represents balance of payments equilibrium. Net exports plus net capital inflows must be equal to zero. Net capital inflows are written as a positive function of the real interest rate. They also depend on the shift variable γ, which corresponds to an (autonomous) demand for US (and other industrialized country) assets. We model the start of the Asian crisis as an increase in γ, that is, a desired shift in capital from the Asian countries to the United States and other industrialized countries. For our purposes, it is not important to know the exact cause of this desired reallocation of capital; we can think of the cause as a general decline in financial and macroeconomic conditions in the crisis countries.

This simple model is diagramatically represented in Figure 14. The top diagram represents goods market equilibrium. Output is on the y-axis and the real exchange rate is on the x-axis. The demand schedule is drawn for a given interest rate. The bottom diagram represents balance of payments equilibrium (equation (2)). The reallocation of capital to the United States (or non-Asian countries in general) – represented by an increase in γ – leads to a downward shift in the balance of payments equilibrium schedule. At a given real exchange rate, the new balance of payments equilibrium is reached at a lower interest rate. This lower interest rate leads to an increase in demand, shown by a rightward shift in the demand curve in the top diagram. Output increases and the real exchange rate appreciates. The figure illustrates the pre-crisis and post-crisis levels of output, interest rate and real exchange rate.

The figure also permits a clean decomposition of the domestic demand and net export demand effects. The distance AC captures the increase in domestic demand engendered by the lower interest rate, while BC captures the reduced net exports caused by the real appreciation (corresponding to a

movement from *C* to *D* along the demand curve). The net effect on output is equal to the distance *AB* and is positive. This corresponds to the increase in supply as a result of the drop in the relative price of imported inputs (movement from *A* to *D* along the supply curve).

The model can easily be extended in two ways. First, it is likely that domestic demand depends positively on income $Y = Y^s$, while net export depends negatively on income. A rise in income raises

**Figure 14: Diagrammatic representation
of the model**
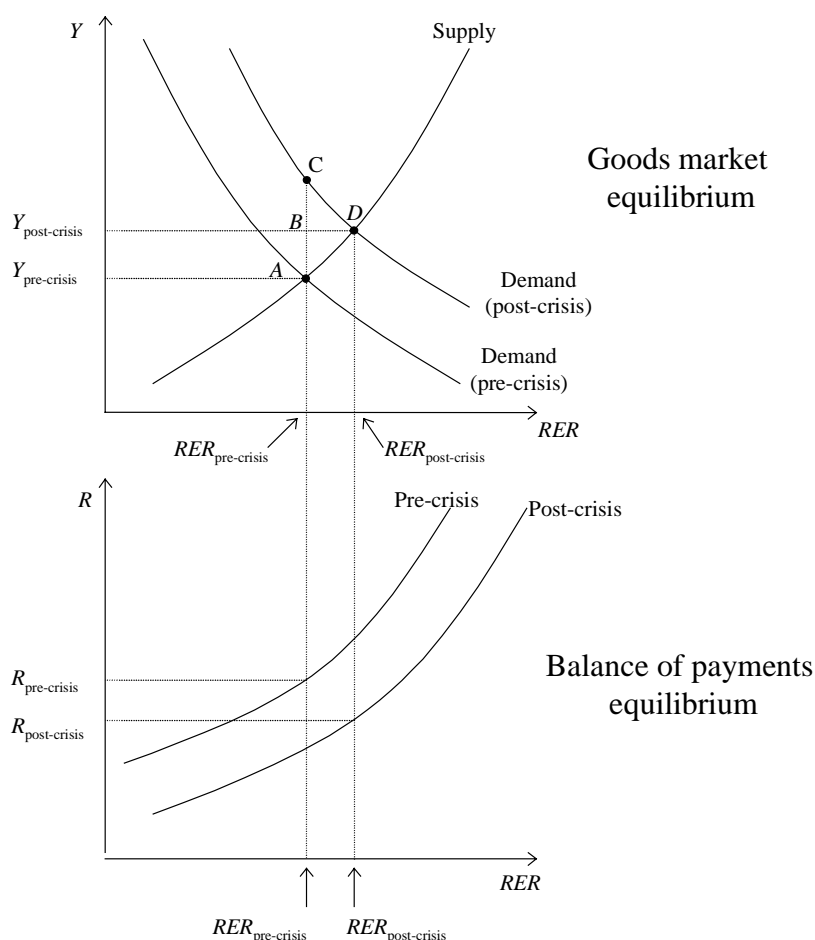
AC = Rise in domestic demand due to lower interest rate
BC = Drop in net exports due to real appreciation
AB = Net positive effect on output

import demand, which lowers net exports. In that case $DD = DD(\bar{r}, \overset{+}{Y})$ and $NX = NX(R\bar{E}R, \bar{Y})$. Such an extension eliminates the clean decomposition of the two demand effects, but it does not change the conclusions. The reallocation of capital resulting from the increase in γ still leads to a decrease in the interest rate, a real appreciation, and a rise in output.

Another extension would be to include foreign income (and output) Y^*. As mentioned before, the capital outflow from Asia led to a recession in these countries, which led to a drop in US net exports. In order to appropriately include for Y^*, we need to model the Asian countries as well. The world now consists of the United States (or non-Asian countries in general) and the Asian crisis countries. The latter are denoted by an asterisk ($*$). The extended model is displayed in Box I. Three changes are noteworthy relative to the two-equation miniature model. First, there is an additional equation, which is the foreign goods market equilibrium condition (and the foreign interest rate is the third endogenous

variable). Second, net exports depend on both domestic and foreign income, while domestic demand depends on domestic income. Finally, capital flows depend on the interest rate differential. One can easily check that this model generalizes the conclusions reached from the miniature model discussed above. The rise in γ still leads to a decrease in interest rates in the home country, real appreciation of the home currency and a rise in home output. The model now also has implications for the foreign country (the Asian crisis region). Its real interest rate will rise and output will decline.

<div style="border:1px solid">

Box I
A two-country equilibrium model

Domestic goods market equilibrium
$$Y(R\overset{+}{E}R) = DD(\overset{-}{r}\overset{+}{Y}) + NX(R\overset{-}{E}R, \overset{-}{Y}, \overset{+}{Y}*)$$

Foreign goods market equilibrium:
$$Y*(R\overset{-}{E}R) = DD*(\overset{-}{r}*, \overset{+}{Y}*) - NX(R\overset{-}{E}R, \overset{-}{Y}, \overset{+}{Y}*)$$

Balance of payments equilibrium:
$$NX(R\overset{-}{E}R, \overset{-}{Y}, \overset{+}{Y}*) + KA(r \pm r*, \overset{+}{\gamma}) = 0$$

</div>

4.2 Evidence on the three channels

In this section, we examine several macroeconomic indicators that provide evidence on the three channels. Figures 15 to 21 show that the evidence is broadly in line with the model.

The negative trade channel is illustrated in Figures 15 and 16. Figure 15 shows the real exchange rate of the dollar against a GDP-weighted average of the Asia-4. We used GDP deflators as proxies for the price levels. The figure shows a 40% real appreciation of the dollar from the second quarter of 1997 to the first quarter of 1998. 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. Figure 16 shows that US merchandise net exports to the Asia-4 fell from about $2 to 3 billion per quarter before the crisis to $–5 to –7 billion per quarter soon after the crisis. Summing over the four quarters preceding the crisis (1996Q3–1997Q2) 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 China (mainland), Hong Kong, Malaysia and Singapore, US net merchandise exports fell by $46 billion after the crisis. Figure 16 also shows that the United States was not alone. Net exports from Japan and Europe to the Asia-4 also fell considerably following the crisis.

Figures 17–19 provide evidence that the second channel was important. Figure 17 shows that, with the exception of very short-term rates, interest rates fell considerably following the crisis. The 30-year fixed mortgage rate fell by 150 basis points from the middle of 1997 to early 1998, followed by a further drop during the course of 1998 to reach its lowest level in 30 years. The yield on Moody's Aaa-rated corporate bonds fell by a similar magnitude, while the 10-year government bond yield fell by even more. Figure 18 shows that the drop in mortgage rates lead to a sharp increase in mortgage refinancing. A significant fraction of the mortgages refinanced during 1998 involved cash-outs, increasing the overall size of the mortgage.

Our model implies that we would expect to see a drop in the contribution to GDP growth coming from net exports (channel 1), while we would expect to see a rise in the contribution to GDP growth from domestic demand. Figure 19 illustrates that this is exactly what happened. While the GDP growth rate in 1998 (Q/Q–4) remained unchanged at 4%, the contribution from domestic demand rose from about 4% pre-crisis to about 5% post-crisis. At the same time, the contribution from net exports fell from slightly negative to about –1%. Figure 20 shows that the United States was not alone as Europe underwent a similar response to the crisis. We have separated the Europe-6 from the United Kingdom.

Figure 15: Asia-4/US GDP-weighted real exchange rate

1997:2 = 100

Note: Real exchange rate is P/eP^*, where P and P^* are the GDP-weighted GDP deflators of the Asian countries and the US GDP deflator respectively, and e is the nominal exchange rate. GDP weights are 1994-96 average GDP shares.

97:2
Eve of crisis
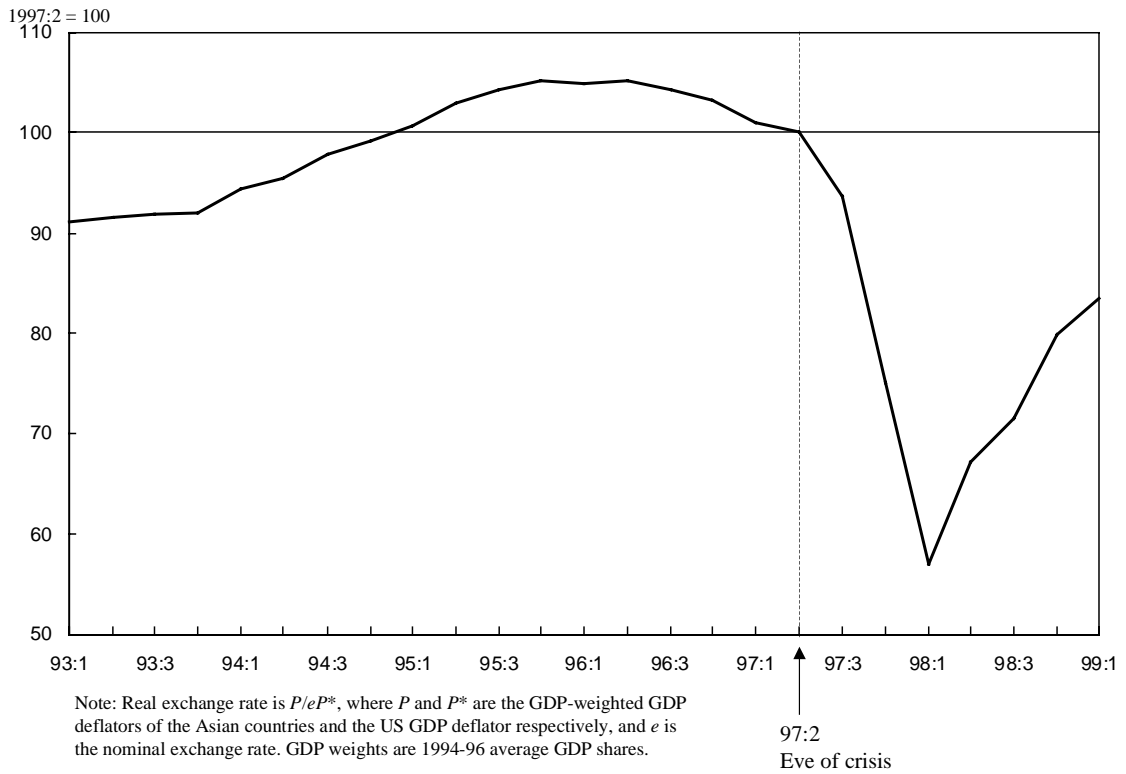
Figure 16: Net exports to the Asia-4

US$ bn

97:2
Eve of crisis

297
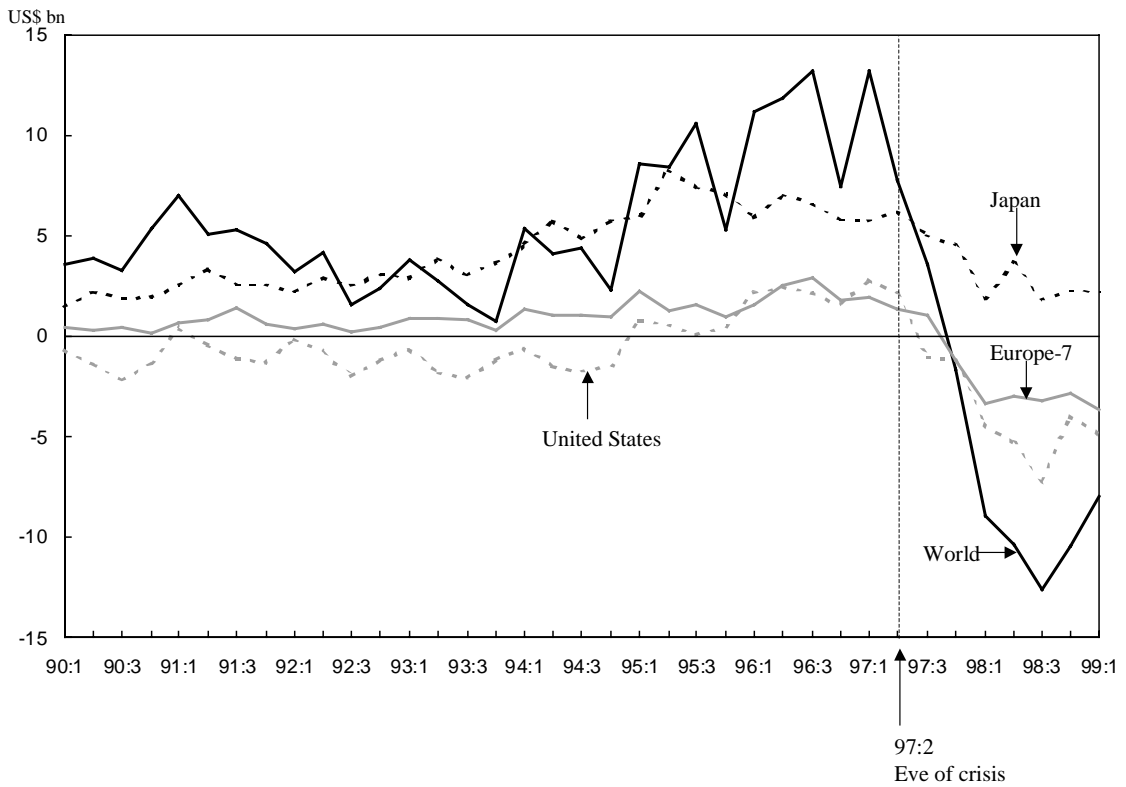
Figure 17: US interest rates

Per cent

97:2
Eve of crisis
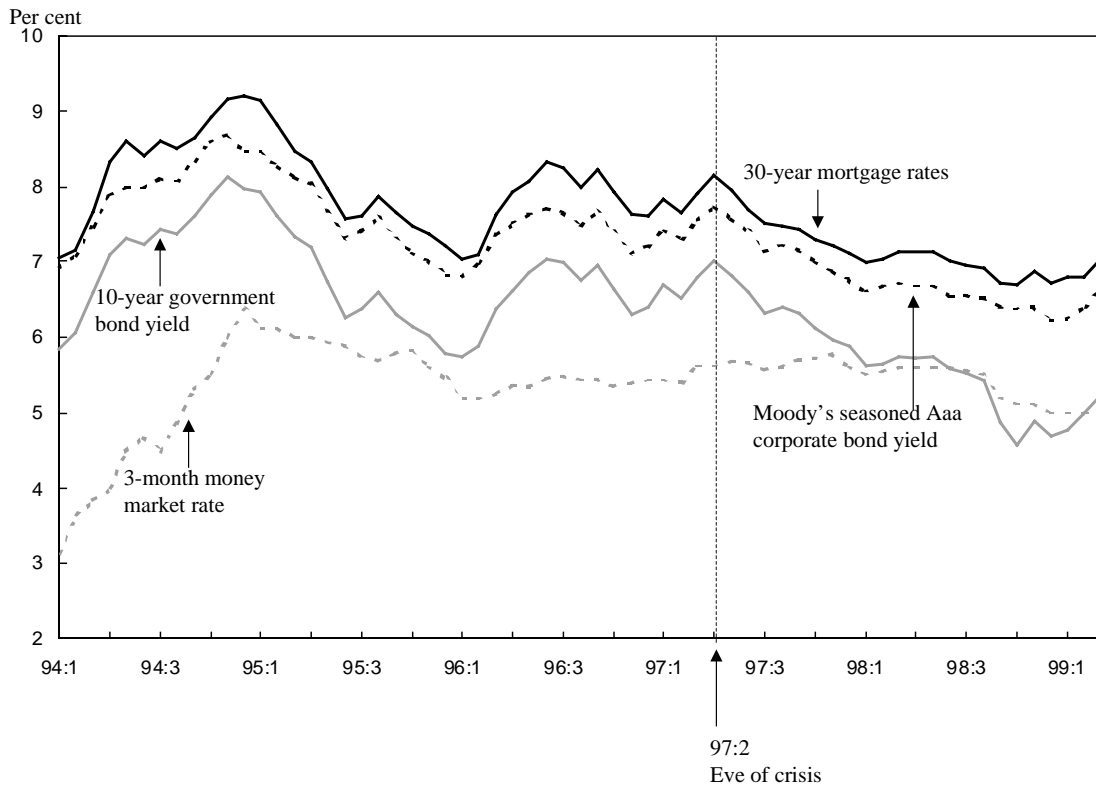
Figure 18: United States mortgage refinancing

16 March 1990 = 100

Source: Mortgage Banker's Association.

June 1997
Eve of crisis

298
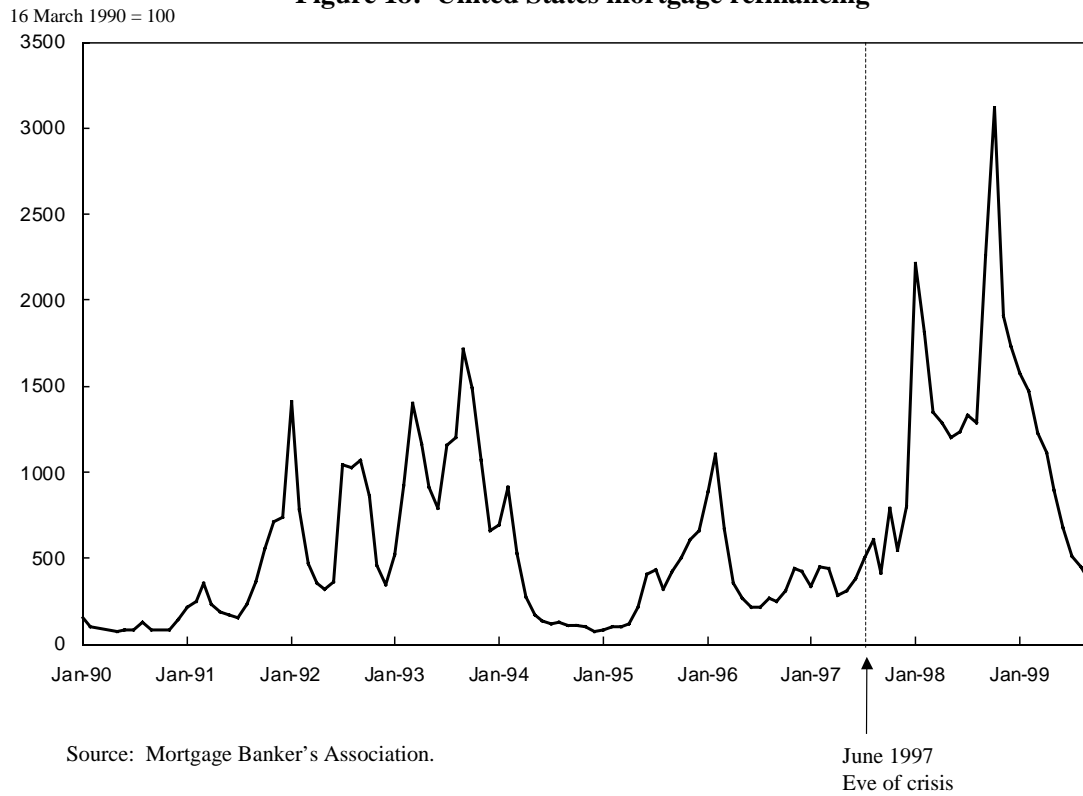
Figure 19: Composition of US growth

4-quarter % change

Contribution of
domestic demand

Real GDP growth

Contribution of net exports

91:1 91:3 92:1 92:3 93:1 93:3 94:1 94:3 95:1 95:3 96:1 96:3 97:1 97:3 98:1 98:3 99:1

97:2
Eve of crisis
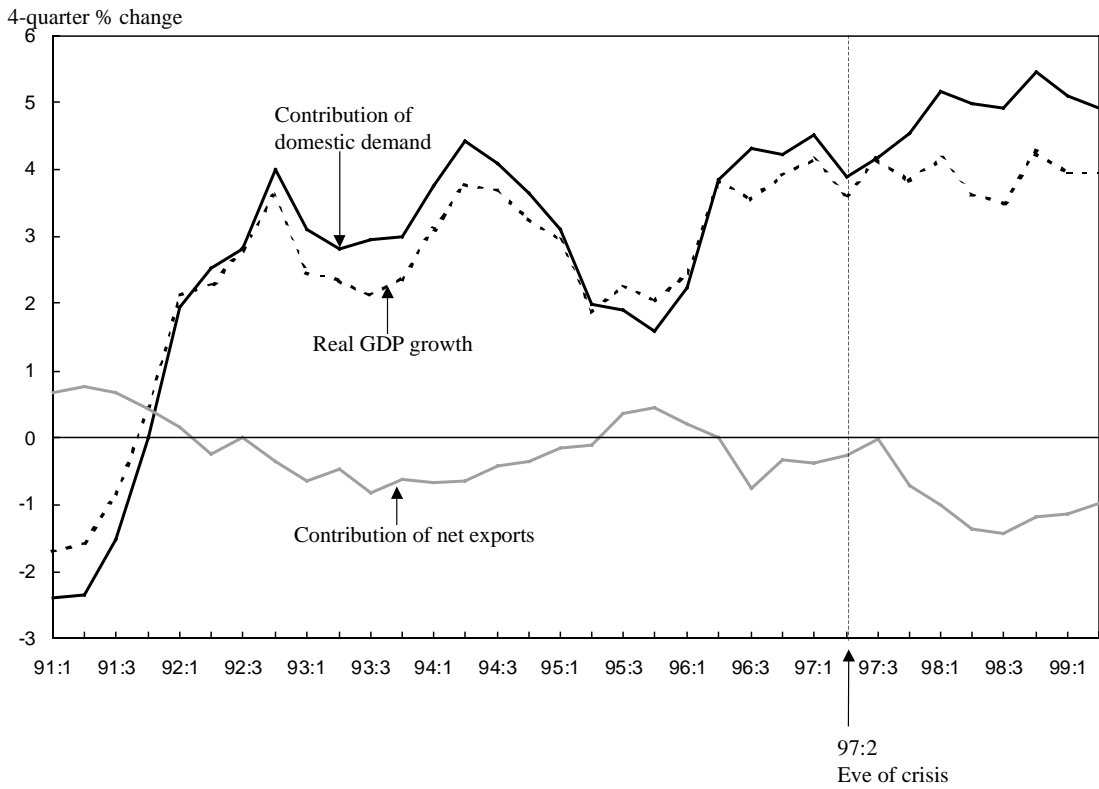
Figure 20: Composition of European Growth

4-quarter % change

Europe-6

Real GDP growth

Contribution of
domestic demand

Contribution of
net exports

92:1 92:3 93:1 93:3 94:1 94:3 95:1 95:3 96:1 96:3 97:1 97:3 98:1 98:3 99:1

Eve of Crisis

4-quarter % change

United Kingdom

Contribution of
domestic demand

Real GDP
growth

Contribution of net exports

92:1 92:3 93:1 93:3 94:1 94:3 95:1 95:3 96:1 96:3 97:1 97:3 98:1 98:3 99:1

Eve of crisis

299
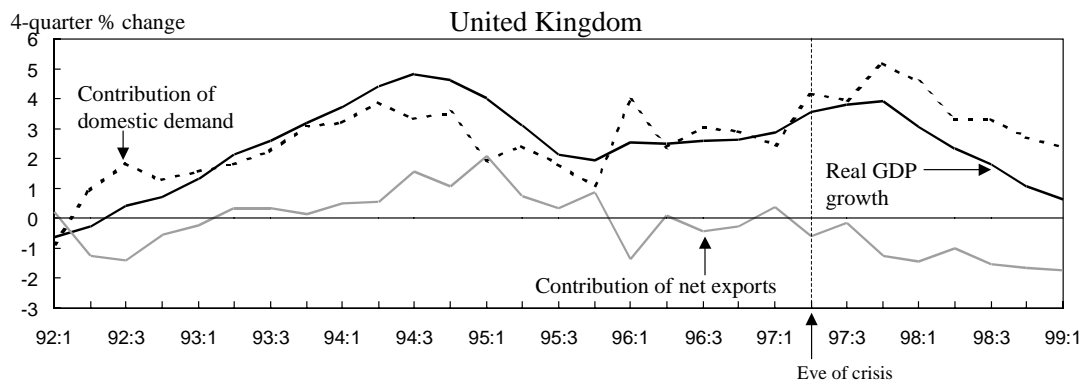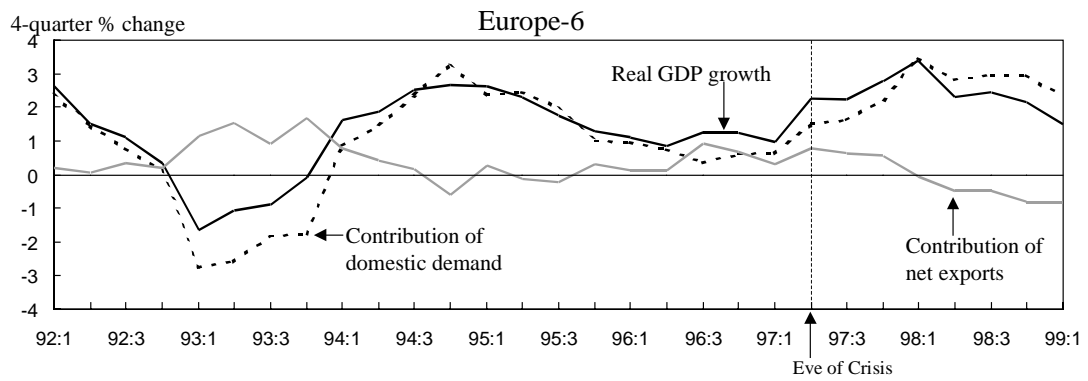
The United Kingdom is a special case because significant fiscal consolidation and a tightening of monetary conditions dampened domestic demand growth. For the Europe-6, we see that the contribution of domestic demand growth rose from about 1% pre-crisis to a level between 2% and 3% post-crisis. At the same time, the contribution of net exports to GDP growth fell from slightly below 1% to slightly above –1%.

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; the next section derives the elasticity of supply. Figure 21 shows the import price index for total imports, and for merchandise imports from the Asia-4 and the Asia-8.[10] All import price indices are shown relative to the US GDP deflator, and are indexed to 100 in 1997Q2. The Asia-8 index represents a broader view of the impact of the Asian crisis on US import prices. The import price indices show a sharp decrease for both sets of countries. From the pre-crisis period 1996Q3–1997Q2 to 1998, the relative import price index dropped by 18% for the Asia-4 and 12% for the Asia-8.[11]

**Figure 21: Real US import price indexes,
relative to GDP deflator***

1997:2 = 100

From Asia-4

From Asia-8

Overall index

* Seasonally adjusted.

97:2
Eve of crisis
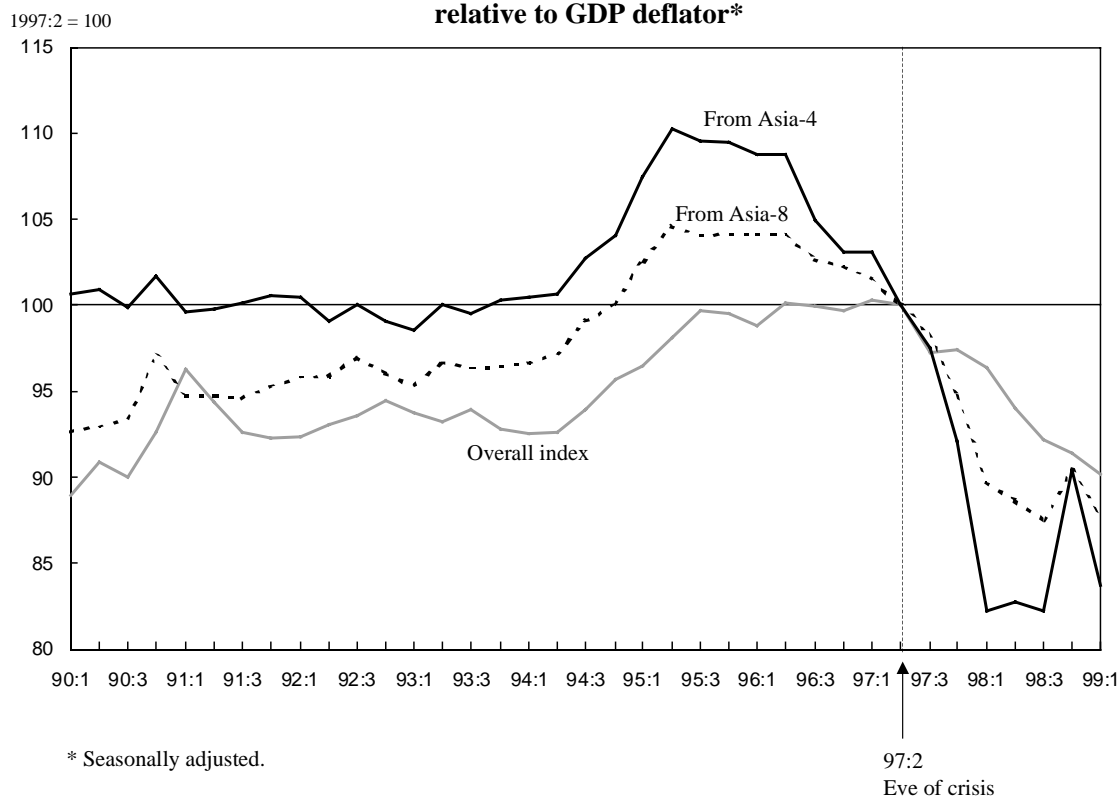
4.3   Quantifying the three channels

We now attempt to quantify the effect on GDP growth of each of the three channels. In so doing, we impose only minimal assumptions, in contrast to the strong structure imposed by the model. We can estimate the trade effect without making any model-specific assumptions. By directly examining bilateral trade data, we can estimate how much the contribution to US GDP growth from net exports

---

[10]   We have proxied the US import price index from each Asian country by each country's overall export price index (expressed in US dollars).

[11]   These numbers are consistent with those reported in Barth and Dinmore (1999).

fell as a result of the Asian crisis. We do not need to know precisely what factors gave rise to the drop in net exports to the Asian crisis countries. In estimating the supply effect, we assume that firms maximize profits by choosing optimal levels of labor input and imported intermediate goods. To facilitate our calculations of the supply effect, we make three auxiliary assumptions. First, we hold the capital stock constant. This assumption is not very restrictive, because it simply reflects the fact that our analysis is short-term. Second, we assume that the real wage rate is constant. This 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. Third, we make assumptions about the production technology; these are described in detail below. The essential assumption is that firms are profit-maximizing, so that output is not simply demand-determined.

We estimate the domestic demand effect as the residual. The difference between the supply effect and the trade effect equals the domestic demand effect. It would be difficult to calculate the domestic demand effect directly. For example, we would need to know the size of the increase in capital flows to the United States that can be traced to the crisis. We would need to know the effect of these inflows on the interest rate. We would need to know 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 need to have a model of consumption behavior and of investment behavior, with its corresponding set of assumptions. Hence, by treating the domestic demand effect as the residual, we avoid making the large number of assumptions necessary to calculate it.

In computing the trade and supply effects, we consider both the Asia-4 countries and the broader set of Asia-8 countries. The advantage of looking at the broader set of Asia-8 countries is that we take into account spillovers of the crisis to some important neighboring countries. We do not consider indirect supply channels operating through oil prices or commodity prices, however. 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 effect.

We define the pre-crisis and post-crisis periods as we did above: 1996Q3–1997Q2 and 1998Q1–1998Q4. It is not appropriate to simply compare 1997 and 1998 because the crisis had already started in 1997. Another unattractive alternative would be to compare the four quarters before the crisis to the four following the start of the crisis (1996Q3–1997Q2 compared to 1997Q3–1998Q2), because the crisis did not fully take effect until 1998. As shown in Figure 16, it took two to three quarters for net exports to drop to their lower post-crisis level. As discussed in Section 2, 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 of the current account did not take place until 1998Q1.

In computing the trade effect, we focus on merchandise trade. This is a reasonable approximation because 79% of total US trade in 1998 was merchandise trade, which is also considerably more volatile than services trade. The contribution to real GDP growth of net exports can be written as

$$\frac{P_X X}{Y}\frac{\Delta X}{X} - \frac{P_M M}{Y}\frac{\Delta M}{M} = \frac{\Delta(P_X X - P_M M)}{Y} - (\frac{P_X X}{Y}\frac{\Delta P_X}{P_X} - \frac{P_M M}{Y} - \frac{\Delta P_M}{P_M})$$

where Y is nominal GDP, P_M and P_X are import and export price indices vis-a-vis the Asian countries, and X and M are quantities of bilateral exports and imports. The first term on the right-hand side 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 US export price index to the Asian countries by the overall US export price index. The import price index is approximated by an import weighted-index of the Asian country export price indices.

Box II shows details of the firms' profit maximization problem that underlies our calculation of the supply effect. Firms maximize the difference between the value of gross output and costs. The variable costs are labor costs and the costs of imported inputs. We are interested in the effect of a decrease in intermediate input prices on supply. After computing the first-order conditions for imported inputs and labor, the supply effect can be written as:

$$(3) \qquad \frac{\Delta GDP}{GDP} = \frac{\beta}{1-\beta} \frac{\alpha}{\alpha-1} \frac{\Delta(P_M/P)}{P_M/P}$$

where β is the share of imported inputs in total production costs in the pre-crisis period and α is the share of labor income in domestic valued added. P_M/P is the price of intermediate inputs relative to the price of output. Real GDP is equal to gross output minus intermediate inputs, measured at pre-crisis price levels. We compute the change in the overall P_M/P as the merchandise import share from the Asia-4 or Asia-8 multiplied by the percentage change of P_M/P for the Asia-4 or Asia-8.[12] Notice that the supply effect is independent of the elasticity of substitution between imported inputs and domestic value added. The labor income share of GDP in 1997 was 58%, so we set $\alpha = 0.58$. We set β equal to US imports of intermediate and capital goods in 1998 (about 60% of total merchandise imports) divided by the sum of those imports and US GDP. This yields approximately 0.06.

<div style="text-align:center">

Box II
Firms' decision problems:

</div>

Maximise $P\bar{Y} - WL - P_M M$

where:

$\bar{Y}$ = gross output

L = labor

K = capital = constant

M = imported intermediates and imported capital goods

P = price of imported inputs

P_M = price of imported inputs

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

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

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

The results of these computations are reported in Table 2. If we interpret the Asian crisis broadly as corresponding to developments in the Asia-8 countries, US GDP fell by 0.8 percentage points as a result of a drop in net exports to those countries, while it rose by 1.0 percentage points as a result of the increase in domestic demand. The net effect, which is also the supply effect, is +0.2 percentage points of GDP. The numbers are slightly smaller for the Asia-4. Our supply effect calculations suggest that the net effect of the Asian 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. While the lower prices of imported inputs lead to an increase in demand for imported 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% and 0.2%.[13]

Our findings correspond well with Figure 19. It shows that real GDP growth remained virtually unchanged following the crisis. The negative effect from lower net exports was almost exactly offset

---

[12] We approximate P with the GDP deflator, as in Figure 15. This is not exactly correct because P is the price of gross output. But it gives a very close approximation as β is quite small.

[13] As noted earlier, we abstract from indirect supply effects, such as those resulting from oil prices. If the decline in oil prices in 1998 were entirely attributable to declining demand in the Asia-8 countries, then the supply effect would be considerably larger, close to 1.0 percentage points of GDP.

by the rise in domestic demand. The increase in the contribution of domestic demand to GDP growth from the pre-crisis to the post-crisis period (Figure 19) was about 1.0%. Hence, the Asian crisis could have accounted for all of the increase in US domestic demand.

Table 2
Growth effect of Asian crisis

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

Notes: The table reports the contribution to GDP growth of lower trade and higher domestic demand as the result of the Asian crisis, as well as the total effect on GDP growth (which is also the supply effect). Results are reported both when thinking of the Asian crisis as narrowly associated with four countries: Korea, Thailand, Indonesia and the Philippines (Asia-4) and when it is associated with a broader set of eight countries that also includes Hong Kong, Malaysia, Singapore and China (mainland).

Other explanations have been put forward for the increase in US domestic demand during the Asian crisis. However, we believe that such alternative explanations are less plausible, particularly to the extent that they relate to US-specific developments. For example, it has been pointed out that the US stock market rise could be responsible for the recent surge in US consumption. It has also been suggested that US domestic demand increased in response to the new productivity revolution, which is ushering in an era of permanently higher GDP growth rates. Both of these stories are specific to the United States, because the continental European stock market is much smaller by comparison, and Europe is not undergoing such a productivity revolution. Any US-specific increase in domestic demand unrelated to the Asian crisis should have led to an increase in US interest rates, particularly relative to those in Europe and Japan. Moreover, we should have seen an exchange rate appreciation against the euro and the yen. Our earlier evidence showed that these events did not occur. In addition, we showed that the increase in the contribution of domestic demand to GDP growth in Europe was of similar magnitude to that for the United States. That this pickup in domestic demand on both sides of the Atlantic also occurred in exactly the same time period strongly suggests a causal link to the Asian crisis.

5.   Conclusion

In the 1990s, many emerging market countries facilitated access for foreign investors to their financial markets by liberalizing controls on international capital flows. This has had benefits for both the emerging markets and for investors from industrialized countries. But there have also been risks associated with the increased exposure of foreign investors to these new markets, because capital inflows can be easily reversed in a short period of time. Assessing the causes of the crisis and the consequences for the crisis countries themselves has been the focus of much of the literature on the Asian crisis. In this paper we shift the focus, examining the implications for industrialized countries, and for the United States in particular, of such far away economic crises.

While early in the crisis the negative trade effects for industrialized economies were emphasized, 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 of our goals in this paper, therefore, has been to follow the trail of money out of Asia in order to ascertain its final destination. We have found it difficult to follow the trail very far, and to identify exactly how much ended up in the United States. We also found that large errors and omissions in the US balance of payments complicate the documentation of capital inflows to the United States.

Several stylized facts do emerge though:

1. The Asian crisis countries experienced net capital outflows close to $100 billion from the start of the crisis to the end of 1998.

2. The counterparties to the Asian outflows were essentially BIS reporting country banks.

3. About half of the outflows went to offshore center banks.

4. About half of the outflows went to banks whose nationality was neither US, Japanese nor European.

5. Very little money reached the United States directly from the crisis countries or through the offshore centers.

6. Most of the outflows from the Asian crisis countries, as well as from Japan, did eventually reach both the United States and Europe, probably through channels other than banks.

These facts highlight the importance of banks as the initial propagation mechanisms of the Asian crisis, as well as the "roundaboutness" of the banking flows. One extension for future research is to explore why banks played such a role.

The second goal of the paper was to analyze and quantify the short-run effect on US GDP growth. We identified three channels through which US growth was affected. First, the recessions in the Asian countries and depreciated Asian currencies imply fewer US exports and more US imports. Second, the lower US interest rates that are the result of the increased inflows imply greater domestic demand. Third, appreciation of the dollar implies lower prices for imported intermediates and imported capital goods, reducing the cost of production. Our calculations that quantify these effects suggest that the negative trade response is –0.8% of GDP, while the positive supply response is +0.2% of GDP. These two responses imply that the domestic demand response is about +1.0% of GDP. Thus, the overall effect on the US economy in 1998 is about +0.2% of GDP, or $15–$20 billion.

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

Appendix

Figure 1: Sum across Korea, Thailand, Indonesia and the Philippines (henceforth known as the "Asia-4") of the "financial account" as reported by the IFS. The IFS did not yet report the Korean financial account in 1998Q4, so the "financial account" from McGraw-Hill's DRI Asia CEIC database is used for Korea.

Figure 2: Sum across the Asia-4 of "portfolio investment (liabilities +assets)", "direct investment abroad + direct investment in rep. econ =", and "other investment (liabilities + assets)" in the IFS. Due to missing 1998Q4 Korean data, the CEIC database is used to complete the "balance of direct investment", "balance of portfolio investment", and "balance of other investment" series.

Figure 3: Exchange rate adjusted flows, assets minus liabilities (including non-bank), as reported in the BIS block M database. Vis-à-vis area is the Asia-4 and the reporting area "grand total" of BIS reporting countries.

Figure 4: Exchange rate adjusted flows, assets minus liabilities (including non-bank), as reported in the BIS block M database. Vis-à-vis area is the Asia-4, while reporting areas are Japan, Offshore, United States + IBFs and Europe-7 = United Kingdom + Germany + France + Italy + Netherlands + Spain +Switzerland (henceforth known as the "Europe-7").

Figure 6: The top chart shows the stock of total assets vis-à-vis the Asia-4 with geographical origin of a bank being the reporting area. BIS block M is the source. The bottom chart also shows the stock of total assets vis-à-vis the Asia-4, but by nationality of ownership. These data come from the publication "The BIS Consolidated International Banking Statistics". Due to data unavailability, Switzerland is left out of the Europe series in the bottom chart.

Figure 7: "Financial account" series are the same as that from Figure 1. Other series: sum across the Asia-4 of "reserves and related items" and "current account" as reported by the IFS. The IFS did not yet report the Korean financial or current account in 1998Q4, so 1998Q4 data for the Korean current account come from Bank of Korea External Economic Indicators, Table P.F.2b, while "changes in reserve assets" from the CEIC database was used for Korea for that quarter.

Figure 8: With some exceptions in the most recent quarters, current account balance data for Germany, France, the Netherlands, the United Kingdom, Switzerland and Spain are from the BIS; Italian data are from the Bank of Italy; Japanese, US, Korean, Philippine, Thai and Indonesian data are from the IFS. The exceptions are: Spanish current account in 1999Q1 is from Bloomberg; Korean numbers for 1998Q4 and 1999Q1 come from JP Morgan International Data Watch, as does the Indonesian value for 1999Q1. Data from the BIS are converted to US dollars using period average exchange rates. All series are seasonally adjusted using the X11 additive filter in Eviews 3.0.

Figure 9: The "net bank lending" series is the same as in Figure 4. The "net portfolio flows" series is derived from Treasury International Capital (TIC) data. Long-term net sales by foreigners to US residents are calculated from the TIC table "US Transactions with Foreigners in Long-Term Securities". Short-term treasury obligations from the TIC table "Liabilities to Foreigners Reported by Banks in the United States" are also included. Quarterly data are calculated using monthly sums.

Figure 10: These data are exchange rate adjusted flows, assets minus liabilities (including non-bank), as reported in the BIS block M database. The top chart is the United States + IBFs reporting vis-à-vis all BIS reporting countries, while the bottom chart is the United States + IBFs reporting vis-à-vis Japan, Offshore and the Europe-7.

Figure 11: US "financial account", "current account" and "net errors and omissions" are from the IFS.

Figure 12: Exchange rates are monthly averages of the daily BIS series QBCAXM02 and QBBAJP02.

Figure 13: All data are from the European Central Bank's website at http://www.ecb.int/stats/mb/eastats.htm. The top chart data are three-month deposit rates for the

United States, Japan and euro area from Table 3.1. The bottom chart data are 10-year government bond yields for the United States, Japan and euro area from Table 3.2.

Figure 15: Quarterly average exchange rates for the Asia-4 are from the IFS. GDP deflators are calculated using nominal and real GDP series from the CEIC database. After indexing all series to 1997Q2 = 100, a GDP-weighted (1994–96 average GDP shares) average of the real exchange rates yields the Asia-4/US real exchange rate.

Figure 16: Data are from the IMF's Direction of Trade Statistics database. Asia-4 countries are the primary country, i.e. Asia-4 countries report data on exports and imports, while secondary countries are World, the United States, Japan and Europe-7 countries. To construct each series, the quantity (net exports * –1) was summed across the Asia-4 countries and across the Europe-7.

Figure 17: Three-month money market rates and 10-year government bond yields come from the European Central Bank's Euro Area Statistics Monthly Data, Tables 3.1 and 3.2, respectively (see Figure 13). The Moody's Seasoned Aaa Corporate Bond Yield series and 30-year mortgage rates series (Contract Rates on Commitments: Conventional 30-Yr Mortgages, FHLMC (%)) are both from Haver Analytics' USECON database. The money market rate is an end-of-period rate, and the other interest rates are monthly averages of daily rates.

Figure 18: This series is the refinancing index from the Mortgage Bankers' Association weekly survey. Data are seasonally adjusted and weekly observations have been converted to monthly averages.

Figure 19: 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-type dollar 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-type dollar). The "Contribution of net export" series is the difference between "Real GDP growth" and "Contribution of domestic demand".

Figure 20: For the top chart, 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, nominal domestic demand and nominal GDP series are from the BIS database, where nominal domestic demand is reported in 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 the IFS. Real domestic demand growth for the individual Europe-6 countries is from the following BIS series and corresponding countries: Italy (RHWBIT01), France (RHWBFR01), Germany (RHWBDE01), Switzerland (RHWACH01), the Netherlands (RHWBNL01), and Spain (RHWBES01). The BIS did not yet report Italy's 1998Q4 real domestic demand growth, so Bloomberg (original source is ISTAT) provided the data. Europe-6 real domestic demand growth for each quarter is constructed as the weighted average (a country's weight was the individual country's 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 was the individual country's 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 BIS series used in the construction of "contribution of domestic demand" (see above). The individual countries' real GDP data are from the following BIS series and corresponding countries: Italy (RHGBIT01), France (RHGBFR01), Germany (RHGBDE09), Switzerland (RHGACH01), the Netherlands (RHGBNL01), Spain (RHGBES01). Italy's 1998Q4 real domestic demand is from Bloomberg (original source is ISTAT).

For the bottom chart, 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, nominal domestic demand and nominal GDP series are from the BIS, where nominal domestic demand is reported in

pounds sterling and nominal GDP in dollars. Nominal domestic demand is converted to dollars (for the purpose of summing) using IFS quarterly period average exchange rates. Real domestic demand growth is from the BIS series RHWBGB01.

UK real GDP growth is from the BIS series RHFBGB01.

In both charts in this figure, the "contribution of net exports" series is the difference between "real GDP growth" and "contribution of domestic demand".

Figure 21: US import price indices from the Asian countries are approximated using export price indices of the Asian countries (from Oxford Economics) in dollar terms. Indices are deflated using the US GDP deflator. After calculating real import price indices from the eight Asian countries, 1995 US import shares yield weighted averages for the Asia-4 and Asia-8.

Bibliography

International Monetary Fund, *International Financial Statistics.* Various issues.

Barth, Marvin and Trevor Dinmore (1999): "Trade Prices and Volumes in East Asia Through the Crisis". Board of Governors IFDP, No. 643, August.