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SPECIAL ISSUE:
LESSONS FROM RECENT
CRISES IN ASIAN AND OTHER
EMERGING MARKETS

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Two theories of the causes of currency crises prevail in the economic literature. The first traces currency instability to countries' structural imbalances and weak policies; the second identifies arbitrary shifts in market expectations as the principal source of instability. The authors of this article contend that only a synthesis of these theories can capture the complexity of the 1997-98 Asian currency crisis. In their view, the crisis resulted from the interaction of structural weaknesses and volatile international capital markets. The authors also cite two other factors that contributed to the severity of the Asia crisis: inadequate supervision of the banking and financial sectors and the rapid transmission of the crisis across countries linked by trade and common credit sources.

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Despite predictions to the contrary, the Asia crisis had only modest overall effects on the United States. The expected surge in import volumes did not materialize and the drop in demand for U.S. exports was not enough to slow the nation's robust economy. Nevertheless, these overall effects could have masked other, larger effects in particularly vulnerable U.S. industries. To examine this possibility, the author conducts a sector-level analysis of the turmoil's impact. He concludes that, with the exception of the steel industry, imports from Asia do not compete directly with U.S. products. Accordingly, an appreciation in the dollar with respect to Asian currencies leads to consumption gains with little or no domestic pain.

Overview of the Volume

The goal of this special issue of the *Economic Policy Review* is to draw some lessons from the recent crises in Asian and other emerging markets that may benefit future decision making in the international economy. The articles in the volume, written by economists from the International Research Function and banking specialists from the Emerging Markets and International Affairs Group, are not intended to address all issues relevant to currency and banking crises. Instead, the authors use detailed data and the rigorous tools of economic theory and econometrics to explore select topics: the mechanisms for transmission of crises across countries, the role of banks in emerging markets, the price and quantity responses observed in the trade flows of the crisis countries, and the impact of emerging market crises on the aggregate and sectoral activities of industrialized countries.

In the opening article of the volume, Paolo Pesenti and Cédric Tille summarize the prevailing views on the causes of currency crises. The first generation of economic models to address these causes attributed currency instability to poor or incompatible macroeconomic policies. In this view, large or persistent fiscal deficits can be in conflict with a fixed exchange rate regime if investors anticipate that the government will ultimately resort to printing money to pay off its past debts. The second generation of models linked currency instability to self-fulfilling private sector expectations of future macroeconomic problems. If investors view a future depreciation as likely, capital outflows and lower output will cause a devaluation that validates the initial investor concern.

Pesenti and Tille then proceed to argue that both the first- and the second-generation models are inadequate for under-

standing the complexities of the Asian crisis. Specifically, the models overlook two factors that figured importantly in the 1990s: the role of the banking and financial sectors and the international transmission of crises. The authors incorporate these factors in a more synthetic view of the Asian crisis that suggests that policy weaknesses *and* self-fulfilling investor expectations were at play in the crisis. Consider, for example, a country in which a poorly supervised banking system raises investor expectations of future government spending to cover bad loans. Even though the current fiscal deficit may be small, market expectations shift toward larger future fiscal deficits, putting immediate pressure on the country's exchange rate.

A closer look at the role of the banking and financial sectors in emerging economies is provided by the second article in the volume, by B. Gerard Dages, Linda Goldberg, and Daniel Kinney. The authors begin by acknowledging the important and sometimes heated debate in emerging markets about the appropriate structure and ownership of local banking systems. Many economists maintain that opening the financial sectors of emerging market countries to foreign ownership boosts funding for domestic projects and improves the quality and pricing of financial services. Others contend, however, that foreign-owned financial institutions will destabilize domestic bank credit and crowd local institutions out of the most lucrative domestic markets.

Pursuing the theme of foreign participation, the authors observe that in the Asian countries hit hardest by the financial crisis, foreign-owned banks had few direct roles in the local economies. Yet the fact that emerging markets as a group have increasingly been opening their financial sectors to foreign

bank participation leads the authors to suggest that the experiences of these countries may provide some relevant crisis-management lessons for the future.

With this in mind, Dages, Goldberg, and Kinney narrow their focus to Argentina and Mexico—two countries with a significant foreign bank presence—and compare the behavior of foreign banks with that of domestic banks over the course of the 1990s. The authors find that foreign banks in these countries showed stronger and less volatile loan growth than domestic banks, and that diversity in bank ownership helped produce greater stability in times of crisis. Although the authors emphasize that individual bank health, rather than bank ownership per se, emerges as the most important factor in determining the growth, volatility, and cyclicity of bank credit in Argentina and Mexico, they see the effects of foreign bank participation in the financial systems of these countries as essentially positive.

A close examination of the export and import performance of the Asia crisis economies is provided in the article by Matthew Higgins and Thomas Klitgaard. The authors begin by observing that the swing from large inflows of capital in these countries to large outflows required a corresponding improvement in each country's current account balance. A review of imports and exports in dollar terms reveals that almost all of the improvement in the current accounts stemmed from lower imports.

As the authors note, however, this finding does not imply that the export activities of the crisis countries were unaffected. By breaking down the trade flows into their dollar price and volume components, the authors show that large adjustments occurred in both the import and the export trade volumes of Asian economies. Import volumes fell with the collapse of domestic demand in the wake of the crisis. At the same time, export volumes rose because demand in areas outside of Asia continued to show strong growth. The reason that dollar exports appear flat in the data is that the increase in export volume was offset by the decline in export prices in dollar terms. A similar decline in import prices accentuated the decline in imports in dollar terms.

In their examination of the price component of trade flows, Higgins and Klitgaard attach considerable significance to the fact that dollar import and export prices fell together, with both tracking world prices. This pattern leads the authors to conclude that exchange-rate-induced price changes did not play a large direct role in the improvement of the crisis countries' current account balances.

In the fourth article in the volume, Eric van Wincoop and Kei-Mu Yi analyze the effects of the Asian currency crisis on noncrisis countries. While most earlier studies of such effects

focus on how currency devaluation and economic recession in the crisis countries influence trade balances with other nations, this article explores the sharp outflows of capital that originally prompted the devaluation of the Asian currencies.

Tracking the capital flows out of Asia, the authors find that most of the capital was moved through the world banking system. More than half of the outflows went first to offshore center banks and then to banks in Europe. Although subsequent movements are more difficult to trace, van Wincoop and Yi argue that much of the capital eventually reached the United States.

The authors then assess the effects of this reallocation of capital from Asia to the United States. The flow of capital into this country contributed to lower interest rates and hence encouraged domestic demand growth. On the supply side, the appreciation of the dollar against the Asian currencies lowered the cost of imported intermediate goods, generating a positive effect on the economy similar to the effect of lower oil prices. The rise in the dollar also led, of course, to a deterioration in the U.S. trade balance. Taking all three of these effects into consideration, the authors calculate that the overall effect of the Asian crisis on the U.S. economy was small but positive. As van Wincoop and Yi observe, a narrower inquiry into the trade balance effects of the crisis would, by contrast, have underscored the negative effects of the crisis on U.S. producers.

Calculating the costs and benefits of the Asian financial crisis for an industrialized country such as the United States also involves consideration of the impact of trade adjustments on particular local industries. The final article of the volume, by James Harrigan, examines how the large devaluations experienced by Korea, Malaysia, Thailand, and Indonesia affected the traded goods industries in the United States. The author contends that U.S. exporters were largely unhurt by the devaluations. Although export sales to Asia dropped, strong domestic demand and continued exports to other foreign markets kept the crisis from significantly reducing the growth of shipments by U.S. industries.

On the import side, the drop in the price of goods produced in Asia did not, with the major exception of steel, lead to a surge in imports. This unexpected outcome holds an important lesson about the direct distributional consequences of an emerging market crisis. Because U.S. firms for the most part did not compete directly with Asian imports, they did not lose domestic sales to these goods. Instead, Harrigan concludes, the U.S. economy may have realized a net benefit from the Asian crisis, since the crisis lowered the costs of imported inputs without eroding the position of most U.S. industries relative to their major foreign competitors.

The Economics of Currency Crises and Contagion: An Introduction

- Traditional models of currency crises suggest that weak or unsustainable economic policies are the cause of exchange rate instability. These models provide a partial explanation of the Asian currency crisis, but they cannot account for its severity.
- A more comprehensive view of the turmoil in Asia takes into account the interaction of policy and volatile capital markets. Weak policy makes a country vulnerable to abrupt shifts in investor confidence; the sudden rise of investor expectations of a crisis can force a policy response that validates the original expectations.
- Two additional factors help explain the severity of the Asia crisis: inadequate supervision of the banking and financial sectors in the affected countries and the rapid transmission of the crisis through structural links and spillover effects among the countries.

The 1990s witnessed several episodes of currency turmoil, most notably the near-breakdown of the European Exchange Rate Mechanism in 1992-93, the Latin American Tequila Crisis following Mexico's peso devaluation in 1994-95, and the severe crisis that swept through Asia in 1997-98.¹ However, the economic effects of this exchange rate instability have been especially devastating in Asia. Following years of stellar performances, the crisis-hit countries of Thailand, Malaysia, Indonesia, the Philippines, and South Korea experienced a plunge in the external value of their currencies and a sudden reversal of private capital flows from June 1997 onward. Investors had poured massive amounts of funds into the Asian countries until the first half of 1997, then drastically reversed the pattern in the summer, as "hot money" flowed out at a staggering pace. The ensuing \$100 billion net capital outflow represented a sizable shock to the region, accounting for 10 percent of the combined GDP of the five crisis-hit countries.

International economists and policy analysts attempting to explain the severity of recent currency and financial crises face a major challenge. These episodes have generated considerable—and a finely balanced—debate over whether currency and financial instability can be attributed to arbitrary shifts in market expectations and confidence, or to weakness in economic fundamentals.

To advance the discussion of currency crises, this article presents an introduction to the economic analyses of the crises.

Paolo Pesenti is a senior economist and Cédric Tille an economist at the Federal Reserve Bank of New York.

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We begin by discussing the so-called first generation of models, in which crises are viewed in the literature as the unavoidable result of unsustainable policies or fundamental imbalances. Next, we survey the literature on the second generation of models, which highlights the possibility of self-fulfilling exchange rate crises. We then turn to two key aspects of recent crisis episodes that were not fully addressed in earlier models—namely, the role of the banking and financial sectors and the issue of “contagion,” which is the transmission of a crisis across countries. We conclude by proposing a synthesis of the different views and applying it to the Asia crisis. We contend that far from being mutually exclusive, contrasted approaches complement each other by painting a comprehensive picture of the recent upheavals: the fundamental imbalances stressed by first-generation models make a country vulnerable to shifts in investor sentiment; once a crisis does occur, the second-generation models explain its self-reinforcing features.

First-Generation Models: Unsustainable Economic Policies and Structural Imbalances

In the literature on exchange rate instability, one approach—often referred to as first-generation or exogenous-policy models—views a currency crisis as the unavoidable outcome of unsustainable policy stances or structural imbalances.² This view stresses that the exchange rate regime is a component of a broader policy package, and the regime can be sustained only if it does not conflict with other monetary and fiscal objectives. The ability of a country to cover its current account deficits by generating sufficient export earnings in the future is also a major factor affecting the viability of an exchange rate regime, according to the first-generation view.

Consider a country with an expansionary monetary policy and a fixed exchange rate. In this economy, the defense of the exchange rate peg will lead to a depletion of foreign reserves held by the domestic central bank. More precisely, the rate of domestic credit expansion is bound to exceed the growth in demand for the domestic currency. Agents who are accumulating excess liquidity prefer to exchange domestic currency for foreign-denominated securities or domestic interest-bearing assets. Both scenarios lead to a depreciation of the domestic currency. In the former case, pressures stem directly from increased demand for foreign securities. In the latter, domestic bond prices will rise and their yields will fall, leading market participants to sell domestic securities and buy

higher yielding foreign assets. Since the domestic central bank is committed to keeping the exchange rate fixed, it must accommodate the increased demand for foreign currency by reducing its foreign reserves. In sum, the process of domestic credit expansion translates into a loss of reserves.

At first glance, we would expect the stock of foreign reserves to fall over time. When the reserves are exhausted, the central bank would have no choice but to let the domestic currency float. A key insight of the first-generation model, however, is that the exhaustion of reserves takes the form of a sudden depletion, instead of a gradual running down of the stock. Acting in anticipation of an exchange rate depreciation, market participants liquidate their domestic currency holdings while the stock of foreign reserves held by the central bank is still relatively large. In the context of this model, a currency crisis takes the form of a speculative attack and a stock-shift portfolio reshuffling occurs as soon as agents can confidently expect a non-negative return on speculation. In such a crisis scenario, agents buy the entire stock of foreign reserves that the central bank is willing to commit to defend the fixed exchange rate. In the aftermath of the speculative attack, the central bank is forced to float the currency.

It is easy to interpret this exogenous-policy model in terms of an inconsistency between a fixed exchange rate regime and domestic fiscal imbalances. In fact, the credit expansion described above can be thought of as the result of a fiscal deficit monetization by the central bank. From this vantage point, we see that the model shows that fiscal imbalances directly contribute to a country’s vulnerability to currency crises and speculative attacks.

However, there is an important qualification to the above analysis. Since a speculative attack is triggered by the market’s *foresight* of an unavoidable depreciation, what matters for the analysis are the *future* policy stances that investors foresee, not the ones observed in the *past*. In other words, the fact that a country does not run a sizable fiscal deficit is not a legitimate reason to rule out the possibility of a currency crisis. This is because the observed fiscal balance may be a poor indicator of the effective government net liabilities. To understand this, consider a country in which there is no public deficit or debt, but whose private sector is subject to a series of shocks that threaten corporate and banking profitability. These financial difficulties may require the government to bail out troubled institutions. Bailout intervention can take different forms, but ultimately it has a fiscal nature and it directly affects the distribution of income and wealth between financial intermediaries and taxpayers. Agents observing the weaknesses of the private sector can see that the government will be forced to adopt an expansionary monetary stance in the future to

finance the costs of bailout intervention.³ Since such expansion is inconsistent with maintaining the exchange rate peg, investors will expect the currency to depreciate, and this expectation will trigger a speculative attack.

These considerations can be extended to shed light on the role of structural imbalances—such as chronic current account deficits—in triggering currency crises. A current account deficit represents net borrowing from the rest of the world, so dependency on foreign sources of capital can put a country in a vulnerable position. For example, a deterioration in the country's terms of trade can significantly reduce its ability to repay its debt. Foreign investors might then decide not to extend lending further. Should the private sector become insolvent vis-à-vis its external creditors, the buildup of private sector liabilities ultimately becomes a severe burden for the

Agents observing the weaknesses of the private sector can see that the government will be forced to adopt an expansionary monetary stance in the future to finance the costs of bailout intervention.

public sector. The latter would be asked to rescue private institutions as soon as foreign creditors stopped rolling over existing debt and called in their loans. The dynamics of a currency crisis then follow the same logical steps of the first-generation model analyzed above. Note that a currency devaluation in this framework can help to restore current account sustainability by boosting foreign demand for the country's exports.

The above scenario raises the question, under what conditions can a current account deficit be unsustainable? A country's ability to generate the funds required to pay off its debt is related to its ability to run future trade surpluses. Clearly, a deterioration of the export outlook adversely affects the ability to repay debt. Such a deterioration can result from several factors. For example, domestic inflation can increase the price of traded goods and services under a fixed exchange rate, leading to a slowdown in exports. A similar loss of competitiveness can occur under a fixed exchange rate regime when the exchange rate appreciates against important trading partners. For example, as the countries affected by the Asia

crisis were pegging their currencies to the U.S. dollar, the competitiveness of their exports to Japan suffered from an appreciation of the dollar against the yen in the two years preceding the crisis.

The sustainability of a current account deficit also depends on the use of the borrowed funds. If the deficit finances investment projects in the traded sectors, such investment will provide a new source of export revenue, thereby generating the earnings required to repay the debt. By the same token, a current account deficit that finances investment in a nontraded sector—such as real estate—or in low-profit projects is less sustainable since the return on the investment will not be sufficient to service the debt.

Second-Generation Models: Self-Fulfilling Expectations and Multiple Equilibria

In first-generation interpretations of currency crises, the viability, or lack thereof, of an exchange rate peg is determined by exogenous fundamentals unrelated to the behavior of economic agents. In the model considered above, for instance, market participants base their expectations on the presumption that their actions will not affect fiscal imbalances or domestic credit policies. By contrast, the interaction between expectations and actual outcomes is at the core of the second-generation models of crises, in which market expectations directly influence macroeconomic policy decisions.⁴ Such models are also referred to as the endogenous-policy approach, since policymakers' actions in these models represent optimal responses to macroeconomic shocks.

The key point emphasized in second-generation models is that the interaction between investors' expectations and actual policy outcomes can lead to self-fulfilling crises. This point can be illustrated by means of a stylized example in which entirely different outcomes can occur depending on the agents' expectations. This indeterminacy is at the core of the model's ability to rationalize large market movements, even in the absence of corresponding changes in fundamentals.

Consider a country whose monetary authorities are committed to maintaining the exchange rate peg, but are willing to float their currency under extraordinary circumstances such as a sharp cyclical downturn. If the country's loans from abroad were denominated in the borrowing nation's domestic currency, foreign investors would face the possibility of a devaluation of that currency, which would reduce the value of their claims. If foreign investors considered the possibility of a devaluation to be

very likely, they would charge a high-risk premium on their loans. The country's borrowing costs would rise significantly, reducing credit opportunities and curtailing output growth. The country's authorities would then deem the costs of maintaining the peg to be too high and choose to devalue their currency to boost aggregate demand and employment. The devaluation, in turn, would validate the initial investors' expectations. Ultimately, investors' forecasts are self-fulfilling prophecies: expectations of devaluation lead to actions (the risk premium hike) that raise the opportunity cost of defending the fixed parity. Therefore, the forecasts force a policy response (the abandonment of the peg) that validates the original expectations.

Note that the crisis scenario described above is not the only possible outcome of our simple model. Consider an alternative scenario in which investors do not forecast any devaluation and do not charge any risk premium. In this case, borrowing costs would remain low and the authorities could maintain the exchange rate peg, thereby validating the expectations of no devaluation. Our model is then characterized by the possibility of multiple outcomes, or "equilibria." All things being equal, there are situations in which currency stability is undermined and situations in which it is not. A currency crisis can be thought of as a shift in expectations toward the devaluation outcome. Such a shift suddenly makes the defense of the peg excessively costly.

The main advantage of resorting to such an interpretation of currency crises is the ability to distinguish between two kinds of volatility: one related to financial markets and one related to macroeconomic fundamentals.

A currency crisis can be thought of as a shift in expectations toward the devaluation outcome. Such a shift suddenly makes the defense of the [exchange rate] peg excessively costly.

The former volatility substantially exceeds the latter. Market sentiment—in the form of sudden and arbitrary changes in market participants' expectations—then plays a prominent role in the determination of a crisis. Exchange rates (and other asset prices) are less predictable than they are in models with a unique outcome. As a result, second-generation models are deemed to "square better with the stylized facts of global financial markets" (Masson 1999). These models, however, do not explain what *causes* the shifts

in private agents' expectations. In other words, the theory remains silent on the determinants of the losses of confidence that are the cornerstone of the analysis.

Features of Crisis Episodes Highlighted by the Asian Turmoil

The fundamental and self-fulfilling views of currency crises outlined above provide the two main analytical and conceptual frameworks in which to interpret cases of currency instability. However, it has been argued that these two theories—developed *before* the recent crisis episodes—overlook several features that played central roles in the turmoil of the 1990s, especially the Asia crisis. We now take a close look at two of these features, emphasized in the post-Asia crisis literature—namely, the role of the banking and financial sector and the mechanisms of crisis transmission across countries, or contagion.

The Banking and Financial Sector

Several recent studies have argued that currency and banking crises in emerging markets should be seen as twin events, and that the feedback channel between them should be investigated.⁵ In other words, banking and currency crises can generate a vicious circle by amplifying each other. Indicators of financial strength are therefore crucial when assessing a country's vulnerability to a crisis and the economic impact of exchange rate instability. The central role of financial institutions also points to the need to supervise and regulate the sector, to limit excessive borrowing from abroad, and to reduce the risk that temporary liquidity shortages will trigger full-fledged financial crises. In terms of the distinction between fundamental and self-fulfilling views, the role of the banking sector spans both approaches. The feedback channel between banking and currency crises falls under the fundamental approach, as do the health of the financial sector balance sheets and the overborrowing syndrome. By contrast, liquidity-driven crises in the banking sector reflect the interaction between expectations and outcomes.

A currency crisis has an adverse effect on the banking sector when banks' liabilities are denominated in a foreign currency. A devaluation suddenly and sharply increases the value, expressed in the domestic currency, of these liabilities. As banks typically lend domestically in the local currency, a devaluation exposes them to a sizable currency mismatch and

a deterioration of their balance sheets.⁶ In turn, a banking crisis can lead to a currency crisis through the burden it imposes on the fiscal side of the economy. The cost of addressing the consequences of a banking crisis, such as the liquidation of insolvent banks, is borne by the public sector. A banking crisis is therefore associated with a large, and possibly unexpected, worsening of the fiscal position of a country. A drastic change in effective public liabilities can trigger expectations of monetization of the fiscal deficit and exchange rate depreciation. The mechanism is similar to the one in first-generation models of currency crises stressing the role of unsustainable fiscal policies.⁷

In sum, a country's vulnerability to currency crises strongly depends on the health and stability of its banking sector. The strength of financial intermediaries also affects the impact of a devaluation on real variables. By worsening the balance sheets of financial intermediaries, a devaluation can generate a pronounced tightening in credit market conditions, possibly leading to a contraction in output. The adverse consequences of a devaluation are therefore more severe if banks' balance sheets are plagued with nonperforming loans, or if financial intermediaries borrow heavily in foreign currencies at short horizons.

The central role of financial intermediaries has a number of important implications. First, microeconomic indicators (such as corporate profitability, and debt-to-equity ratios) can help predict the imminence and the likelihood of a currency crisis better than the standard macroeconomic indicators (such as fiscal imbalances and current account deficits). For instance, if firms do not scale back their operations when they experience a fall in investment profitability, they must resort to external financing. To the extent that most of the additional borrowing is short-term, debt financing adds to the fragility of the corporate sector. From the vantage point of the banking sector, low corporate profits and corporate weaknesses result in significant shares of nonperforming loans.⁸

Second, particular attention should be paid to effective supervision and regulation of financial intermediaries in the process of capital market liberalization. Liberalization implemented amid weak supervision can increase a country's vulnerability to external crises by magnifying existing distortions and weaknesses. The reduction in borrowing costs due to financial deregulation can lead banks and firms to borrow extensively in foreign currencies, and funnel the funds toward the acquisition of highly risky assets and/or toward the financing of low-profit and dubious investment projects. The limited ability of the financial regulators to enforce prudential rules makes such excessive borrowing possible.

Third, explicit or implicit government guarantees to the private sector magnify a *moral hazard* problem faced by

financial intermediaries.⁹ Banks will engage in excessively risky borrowing and investment if they expect that the authorities will intervene in the event of massive financial distress.¹⁰ The expectation of financial bailouts can also lead foreign investors to lend with little regard to the riskiness of the projects they are financing.¹¹ From this vantage point, a fixed exchange rate regime is intrinsically unstable and contains the seed of its own collapse. This is because the apparent stability of the exchange rate peg leads financial intermediaries to overlook currency risk, and induces them to borrow heavily in foreign currencies without hedging their exposures.¹²

The central role played by the financial sector in the recent turmoil raises the possibility of liquidity-driven crises, as opposed to the usual solvency-driven events analyzed in earlier models. Chang and Velasco (1998) have stressed the possibility

The reduction in borrowing costs due to financial deregulation can lead banks and firms to borrow extensively in foreign currencies, and funnel the funds toward the acquisition of highly risky assets and/or toward the financing of low-profit and dubious investment projects.

of self-fulfilling international liquidity crises and international bank runs.¹³ In an open economy with unrestricted capital markets, domestic banks are free to accept deposits from both domestic and foreign residents, in both domestic and foreign currencies. These liabilities are used primarily to fund longer term illiquid investments that cannot be readily converted to cash. If bank depositors—both foreign and domestic—anticipate a speculative run, they will seek to exchange their claims on financial institutions for the foreign currency. Banks are then forced to liquidate their investments in order to raise the cash needed to pay off their depositors. Since investments are long-term, they can be liquidated only at highly discounted prices. As a result, even a well-managed bank can quickly exhaust its cash reserves and become insolvent, thereby validating the initial expectation of a run. Because of systemic links, the run could spread to the entire banking and financial sector. If such an event were to occur, extreme strain on the exchange rate and a rapid loss of official reserves are likely to ensue.¹⁴

Contagion

A striking aspect of the crises in the 1990s was their occurrence across several countries and their fast regional spread. For instance, the devaluation of the Thai baht in July 1997 was followed by currency crises in Malaysia and Indonesia within a month and in Korea a few months later. In the literature, this phenomenon is usually—and perhaps mistakenly—referred to as contagion.

Various explanations for the transmission of a crisis across countries can be offered. First, several countries can be similarly affected by a common shock (although a crisis can spread even in the absence of such a shock). Trade linkages can transmit a crisis, as a currency depreciation in one country weakens fundamentals in other countries by reducing the competitiveness of their exports. Financial interdependence can also contribute to the transmission of a crisis, as initial turmoil in one country can lead outside creditors to recall their loans elsewhere, thereby creating a credit crunch in other debtor countries. Finally, a currency crisis in one country can worsen market participants' perception of the economic outlook in countries with similar characteristics and trigger a

In the absence of common shocks, a currency crisis can be transmitted from one country (A) to another (B) if structural links and international spillovers make the economies of countries A and B interdependent.

generalized fall in investor confidence. Explanations of the international transmission of crises contain elements that fall under both the fundamental and the self-fulfilling approaches. Common shocks, along with transmission through trade channels and common creditors, can be categorized as fundamentals-driven crises. By contrast, the role of information frictions in capital markets is consistent with the self-fulfilling view.

The first explanation for the simultaneous occurrence of a crisis in different countries holds that the countries are hit by common shocks, or display similar elements of domestic vulnerability. For instance, several Asian countries shared common features such as a high reliance on foreign-

denominated debt and a relatively stable exchange rate against the U.S. dollar. The occurrence of a crisis across several countries can be seen as an initial disturbance being replicated in other places, rather than as the transmission of a shock from one country to another.

In the absence of common shocks, a currency crisis can be transmitted from one country (A) to another (B) if structural links and international spillovers make the economies of countries A and B interdependent. That is, if the currency devaluation by country A has a negative impact on country B's fundamentals, it will eventually force country B's currency devaluation.

International trade is an obvious candidate for such spillover.¹⁵ The devaluation by country A reduces the price of its goods in foreign markets, leading consumers to purchase more goods produced in country A and fewer goods produced in other countries, including country B, as they are now relatively more expensive. This consumption switching adversely affects the sales by firms in country B. The ensuing reduction in export earnings can, in turn, significantly hamper the ability of country B to sustain a current account deficit, which can leave that country's currency open to attack. Country B may then be left with no choice but to devalue its currency to sustain its exports since defending it may prove too costly in terms of higher interest rates and foreign reserve losses.

Interestingly, the international transmission of a currency crisis through the trade channel does not rely on large trade flows between the two countries. The transmission can occur even if countries A and country B do not trade with each other. The key feature is that their exports compete in other foreign markets. The strength of the transmission mechanism through the trade channel depends on the degree to which goods produced in different countries are similar to each other (so that world demand for goods produced by countries A and B is highly sensitive to price differentials). Also, the trade channel is especially relevant in the transmission of currency crises when countries A and B sell their products in the same markets (see Box 1 for an example).

Besides trade links, different countries are interdependent if they borrow from the same creditors. Indeed, the central role played by capital flows during the Asia crisis suggests that such linkages are especially relevant, as discussed in Kaminsky and Reinhart (2000).

A currency crisis in country A reduces the ability of domestic borrowers to repay their loans to outside banks. Faced with a larger share of nonperforming loans, foreign banks rebuild their capital by recalling some of their loans, including loans made to borrowers in other countries. Borrowers in country B then suffer from a credit crunch caused

by the impact of the currency crisis in country A on their creditors. Interestingly, such a recall can generate a regional pattern in the credit crunch even if banks recall their loans evenly across *all* countries in their portfolio. The credit crunch is sharper in the countries that depend on those banks that incurred heavy losses due to the initial crisis, as illustrated in Box 2.

Notwithstanding the spillover effects resulting from trade linkages or common creditors, a crisis can spread from one country to another because of information asymmetries in

financial markets. Gathering and processing country-specific data on a large number of emerging markets is costly. As pointed out by Calvo (1999) and Calvo and Mendoza (forthcoming), investors may downplay national specificities and asymmetries, and consider several countries in a region as substantially homogeneous. A new piece of information concerning one country can then be extrapolated and applied to the entire group. Country-specific events such as a devaluation may be perceived as “wake-up” calls leading to a generalized reevaluation of investment prospects in the region.

Box 1

Transmission of a Currency Crisis via Trade Channels

Country A and country B do not trade directly with each other, but they export goods to country C and country D. Table 1 presents a baseline case in which country B exports mostly to country D, whereas country A exports mostly to country C.

Table 1

Initial Trade Flows to	Export Share (Percent)			Market Share (Percent)	
	C	D	Total	C	D
From A	90	10	100	90	10
From B	10	90	100	10	90
Total				100	100

Note: Country B's exports fall 1.8 percent following a 10.0 percent devaluation of country A's currency.

The extent to which country B is adversely affected through this indirect trade link depends on the weight of country A exports in the markets on which country B depends most. In our case, the extent of competition between country A and country B is small, as they export to different markets. The devaluation by country A has only a moderate effect on country B exports, as a 10.0 percent devaluation reduces them by 1.8 percent. A technical analysis allows us to derive the following relationship between the percentage devaluation of country A currency vis-à-vis the currencies of countries C and D, *DEV*, and the percentage reduction in country B exports, *EXPRED*:

$$\frac{EXPRED}{DEV} = \sum_{k=C,D} [\rho(k) \times EXSH(B, k) \times MKSH(A, k)],$$

where *EXSH(B, k)* is the share of country B exports to market *k*, and *MKSH(A, k)* is the market share of goods produced in country A in market *k*. $\rho(k)$ reflects the degree to which goods from countries A and B are substitutable in market *k*. The numerical example assumes that a 10 percent decrease in the relative price of goods produced in country A, relative to goods produced in country B, leads to a 10 percent increase in the

demand for goods produced in country A, relative to goods produced in country B ($\rho(C) = \rho(D) = 1$).

Table 2 illustrates the impact of a larger market share of country A exports in country D. Note that the share of country B exports to country D remains unchanged at 90 percent.

Table 2

Initial Trade Flows to	Export Share (Percent)			Market Share (Percent)	
	C	D	Total	C	D
From A	10	90	100	50	50
From B	10	90	100	50	50
Total				100	100

Note: Country B's exports fall 5 percent following a 10 percent devaluation in country A's currency.

In the second example, a 10 percent devaluation by country A leads to a 5 percent contraction in country B exports. The contraction is sharper because country D relies more on country A exports than it does in the first example.

Table 3 illustrates the role of the geographical composition of exports. Compared with Table 1, a larger share of country B exports goes to country C. Note that the market share of country A goods in country C is unchanged. The impact of the devaluation by country A is stronger than in the baseline case, as a 10.0 percent devaluation contracts country B exports by 3.4 percent.

Table 3

Initial Trade Flows to	Export Share (Percent)			Market Share (Percent)	
	C	D	Total	C	D
From A	180	5	185	90	10
From B	20	45	65	10	90
Total				100	100

Note: Country B's exports fall 3.4 percent following a 10.0 percent devaluation in country A's currency.

A Credit Crunch

We consider a situation in which two financial institutions, say bank 1 and bank 2, hold a portfolio of loans in three countries: A, B, and C. The devaluation by country A reduces the ability of borrowers in this country to repay their debts. Banks incur losses, as the quality of their portfolio of borrowers from country A is reduced. In order to absorb these losses and rebuild their capital, the banks have to recall some of their loans to other countries, thereby generating a credit crunch.

The table presents a numerical illustration. It shows the portfolio of the two banks in the three countries, before the devaluation of country A's currency. For simplicity, we assume that all loans to country A are lost, and that each bank has to recall loans to countries B and C. It shows that bank 1 has the largest exposure to country A, as loans to country A represent 33 percent of its predevaluation portfolio, versus 10 percent for bank 2. Bank 1 therefore recalls 50 percent of its loans in countries B and C, whereas bank 2 recalls 11 percent of its loans.

The larger rate of recall by bank 1 is not sufficient by itself to generate a geographical spread of the credit crunch: if the share of bank 1 in total debt is the same in countries B and C, the extent of the credit crunch will also be the same. However, in our example country B is more dependent on bank 1 than country C is, as 66 percent of loans to country B represent bank 1 assets, versus 20 percent of loans to country C. Note that the stronger dependence on bank 1 in country B does not necessarily lead to a different extent of credit crunch across countries. If both bank 1 and bank 2 were to recall their loans at the same rate, the share of loans owed to bank 1 would be irrelevant.

	Initial Portfolio		Exposure (Percent)		Dependence (Percent)		
	From Bank 1	From Bank 2	Bank 1	Bank 2	Bank 1	Bank 2	Total
To A	20	10	33	10			
To B	20	10	33	10	66	33	100
To C	20	80	33	80	20	80	100
Total			100	100			

Note: The extent of the credit crunch is 37 percent in country B and 19 percent in country C. The amount of loans recalled by banks 1 and 2 is 20 and 10, respectively, representing $20/(20 + 20) = 50$ percent and $10/(10 + 80) = 11.1$ percent of the postdevaluation portfolios. The extent of the credit contraction in countries B and C is then 20×50 percent + 10×11.1 percent = 11.1 percent and 20×50 percent + 80×11.1 percent = 18.8 percent, respectively, representing 11.1 percent / $(20 + 10) = 37$ percent and 18.8 percent / $(20 + 80) = 19$ percent of their initial debts.

Our example is characterized by a combination of exposure differences among banks and dependence differences among countries, which lead to a geographical concentration of the credit crunch. Country B is more adversely affected than country C, as it depends on the bank that was most affected by the initial crisis in country A. It is worth stressing that geographical heterogeneity does not stem from banks recalling more loans to country B than country C. Instead, banks recall all loans worldwide to the same extent, and the more severe credit crunch experienced by country B only reflects the initial composition of portfolios.

In addition, information costs can lead investors to focus their efforts on a small number of countries, leading to the emergence of clusters of specialists. This phenomenon can cause herding behavior by investors, where the optimal investment strategy regarding a specific country involves following the lead of the investor most likely to be informed of the prospects of that country.

For illustrative purposes, consider two agents investing in assets issued by countries A and B. Because of information-processing costs, the two agents choose to focus their analytical efforts on, respectively, country A and country B. Due to her limited knowledge of country B, country A's specialist

determines the share of country B's assets in her portfolio by replicating the behavior of country B's specialist. The key aspect of such a strategy is that country A's specialist observes the action but not the ultimate motivation of country B's specialist. For instance, a sale of country B's assets by country B's specialist may be the result of adverse news regarding country B, or an investor-specific need for liquidity. In the latter case, as country A's specialist "mimics" the action of country B's specialist, a generalized capital outflow from country B occurs, even though there is no deterioration in fundamentals.¹⁶

A Synthesized View as Applied to Asia

Our discussion of the role of the banking and finance sectors and the international transmission of crises—two central aspects of the Asia crisis—has highlighted the fact that they encompass both the fundamental and self-fulfilling views of currency crises. This section suggests that the two views are ultimately complementary rather than opposing, and that their synthesis can help to create a comprehensive picture of recent episodes of turmoil in exchange rate markets.

Taken separately, each view offers an unsatisfactory explanation of the Asian events. Explanations based on the interactions between expectations and outcomes fail to account for the 1997 confidence crises and overlook the evidence of several factors that contributed to the deterioration of fundamentals in Asia well before the onset of the crisis. Moreover, explanations based on fundamentals cannot account for the unpredictability and severity of the crisis.

A synthesized approach combines the strengths of each view and stresses how they complement one another. Fundamental weaknesses leave countries at the mercy of sudden shifts in market sentiment, and confidence crises have devastating implications when they act as catalysts of ongoing processes.¹⁷ Indeed, advocates of both the fundamental and the self-fulfilling views agree in principle that a deteriorating economic outlook increases an economy's vulnerability to a crisis. Whether or not the plunges in asset prices after the eruption of the event are driven by self-fulfilling expectations and investor panic, weak economic fundamentals are a crucial element in the genesis and spread of a crisis.

According to such a synthesized view, the Asia crisis resulted from the interaction between structural weaknesses and the volatility of the international capital markets. The relevance of fundamental imbalances is illustrated by the different experiences of several countries during the crisis. Taiwan, Singapore, and Hong Kong were, relatively speaking, less affected by the regional turmoil. The Hong Kong currency parity was maintained despite strong speculative attacks. Taiwan and Singapore decided to let their currencies float rather than to lose reserves by trying to stabilize the exchange rate. The depreciation rates of their currencies were modest and, most important, they did not experience drastic reversals in market sentiment, financial panic, and large-scale debt crises.

These three countries shared a number of characteristics. Their trade and current account balances were in surplus in the 1990s and their foreign debt was low (Taiwan was a net foreign creditor toward Bank for International Settlements banks). They had a relatively large stock of foreign exchange reserves

compared with those of the crisis countries. Their financial and banking systems did not suffer from the same structural weaknesses and fragility observed in the crisis countries. And finally, they were perhaps less exposed to forms of so-called "crony capitalism" with intermingled interests among financial institutions, political leaders, and corporate elite. Conversely, the Asian countries that came under speculative attack in 1997—Thailand, Malaysia, Indonesia, the Philippines, and South Korea—had the largest current account deficits throughout the 1990s. Although the degree of real appreciation over the 1990s differed widely across Asian countries, all the currencies that crashed in 1997, with the important exception of Korea's, had experienced a real appreciation (Corsetti, Pesenti, and Roubini 1999b and Tornell 1999).

The major fundamental weakness of the Asian countries consisted of the exposed position of the banking and corporate sectors in an environment of limited prudential supervision. Indeed, it has been argued that the Asian miracle occurred despite significant distortions of the market mechanism in the financial sector. In the presence of extensive controls and limits on foreign borrowing, these distortions did not translate into high domestic vulnerability to external shocks. This key feature

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changed with the liberalization of financial markets in the early 1990s, which provided Asian borrowers with access to inexpensive foreign funds (McKinnon and Pill 1997). Although international capital markets became progressively more accessible and domestic markets were deregulated, supervision of the financial system remained inadequate—the best-known example being provided by the strong, unregulated growth of financial companies in Thailand.

In such an environment of limited prudential supervision, financial intermediaries borrowed heavily in foreign currencies over short horizons, as the stability of the exchange rate and the perception of government guarantees contributed to a false sense of safety. The funds were then channeled to investment projects of questionable profitability. Domestic banks and foreign investors downplayed the riskiness of their positions, in part because the authorities were perceived as guarantors and in part because the stellar past economic performance provided

the background for overly optimistic projections. The financial sector was therefore left with an increasing portfolio of nonperforming loans, financed by short-term foreign borrowing. The ensuing maturity and currency mismatch exposed the banks and the countries as a whole to reversals of capital flows.

As a result, even a small attack on a currency was bound to put a snowball mechanism in motion. The authorities' ability to defend the exchange rate peg through higher interest rates was limited, as such rates would have jeopardized the financial and corporate sectors. They were then left with little choice but to allow the currency to depreciate.¹⁸ But the outcome was a sharp deterioration of financial institutions' balance sheets and a surge in the domestic value of foreign debt, leading to the bankruptcy of several banks and firms. The fiscal cost of any bailout by the government in turn fueled the loss in investor confidence.

Conclusion

The central role of the financial sector has led to a reassessment of the optimal pace of financial liberalization, due to the necessity of setting up adequate supervisory and regulatory mechanisms—and being able to enforce them—as preconditions for the removal of obstacles to international borrowing and lending. In terms of its lessons for future crisis prevention strategies, the Asian episode points especially to the need to prevent the accumulation of a large stock of foreign-currency-denominated debt. It also emphasizes the need to control the magnitude of currency and maturity mismatches of the assets and liabilities of financial institutions and firms. Whether debt is held by the private or the public sector does not affect this conclusion, because the difference between the two categories blurs in crisis situations.

Endnotes

1. For recent studies focusing on the large-scale speculative episodes in the 1990s, see, for example, Eichengreen and Wyplosz (1993) and Buitier, Corsetti, and Pesenti (1998a, 1998b) on the European Monetary System crisis of 1992-93; Sachs, Tornell, and Velasco (1996) and Calvo and Mendoza (1996) on the Mexican peso crisis of 1994; and International Monetary Fund (1997, 1998), Corsetti, Pesenti, and Roubini (1999a, 1999b), Mishkin (1999), and Radelet and Sachs (1998) on the Asia crisis of 1997-98.
2. The approach was pioneered by Krugman (1979), who adapted a model by Salant and Henderson (1978) to the analysis of currency crises. It was further refined by Flood and Garber (1984).
3. For an earlier presentation of these considerations, see Diaz-Alejandro (1985). The contributions made by Dooley (1997) and McKinnon and Pill (1997) present an analysis along similar lines. For recent analytical models, see Corsetti, Pesenti, and Roubini (1999a) and Burnside, Eichenbaum, and Rebelo (1998).
4. The standard studies on self-fulfilling crises are Obstfeld (1986, 1994).
5. For instance, Kaminsky and Reinhart (1999) find that problems in the banking sector typically precede a currency crisis, which in turn deepens the banking crisis.
6. Caballero and Krishnamurthy (1999) and Krugman (1999) point to another impact of a currency crisis on balance sheets: devaluation reduces the foreign currency value of the borrower's collateral, thereby curtailing the country's access to additional funding.
7. Weaknesses in the banking sector played a key role in crisis episodes preceding the Asian meltdown. In Mexico, the banking and financial system was fragile even before the peso crisis of 1994 (see Krueger and Tornell [1999]). The peso devaluation of 1994 increased the pressure on the banking system, leading to a crisis estimated to have accounted for about 14 to 20 percent of GDP.
8. The profitability of Asian firms indeed appears to have decreased on the eve of the crisis. For instance, the Korean conglomerates (*chaebols*) relied heavily on debt to finance low-return investments, leading to very low profits, if any (World Bank 1998). Similarly, a study of a wide sample of firms in the Asian countries by Claessens, Djankov, and Lang (1998) shows reduced profits on investments since the mid-1990s.
9. See Krugman (1998), Mishkin (1999), and Corsetti, Pesenti, and Roubini (1999a).
10. Dooley (1997), and Chinn, Dooley, and Shrestha (1999) consider a model where the government cannot credibly commit not to use its reserves for an eventual bailout of the financial sector. Private agents then accumulate guaranteed assets in the country with the intention to redeem them eventually for government reserves. A crisis occurs when investors trade their assets for reserves.
11. Díaz-Alejandro (1985) highlights a similar problem underlying the financial crisis experienced by Chile during the process of deregulation and liberalization in the early 1980s.
12. Note that twin crises leave the authorities with a policy dilemma. If a currency comes under speculative attack, a defense of the exchange rate through an interest rate hike may be counterproductive, as higher interest rates contribute to the collapse of the weakened banking sector. However, if the country does not stabilize its exchange rate, a currency plunge worsens bank balance sheets and ultimately becomes a catalyst of further banking sector disruption.
13. The authors extend the banking crisis model developed by Diamond and Dybvig (1983) to an open economy.
14. The provision of liquidity in a currency crisis poses a problem not faced in domestic bank runs. Both types of crises begin with a widespread attempt to convert short-term claims into currency. In a closed economy, the central bank can satisfy these claims by issuing (in principle) an unlimited supply of domestic currency. In an open economy, however, the central bank can only provide foreign currency up to the extent of its stock of foreign reserves. Furthermore, in a closed economy, a bank run can be ruled out with deposit insurance and access to the central bank discount window. In an open economy, the central bank may not have enough reserves to function as its lender of last resort; hence, the potential need exists for an international lender of last resort.
15. For studies stressing the role of trade linkages, see Eichengreen, Rose, and Wyplosz (1996) and Glick and Rose (1998). Structural spillovers are at the core of the interpretation of the 1992-93 European Monetary System crisis by Buitier, Corsetti, and Pesenti (1998a, 1998b). A modern revisit of the theory of competitive devaluations is provided by Corsetti, Pesenti, Roubini, and Tille (2000).

Endnotes (Continued)

16. A related model by Chari and Kehoe (1997) assumes that each potential investor observes an imperfect signal of the profitability of an investment project and decides whether to invest based on this signal and the investment decisions of other investors. This strategy can lead to an entrapment of information. If the first—in terms of observed behavior—agents decide not to invest, subsequent investors may infer that their predecessors received adverse signals and decide to refrain from the project, even if their own signal is positive. Several authors analyze whether financial markets are characterized by “pure” contagion, in the sense that changes in asset prices in a country have an effect on prices in other countries that cannot be explained by trade or common creditor links. The debate remains active as there is no compelling evidence that emerging markets have experienced such contagion (Baig and Goldfajn 1999; Brown, Goetzmann, and Park 1998; Choe, Kho, and Stulz 1998; Forbes and Rigobon 1999).

17. Models with multiple equilibria show that an economy with strong fundamentals is not exposed to a crisis risk, whereas one with weak fundamentals is in a region of parameters where shifts in

investors’ expectations can occur as rational phenomena. Morris and Shin (1998) show that the multiplicity of equilibria disappears if investors receive private signals of the state of fundamentals. Their approach provides the foundation for an endogenous theory of confidence crises.

18. It has been argued that currency crises and their adverse impact could be avoided by adopting more stringent forms of exchange rate pegging. An example is a currency board in which the entire monetary base is backed by foreign reserves. However, it is unclear whether such arrangements address the core problem. Obstfeld and Rogoff (1995) stress that currency crises reflect the unwillingness of the monetary authorities to incur the costs of defending the exchange rate peg, and not their inability to do so.

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Foreign and Domestic Bank Participation in Emerging Markets: Lessons from Mexico and Argentina

- The Argentine and Mexican experiences with foreign bank participation are broadly instructive for other emerging markets contemplating an expanded role for foreign banks in their local economies.
- A review of bank lending patterns from 1994 through mid-1999 reveals that foreign banks in Argentina and Mexico exhibited stronger and less volatile loan growth than domestic banks.
- The asset quality of bank portfolios, and not ownership per se, appears to be the decisive factor behind the growth and volatility of bank credit.
- In both Argentina and Mexico, diversity of ownership has contributed to greater stability of credit in periods of crisis or financial system weakness.

Over the past decade, numerous financial systems have opened up to direct foreign participation through the ownership of local financial institutions, frequently as a direct consequence of—and as a perceived solution to—financial crises. Significant increases in such foreign participation have characterized the transition experience of Eastern Europe and the post-Tequila Crisis period in Latin America. However, the crisis experience in Asia has been markedly different to date, and is more notable for the limited nature of majority investments by foreign banks, despite the need for large-scale recapitalization of the region's troubled financial systems.

Arguments supporting a policy of openness to foreign participation are far from universally accepted. The benefits to emerging markets of foreign participation in domestic financial systems are widely explicated and argued to be broad-based. These arguments are mirrored by a set of concerns over the potentially adverse effects of opening to foreign participation (or at least opening too quickly). There is a shortage of hard evidence to support either side.

This article contributes factually to the debate over the opening of emerging markets to foreign participation by exploring the experiences of Argentina and Mexico—two

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markets that exhibit a significant degree and duration of foreign bank activity.

We begin our analysis by presenting the opposing views on the role of foreign-owned banks in emerging markets.¹ Next, we argue that ownership per se is not a reason to expect differences in the lending patterns of domestic and foreign banks; instead, these would arise because lending objectives, funding patterns, market access, and balance-sheet health may vary. We then review liberalization efforts in Argentina and Mexico in the 1990s and examine local lending patterns by foreign- and domestically owned local banks, including state-

Although a sizable body of research has explored the potential benefits of financial liberalization broadly defined, few studies have focused on the potential benefits of increased foreign participation in banking and finance.

owned banks. Our goal is to document these banks' relative stability in lending to different client bases and to examine the cyclical properties of such lending. Throughout, we base our analysis on published quarterly loan data for individual banks in Mexico and in Argentina in the 1990s. We look at total lending, personal/consumer lending, mortgage lending, and the broad remaining group that includes commercial, government, and other lending.

Econometrically, we show that in these countries behavioral differences are apparent across certain types of banks. These are related to whether a bank is public or private, potentially reflecting the role of distinct lending motives across these institutions. In addition, bank behavior is significantly related to the asset quality of the bank portfolio. In response to some types of economic fluctuations, domestic privately owned banks with low levels of impaired loans can have more volatile lending than their foreign bank counterparts. We argue that these differences among foreign and domestic private banks are plausible and are to be expected, especially if the respective banks rely on alternative sources of funds.

Based on bank lending patterns from 1994 through mid-1999, overall we do not find any support for the view that foreign banks contribute to instability or are excessively volatile in their responses to market signals. In Argentina, extensive and rapid banking reforms have led to a system in which both foreign and domestic privately owned banks are responsive to

market signals, but where behavior is now consistent with more diversified sources of loanable funds. In Mexico, despite reform efforts in the second half of the 1990s, many domestic banks continue to face significant asset quality problems. These banks have had shrinking loan portfolios in the post-Tequila Crisis period. Healthy foreign banks have emerged as an important engine for funding local investment and growth opportunities without raising lending volatility vis-à-vis their healthy local counterparts.

Foreign Ownership of Financial Institutions in Emerging Markets

Arguments for Foreign Bank Participation

There are three main arguments in favor of opening emerging market financial sectors to foreign ownership. First, consistent with traditional arguments in support of capital account liberalization, some contend that a foreign bank presence increases the amount of funding available to domestic projects by facilitating capital inflows. Such a presence may also increase the stability of available lending to the emerging market by diversifying the capital and funding bases supporting the overall supply of domestic credit. This type of argument is especially persuasive when applied to small and/or volatile economies.²

Second, some contend that foreign banks improve the quality, pricing, and availability of financial services, both directly as providers of such enhanced services and indirectly through competition with domestic financial institutions (Levine 1996). Third, foreign bank presence is said to improve financial system infrastructure—including accounting, transparency, and financial regulation—and stimulate the increased presence of supporting agents such as ratings agencies, auditors, and credit bureaus (Glaessner and Oks 1994). A foreign bank presence might enhance the ability of financial institutions to measure and manage risk effectively. Additionally, foreign banks might import financial system supervision and supervisory skills from home country regulators. While many of these goals ultimately may be achievable without foreign financial institutions, an increased foreign presence may meaningfully accelerate the process.

Although a sizable body of research has explored the potential benefits of financial liberalization broadly defined, few studies have focused on the potential benefits of increased foreign participation in banking and finance.³ For the most

part, these studies focus on bank efficiency spillovers but not on lending behavior. For example, a recent cross-country study shows that foreign bank presence is associated with reduced profitability and diminished overhead expenses for domestic banks, and hence with enhanced domestic bank efficiency (Claessens, Demirguc-Kunt, and Huizinga 1998).⁴ Findings of increased domestic bank efficiency and heightened competition are also supported in the Argentine experience of the mid-1990s (Clarke, Cull, D'Amato, and Molinari 1999). Increased foreign competition in corporate loan markets reduced associated net margins and before-tax profits, and margins and profits remained higher in the consumer sector, which had not attracted comparable foreign entry.⁵ Evidence on behavioral comparisons between foreign and domestically owned banks remains largely undocumented.

Arguments against Foreign Bank Participation

Arguments against opening domestic financial systems to foreign ownership in part mirror the arguments presented above. One strand of concern contends that foreign-owned financial institutions will in fact *decrease* the stability of aggregate domestic bank credit by providing additional avenues for capital flight or by withdrawing more rapidly from local markets in the face of a crisis either in the host or home

The need for an understanding of the implications of an increased foreign bank presence is especially compelling in the wake of financial crises.

country. Others argue that foreign financial institutions “cherry pick” the most lucrative domestic markets or customers, leaving the less competitive domestic institutions to serve other, riskier customers and increasing the risk borne by domestic institutions. Moreover, independent of the effect on aggregate credit generally or during a crisis, the distribution of credit may be affected, resulting in redistribution and potential crowding out of some segments of local borrowers.

These concerns blur into similar arguments centered on the principle that financial services represent a strategic industry best controlled by domestic interests, especially in the context of a state-directed development model in which domestic

banks serve identified development interests. Such arguments are especially likely to be voiced by those domestic concerns that will be most negatively affected by financial sector opening, whereas any benefits are likely to accrue across broader segments of the economy.

Contrary to the argument that increased foreign ownership brings improved financial supervision, concerns are voiced over the multiple challenges to supervision raised by complex financial institutions active in a number of jurisdictions. These concerns are accentuated by asymmetries in information between home and host country supervisors.

Even many supporters of increased foreign ownership of banks argue that the sequencing of any such opening is critical, and that it should follow the consolidation and strengthening of the domestic financial system and/or the development of the necessary financial infrastructure, including supervision. Most of these concerns are generally unsupported by empirical evidence. However, recent research on the sources of financial crises has fueled an additional concern by establishing a pattern in which the crises tend to be preceded by financial liberalization (Kaminsky and Reinhart 1999; Rojas-Suarez 1998). Such studies, however, typically have not focused on or identified the role of foreign-owned financial institutions in contributing to or mitigating crises. The exception is Demirguc-Kunt, Levine, and Min (1998), who observe that over the 1988-95 period and for a large sample of countries, foreign bank entry generally was associated with a lower incidence of local banking crises.

The need for an understanding of the implications of an increased foreign bank presence is especially compelling in the wake of financial crises. In this context, foreign institutions may represent important sources of equity capital for domestic financial systems, particularly in postcrisis recapitalization efforts like those under way in Asia. In addition to helping to further the goal of an active and efficient private banking network, foreign institutions may bring important attributes that domestic financial institutions lack.

Conceptualizing the Differences among Banks in Loan Supply and Volatility

The crux of some arguments for and against foreign bank participation could be better understood within the context of a conceptual framework of bank lending volatility and funding availability. Specifically, we expect that lending patterns will vary among state-owned, private domestically owned, and private foreign-owned banks to the extent that there are corresponding differences in bank motives or goals, in balance-sheet health, and in funding sources.⁶ These differences would

influence the interest rate sensitivity of the loan supply by any bank and the extent to which a bank expands or contracts lending in response to various market signals.

Some of the points raised in the aforementioned debate on credit volatility hinge on the idea that interest rate sensitivity of lending is likely to be greatest for banks with closer ties to international capital markets, and wider access to a range of profitable investment opportunities. In emerging markets, banks with foreign affiliates are likely to have such ties, potentially affirming the feature of having a more interest-rate-elastic loan supply than private domestically owned banks. Moreover, if profitability is more of a motive for private domestic banks than for state-owned banks, the state-owned banks would be expected to have the lowest interest rate sensitivity among this group.

However, despite such presumed differences across banks, it is inappropriate to conclude that foreign banks will necessarily have more volatile lending patterns. Loan supply and demand may differ across banks for numerous reasons. One such reason is that banks may be distinct from one another in terms of *lending motives* with respect to their clients. Through “transaction-based” lending motives, improved economic conditions generate opportunities for expanding production and investment. Bank loans expand to accommodate part of this demand. Alternatively, through “relationship” lending motives, bank lending helps established customers smooth over the effects of cyclical fluctuations or consumption. Under adverse economic conditions, lending expands to offset some of the revenue shortfall of clients; under good economic conditions, net lending by banks declines as borrowers pay back outstanding loans. Under these stylized conditions, relationship lending is countercyclical, while transaction-based lending is procyclical.

The *quality of bank balance sheets* can also influence bank responsiveness to market signals. Banks focused on balance-sheet repair will concentrate less on expanding loan availability when aggregate demand conditions improve, leaving profitable local investment opportunities underfunded. Thus, the poor health of banks could be associated with reduced loan variability, decreased sensitivity to market signals, and missed opportunities for profitable and efficient investment. An alternative and potentially more dangerous scenario arises when less healthy banks, instead of undertaking balance-sheet repair, focus on lending expansion in a gamble for redemption. Overall, if the local banking system’s health is compromised, the presence of healthy foreign banks should reduce some of the negative current and future externalities attributable to unhealthy local lenders. In this scenario, foreign bank presence fills a domestic vacuum by providing finance for worthwhile local projects.

Lending sensitivity across banks will also depend on *the bank’s sources of loanable funds*. If domestically owned banks rely more heavily on local demand deposits and cyclically sensitive sources of funds,⁷ local aggregate demand shocks should generally lead to more volatile lending by private domestic banks than by their foreign-owned counterparts. In the same vein, smaller domestic banks with more narrow funding bases are likely to demonstrate the greatest degree of credit cyclicity, all else equal.⁸

Case Studies: Foreign versus Domestic Banks in Argentina and Mexico

As we turn to the specific experiences of Mexico and Argentina, our goal is to document some patterns in bank lending activity and provide factual evidence in response to two main questions. First, did foreign bank participation in local markets deepen or diversify local loan supply and improve the stability of bank lending? Second, did foreign bank participation increase the sensitivity of lending to market signals? Our conceptual discussion leads us to expect that healthy foreign banks will be more sensitive to market signals than unhealthy

In Argentina, foreign banks now participate on an equal footing with domestic institutions and are active in all broad segments of the loan market. Until very recently, foreign banks in Mexico faced a competitive landscape dominated by large domestic banks.

banks or state-owned banks with different lending goals. However, some types of aggregate fluctuations—such as those arising from local GDP cycles—may lead to more lending fluctuation by healthy local banks than by healthy foreign banks, especially if domestic banks have less internationally diversified funding bases.

Argentina and Mexico are both instructive case studies for examining the implications of broader foreign bank participation in domestic markets. Over the course of the last decade, both countries implemented reforms facilitating foreign bank entry and then experienced a substantive internationalization of domestic financial markets, with the

pace of foreign entry sharply accelerating in the wake of severe financial crises. However, the Mexican and Argentine experiences have also contrasted markedly with regard to the pace, depth, and nature of foreign bank penetration. In Argentina, foreign banks now participate on an equal footing with domestic institutions and are active in all broad segments of the loan market. Until very recently, foreign banks in Mexico faced a competitive landscape dominated by large domestic banks. Furthermore, the financial sector as a whole remains fragile, with real loan growth yet to recover from the 1994 Tequila Crisis. We briefly outline the experiences of each country, focusing on financial sector reforms and the evolution of the foreign bank presence before turning to the data analysis.

Argentina: Financial Reforms and Foreign Entry

Introduction of the Convertibility Plan in 1991 marked a turning point in Argentine financial history. It heralded profound monetary and fiscal reform, broad deregulation of domestic markets, privatization of a majority of government-owned entities, trade liberalization, elimination of capital controls and, more generally, a macroeconomic environment conducive to foreign investment.

The Convertibility Plan succeeded in stemming hyperinflationary pressures and restoring economic growth relatively quickly. Within the financial sector, this contributed to enhanced intermediation: credit to the private sector almost doubled, reaching 19 percent of GDP by year-end 1994, up from close to 10 percent of GDP in 1990. Following the removal of restrictions on foreign direct investment and capital repatriation, the number of foreign banks operating in Argentina increased, but their assets remained below 20 percent of system assets through year-end 1994 (Table 1).

Beginning in early 1995, contagion from Mexico's Tequila Crisis severely tested the Argentine financial sector—sparking an outflow of almost 20 percent of system deposits. In the wake of the Tequila Crisis, the transformation of the Argentine financial sector accelerated. Efforts undertaken to reestablish confidence in the banking sector included the introduction of deposit insurance, a renewed commitment to privatizing inefficient public sector banks, the liquidation and/or consolidation of nonviable entities, and the dedication of substantial resources to strengthening supervisory oversight and the regulatory framework. Within this context, foreign banks were permitted to play an important role in recapitalizing the Argentine banking system.

Prior to the 1990s, very few foreign banks were present in Argentina, with U.S.-based institutions—primarily Citibank

and BankBoston—among the more active. Subsequent entry occurred mainly via the acquisition of existing operations, with foreign shareholders acquiring stakes in private institutions with a national or regional franchise—generally in better condition and with stronger distribution networks than privatized provincial and municipal banks. Such acquisitions accelerated dramatically beginning in 1996, with foreign banks acquiring controlling stakes in a majority of Argentina's largest private banks.⁹ By 1999, roughly half of all banking sector assets were under foreign control, with foreign shareholders holding significant minority stakes in a number of other financial institutions.

The growing foreign bank presence dramatically altered the competitive landscape of Argentina's banking sector and catalyzed aggressive competition for market share, primarily via retail expansion. As shown in Table 1, foreign-controlled banks have been particularly successful in penetrating commercial, government, interbank, and personal loan markets. Although they still appear to lag their domestic counterparts in mortgage lending, this may change in the wake of the January 1999 privatization of a controlling stake in the national mortgage bank.

Overall, foreign and domestic banks in Argentina appear to compete aggressively in all segments of the local loan market. Details of foreign and domestic bank loan portfolios are provided in Table 2.¹⁰ It is striking that foreign banks generally engage in the same types of broad lending activities as domestic banks, but are more heavily weighted toward relatively lower risk commercial, government, and other lending.¹¹ Overall, the recent growth in foreign bank presence and in commercial and government lending share implies that foreign banks are playing an increasingly important role in these segments of local financing. In addition, lending patterns by private

Table 1
Penetration of Foreign Banks into Argentine Lending Markets
Foreign Bank Loans as a Percentage of Total Outstanding Loans in Each Category

Type of Loan	1994	1997	1999
Personal	25.4	48.5	45.8
Mortgage	10.3	20.4	31.9
Commercial, government, and other	19.0	37.4	53.2
Total loans	18.0	35.0	48.1

Source: Authors' calculations, based on data from various issues of *Información de Entidades Financieras* (formerly *Estados Contables de las Entidades Financieras*), published by Banco Central de la República Argentina.

Table 2
Composition of Bank Loan Portfolios by Owner Type
As a Percentage of Total Bank Loans

Type of Loan	Domestically Owned Banks						Foreign-Owned Banks		
	State-Owned			Privately Owned			1994	1997	1999
	1994	1997	1999	1994	1997	1999			
Personal	5.2	5.8	5.9	13.2	10.4	6.1	14.1	13.3	5.5
Mortgage	32.1	32.2	35.1	9.4	13.2	15.0	11.0	11.7	14.7
Commercial, government, and other	62.7	62.0	59.0	77.4	76.4	78.9	74.8	75.0	79.8

Source: Authors' calculations, based on data from various issues of *Información de Entidades Financieras* (formerly *Estados Contables de las Entidades Financieras*), published by Banco Central de la República Argentina.

domestic banks appear to be much more similar to those of foreign banks than to those of state-owned banks. Like foreign bank portfolios, Argentine private bank portfolios tend to have lower mortgage shares and higher shares of commercial, government, and other lending.

Foreign Banks and Loan Supply Patterns in Argentina

A key issue in the ongoing policy debate is whether patterns in loan issuance by banks have become more stable over time as foreign banks have become more entrenched. Using lending data from individual banks operating in Argentina, we compute weighted and unweighted averages of quarterly bank loan growth rates. We report the mean of these growth rates over time. We also compute the standard deviations of the loan growth rates, normalized by mean levels of loan growth. These normalized standard deviations are an indicator of average volatility per unit of loan growth. The unweighted numbers reflect averages across banks, regardless of the individual banks' importance in various lending markets. The weighted numbers reflect overall availability of loans by the respective classes of lenders (state-owned banks, domestic private banks, and foreign private banks).¹²

Among domestically owned banks, the state-owned banks exhibit relatively low average growth in loan portfolios.¹³ The loan growth and volatility figures for these banks are quite striking in the crisis period, with average loan expansion close to zero and average normalized volatility at a very high level. In all periods, private foreign banks had both the highest quarterly loan growth and the lowest normalized variability of this growth. In the crisis and postcrisis periods, domestic private and foreign private banks had higher loan growth and lower normalized volatility than did domestic state-owned banks.

When lending volumes are weighted by bank size (Table 3, panel B), the crisis and postcrisis periods register generally higher loan growth for all types of banks. These findings, compared with those in panel A, imply that among all banks, the larger banks had more loan growth than the smaller banks.

Table 3
Average Bank Loan Growth: Argentina
Quarterly Percentage Changes

Time Period	All Banks	State-Owned Banks	Private Domestic Banks	Private Foreign Banks
Panel A: Unweighted Average across Individual Banks				
Precrisis	3.6	3.8	2.4	5.0
Crisis	2.0 (0.7)	0.3 (14.3)	2.1 (1.9)	3.0 (1.1)
Postcrisis	3.2 (0.9)	1.5 (2.4)	3.2 (1.0)	4.3 (0.8)
Panel B: Weighted Average across Individual Banks				
Precrisis	2.2	1.4	1.4	5.9
Crisis	2.5 (0.7)	2.4 (2.0)	2.6 (1.9)	2.8 (1.3)
Postcrisis	4.0 (0.7)	1.9 (1.2)	4.6 (0.8)	5.6 (0.8)

Source: Authors' calculations, based on data from various issues of *Información de Entidades Financieras* (formerly *Estados Contables de las Entidades Financieras*), published by Banco Central de la República Argentina.

Notes: For single missing observations, we use data averaged across prior and subsequent periods. Calculations use real balances of outstanding loans of individual banks. The precrisis period for which data are available is second-quarter to third-quarter 1994, too short a period for standard deviations on the average loan growth rates. The Tequila Crisis period for Argentina is fourth-quarter 1994 to fourth-quarter 1995. The postcrisis period ends in second-quarter 1999. Normalized standard deviations are reported in parentheses.

Larger foreign banks have greater average loan growth and equal or lower average volatility per unit of loan growth than their public and private domestic counterparts.

As we noted earlier, another metric of lending stability controls for whether changes in loan volumes arise because of differing responses to market signals; alternatively, changing loan volumes can be more random and unrelated to macroeconomic fundamentals. Using time-series data from individual bank balance sheets, we perform pooled time-series regressions to test for differences across domestic, foreign, and state-owned banks in loan responsiveness with respect to real GDP and real interest rates.¹⁴ This responsiveness is estimated using both unweighted and weighted regressions: unweighted regressions measure the responsiveness of an average bank, regardless of its size, while weighted regressions measure the

responsiveness of total lending by a class of banks. The difference across these types of regressions can be interpreted as suggesting differences across larger versus smaller banks (or across total lending volumes versus average bank behavior) in the respective specific lending areas—that is, in total lending, mortgage lending, personal lending, and commercial and other lending. The results for second-quarter 1996 through second-quarter 1999 are summarized in Table 4.¹⁵

In the post-Tequila Crisis period, total lending by Argentine state-owned banks was largely insensitive to GDP and interest rate fluctuations, a pattern that is attributable to a lack of sensitivity of both mortgage lending and commercial and related lending.¹⁶ Personal lending, which accounts for only about 6 percent of the portfolio of state-owned banks, has been countercyclical. A 1.0 percent rise in GDP is associated with a

Table 4
Bank Loan Sensitivity to GDP: Argentina
Second-Quarter 1996 to Second-Quarter 1999

Type of Bank	Total Loans	Personal Loans	Mortgage Loans	Commercial, Government, and Other Loans
Panel A: Unweighted Elasticities				
State-owned	0.37 (0.58)	-7.73*** (1.66)	-5.56 (7.83)	0.08 (0.77)
Number of observations	90	73	73	73
Domestic privately owned	1.44** (0.61)	-4.56*** (1.53)	-0.04 (7.17)	1.71** (0.70)
Number of observations	104	101	101	101
Foreign privately owned	0.90* (0.46)	-6.28*** (1.32)	2.87 (5.52)	1.31** (0.54)
Number of observations	143	140	140	140
Domestic private equal to foreign private?	Yes	Yes	Yes	Yes
Panel B: Elasticities Weighted by Bank Size				
State-owned	0.15 (0.47)	-8.25*** (1.66)	0.28 (1.72)	0.15 (0.60)
Domestic privately owned	1.26* (0.66)	-4.59*** (1.75)	1.06 (3.64)	1.12 (0.74)
Foreign privately owned	1.00** (0.46)	-7.44*** (1.44)	0.52 (2.73)	1.63*** (0.52)
Domestic private equal to foreign private?	Yes	Yes	Yes	Yes

Notes: Standard errors are reported beneath the average elasticities drawn from ordinary least squares regressions over the percentage change in real loans against bank fixed effects, the percentage change in real GDP, and local real interest rate differentials vis-à-vis the United States. The equality test rows ask whether statistically the coefficients on private domestic and private foreign banks are equal to each other. Some outlier observations were omitted from the regression analysis.

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Statistically significant at the 1 percent level.

7.7 percent contraction in personal lending by the average state-owned bank, with a slightly higher contraction by larger banks.

In stark contrast to state-owned banks, private banks in Argentina—both domestically owned and foreign-owned—have been significantly more responsive to economic signals in the post-Tequila Crisis period. Total lending tends to be procyclical for both domestic and foreign banks, driven by the highly procyclical nature of lending to “commercial, government, and other” clients. This type of lending is consistent with transaction-based, or arms-length, activity. The point estimate of the cyclical response by domestic private banks (at 1.44) is stronger than the response by foreign banks (at 0.90), as one would expect with domestic private banks

In stark contrast to state-owned banks, private banks in Argentina—both domestically owned and foreign-owned—have been significantly more responsive to economic signals in the post-Tequila Crisis period.

more heavily reliant on local sources of funds. Yet, despite consistent patterns in the size of point estimates, statistically we cannot reject that both private domestic banks and private foreign banks have identical proportionate lending responses to cyclical forces in Argentina.

Both types of privately owned banks also have strong countercyclical patterns of personal lending. When GDP expands by 1.0 percent, personal lending contracts by 4.6 percent for the average domestic privately owned banks and by 6.3 percent for their average foreign-owned counterparts. Finally, a comparison of elasticities from the unweighted and weighted regressions suggests that smaller domestic banks have greater credit cyclicity than the larger domestic banks, which may lend additional support to the funding composition hypothesis.

Overall, the evidence on loan activity in Argentina supports a claim of differences in behavior across state-owned banks and private banks. However, domestic and foreign private banks exhibit comparable loan behavior, coexist in the distribution of larger and smaller banks within the top twenty-five banks nationally, and have loan portfolios of similar compositions. The banks respond similarly to market signals, including real GDP growth and real interest rates. Overall, foreign-owned banks appear to have provided greater loan growth than what was observed among domestic-owned banks, while reducing the volatility of loan growth for the financial system as a whole.

Foreign banks also exhibited notable loan growth during the crisis period, suggesting that they may be important stabilizers of credit during such episodes. It is also noteworthy that state-owned banks had higher variability of lending as well as a smaller portion of this variability explained by macroeconomic fundamentals.

Mexico: Financial Reforms and Foreign Entry

In Mexico, recent efforts toward financial liberalization began in the early 1990s with the reprivatization of the financial sector, following a decade of nationalization and government-orchestrated bank consolidation.¹⁷ After several years of rapid expansion by the newly privatized banks, however, Mexico’s financial crisis—triggered by the 1994 peso devaluation—both revealed and exacerbated significant weaknesses in a large number of institutions. Since the crisis, authorities have responded with an array of support programs for financial institutions and their borrowers, intended to bolster the health of the financial sector; they have also opened the sector to foreign investment beyond the schedules originally negotiated under the North American Free Trade Agreement (NAFTA).¹⁸ Pressures on bank condition, however, remain significant and widespread and continue to be an important driver of Mexican bank behavior.

In the early 1990s, only one foreign bank, Citibank, was permitted to conduct local banking operations, accounting for less than 1 percent of total loans. With the initiation of NAFTA in 1994, restrictions on foreign bank participation Mexico were gradually eased. Initial entrants generally established very small de novo subsidiaries engaged in wholesale, nonloan banking activities. On average, each of these foreign bank operations consisted of a single branch office with less than 100 employees and captured about 0.1 percent of loan market share. As Table 5 shows, foreign banks in 1995 cumulatively represented

Table 5
Penetration of Foreign Banks into Mexican Lending Markets
Foreign Bank Loans as a Percentage of Current Loans in Each Category

Type of Lending Activity	1992	1995	1998
Consumer	0.0	0.9	11.1
Mortgage	0.0	0.0	6.4
Commercial, government, and interbank	0.2	1.0	19.7
Total loans	0.2	0.7	17.8

Source: Authors’ calculations, based on data from Comisión Nacional Bancaria y de Valores.

about 1 percent of the consumer and commercial, government, and interbank loans.

As in the Argentine experience, in the aftermath of the 1994-95 Tequila Crisis, foreign banks in Mexico began establishing a significant local retail presence (Table A4). Despite a variety of support programs, twelve Mexican banks (accounting for roughly 20 percent of total loans) failed outright, prompting the authorities to intervene. The subsequent sale of these franchises (or portions thereof) provided an avenue for foreign bank entry into, and partial recapitalization of, the Mexican retail banking sector. As outlined in Table A4, there were six foreign bank acquisitions of domestic retail operations through the end of 1998, with Spanish banks among the most active buyers. In addition, there have been six mergers of domestic banks with other domestic banks.

By 1998, foreign bank participation in the local loan market had grown from less than 1 percent prior to the crisis to 18 percent (Table 5). Foreign banks controlled two of the six largest banks (Santander Mexicano and BBV), held minority stakes in three more, and operated nineteen fully owned local subsidiaries (Table A5). However, restrictions on foreign ownership remained in place until December 1998, prohibiting foreign control of Mexico's three largest banks (in aggregate, almost 60 percent of the loan market share). In the aftermath of this liberalization, two of the three largest Mexican banks have come under foreign control.¹⁹

As shown in Table 5, foreign bank lending has been concentrated in the commercial, government, and interbank sectors, with much lower penetration of the consumer and mortgage markets. This concentration may be a function less of strategic considerations than of pervasive weaknesses in Mexico's credit environment, which has been characterized by high real interest rates, a reduced pool of creditworthy borrowers, a breakdown in borrower discipline, and a legal environment that provides little creditor protection. This pattern is supported by a noticeable shift in domestic bank loan portfolios from consumer and mortgage lending over this same period—a shift that is due in part to the government acquisition of a large portion of these loans in the wake of the crisis.

Precrisis domestic lending to the consumer and mortgage sectors represented about 30 percent of the lending portfolios of banks, a ratio very similar to that observed in Argentina (Table 6).²⁰ However, by 1998, consumer and mortgage loans accounted for less than 18 percent of domestic bank loan portfolios and only 6 percent of foreign lending. Foreign bank activity remained concentrated (93.6 percent) in the consumer, government, and interbank market.

The condition of Mexico's banks over this period has also played a significant role in influencing loan behavior. Although

Table 6
Mexican Bank Loan Portfolio Composition
As a Percentage of Total Current Loans

Type of Loan	Domestically Owned Banks			Foreign-Owned Banks		
	1992	1995	1998	1992	1995	1998
Consumer	12.0	5.6	3.3	0.3	6.9	1.9
Mortgage	16.0	22.4	14.3	2.0	0.3	4.5
Commercial, government, and interbank	72.0	72.0	82.4	97.7	92.8	93.6

Source: Authors' calculations, based on data from Comisión Nacional Bancaria y de Valores.

objective measurement of Mexican bank condition is impeded by a lack of full transparency (for example, not all banks publicly release financial statements) and by changes in accounting standards over the sample period, a measure of impaired loans as a proportion of total loans can be used as a relative indicator of the depth of asset quality problems on bank balance sheets. Impaired loans are defined here as the sum of reported nonperforming loans, restructured loans, and the full amount of loans sold to the government.

The vast majority of domestic banks (88 percent), which represent the bulk of domestic bank lending in Mexico, had impaired loan ratios (ILRs) under 10 percent at the beginning of 1994 (Table 7). By 1998, in part because of improved accounting and reporting conditions, 41 percent of the banks (representing 93 percent of total lending by domestic banks) had ILRs exceeding 30 percent. While the bulk of foreign-owned banks (90 percent) remained relatively healthy, the larger foreign-owned retail franchises (accounting for 76 percent of foreign bank lending) also had ILRs in excess of 30 percent at year-end 1998, largely reflecting postcrisis acquisitions of troubled domestic banks by foreign banks.

The Foreign Bank Effect on Loan Supply Patterns in Mexico

The data presented thus far show that foreign banks operating in Mexico have focused their efforts mainly on commercial, government, and interbank lending. Given the condition of the Mexican banking sector, the potential for a broad and positive role for healthy foreign banks therefore seems substantial. Foreign banks could be an important absolute and diversified source of credit to firms, especially in an economy in which government-operated and domestic banks are heavily focused on balance-sheet repair instead of new lending. In this

Table 7
Impaired Loan Ratios (ILRs) of Banks in Mexico

Nationality of Banks	Date	ILR: 0-10 Percent		ILR: 10-30 Percent		ILR: 30 Percent or Greater	
		Percentage of Banks	Percentage of Current Loans	Percentage of Banks	Percentage of Current Loans	Percentage of Banks	Percentage of Current Loans
Domestic	1994:1	86.4	94.4	13.6	5.5	0.0	0.0
	1998:4	58.8	7.2	0.0	0.0	41.2	92.8
Foreign	1994:1	100.0	100.0	0.0	0.0	0.0	0.0
	1998:4	90.0	24.1	0.0	0.0	10.0	75.9

Source: Authors' calculations, based on data from Comisión Nacional Bancaria y de Valores.

Note: Impaired loans are the sum of reported nonperforming loans, restructured loans, and the full amount of loans sold to the government.

environment, funds provided by foreign banks can be a source of much needed capital for local profitable growth opportunities.

Our conceptualization of differences across banks that can lead to distinct lending behaviors emphasized bank health as a potentially important issue. Given the preponderance of impaired loans among Mexican banks in the second half of the 1990s, we consider the extent to which distinctions among banks in lending behavior are evident according to broad indicators of bank health. We use the previously defined ILR as an indicator of financial condition, whereby banks with an ILR in excess of 10 percent are considered to be in relatively poor financial health.

The loan growth and associated volatility of banks operating in Mexico appear in Table 8. By sorting banks in each period according to whether their ILR falls below or exceeds 10 percent, we observe significant differences in loan growth and in the volatility of this growth between healthier and less healthy banks. These differences pertain both to domestically owned and foreign-owned banks. In general, banks with higher impaired loan ratios had more volatile loan growth rates and lower (or negative) rates of loan portfolio expansion than banks with less problematic portfolios. In terms of average quarterly growth, both domestic and foreign banks with low ILRs continued to extend credit fairly steadily in the postcrisis period. In this healthier group, smaller foreign and domestic banks grew at a quicker pace than their larger counterparts, without increasing measured volatility per unit of loan growth.

Lending by banks with low ILRs grew at high rates, leaving these banks to play an expanding role mainly in commercial finance, even as they remained a small part of the Mexican banking system (accounting for about 30 percent of the total current loans at the end of 1998). Although the full financial system continues to show small average contraction in the

postcrisis period, it is evident that the extent of this loan contraction has been reduced by the presence of foreign banks, and by healthy banks in general. As we observed in Argentina, the more extensive role played by foreign banks in Mexico does not appear to have come at the expense of greater lending volatility.

Table 8
Average Quarterly Loan Growth Rates: Mexico
Percent

Time Period	All Banks	ILR Less Than 10 Percent		ILR Greater Than 10 Percent	
		Domestic	Foreign	Domestic	Foreign
Panel A: Unweighted Average across Banks					
Precrisis	9.6	9.5	26.9	1.3	—
	(0.5)	(0.6)	(1.8)	(8.7)	—
Crisis	16.0	20.1	15.5	1.7	—
	(1.1)	(0.8)	(0.3)	(9.9)	—
Postcrisis	9.6	11.7	18.2	-1.1	7.4
	(1.1)	(1.5)	(1.2)	(5.7)	(3.1)
Panel B: Weighted Average across Banks					
Precrisis	4.5	4.4	26.9	2.0	—
	(0.8)	(0.8)	(1.8)	(6.1)	—
Crisis	8.1	8.5	15.5	5.9	—
	(1.7)	(1.6)	(0.3)	(2.2)	—
Postcrisis	-0.3	9.1	12.6	-1.5	7.4
	(21.6)	(1.7)	(1.3)	(4.5)	(3.1)

Source: Authors' calculations, based on data from Comisión Nacional Bancaria y de Valores.

Notes: ILR is impaired loan ratio. For these calculations, we drop from our data sample the observations for individual new banks that represent their initial periods of entry and expansion. Inclusion of these initial data points would otherwise artificially show a sharp increase in the loan growth of foreign banks especially, along with higher variability of growth. Normalized standard deviations are reported in parentheses.

Table 9
Bank Loan Sensitivity to GDP: Mexico
Second-Quarter 1995 to Fourth-Quarter 1998

	Total Loans	Consumer Loans	Mortgage Loans	Commercial, Government, and Interbank Loans
Panel A: Unweighted Elasticities				
Banks with impaired loan ratios under 10 percent				
Domestic banks	1.67*** (0.56)	-0.62 (0.69)	-2.02** (0.97)	1.67*** (0.57)
Number of observations	153	78	50	153
Foreign banks	0.93* (0.51)	-0.04 (1.11)	0.29 (1.40)	1.02** (0.53)
Number of observations	190	28	20	182
Domestic private equal to foreign private?	Yes	Yes	Yes	Yes
Banks with impaired loan ratios above 10 percent				
Domestic banks	0.85* (0.49)	0.09 (0.44)	0.26 (0.48)	1.35*** (0.50)
Number of observations	178	165	159	178
Foreign banks	-1.51 (1.81)	2.94* (1.55)	-0.08 (1.72)	-1.58 (1.85)
Number of observations	16	16	15	16
Panel B: Elasticities Weighted by Bank Size				
Banks with impaired loan ratios under 10 percent				
Domestic banks	1.55*** (0.49)	-0.43 (4.14)	-1.11 (2.26)	1.52** (0.65)
Number of observations	153	72	46	152
Foreign banks	0.92 (0.71)	0.40 (1.42)	0.31 (17.70)	0.93 (0.94)
Number of observations	190	26	20	181
Domestic private equal to foreign private?	Yes	Yes	Yes	Yes
Banks with impaired loan ratios above 10 percent				
Domestic banks	0.97*** (0.10)	0.15 (0.22)	-0.73*** (0.23)	1.76*** (0.15)
Number of observations	178	165	158	178
Foreign banks	-1.26*** (0.44)	2.81 (1.73)	0.26 (1.67)	-1.37** (0.59)
Number of observations	16	16	15	16

Notes: Standard errors are reported beneath the average elasticities drawn from ordinary least squares regressions over the percentage change in real loans against bank fixed effects, the percentage change in real GDP, and local real interest rate differentials vis-à-vis the United States. The equality test rows ask whether statistically the coefficients on private domestic and private foreign banks are equal to each other. For these calculations, we drop from our data sample the observations for individual new banks that represent their initial periods of entry and expansion.

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Statistically significant at the 1 percent level.

Next, we consider these lending fluctuations in the context of Mexican real demand growth and real interest rate differentials vis-à-vis the United States.²¹ Since a small number of very large banks have dominated lending activity in Mexico, we anticipate large distinctions between our results presented as averages across individual banks and averages across all lending, even when bank condition is considered. In general, however, the domestic banks with sounder reported asset-quality ratios are smaller banks engaged in limited retail lending.

For the post-Tequila Crisis period for which we have data—second-quarter 1995 through fourth-quarter 1998—our sorting of banks according to domestic versus foreign ownership and according to ILRs is highly revealing (Table 9).²² In Mexico, on an unweighted basis, the banks most responsive to cyclical fluctuations were the domestically owned ones with low nonperforming loan shares (particularly smaller banks). Indeed, behavior by these banks is strikingly similar to the behavior reported for the private banks in Argentina. Lending to commercial and other clients is strongly procyclical, consistent with transaction-based, or arms-length, lending, as was observed in Argentina. Lending to consumer and mortgage clients is in general statistically insignificantly correlated with real GDP growth in Mexico. Our conceptual framework presented earlier anticipated the finding here that the banks with lower impaired loan ratios are more responsive to fluctuations and market signals than are banks with more problematic loan portfolios.

Regarding the foreign banks operating in Mexico, there appears to be a strong behavioral distinction among banks with lower ILRs versus the few banks observed with higher ILRs. The foreign banks with low ILRs appear to behave similarly to domestically owned banks with low ILRs. As anticipated, and as observed in the Argentine case, the point estimates on responses are higher for the domestic banks in this group with low impaired loan ratios. Their larger response elasticities to GDP stimuli are consistent with domestic banks having heavier reliance on domestic sources of funds. Still, as we observed in the case of Argentine private banks, we cannot reject similar behavior by these banks with low ILRs but different nationalities of owners. The foreign banks with high ILRs behave differently from all other categories of banks in our sample, with procyclical consumer lending and countercyclical commercial and other lending.

Several findings stand out in this empirical analysis. First, bank health appears to be a key factor distinguishing the responsiveness to market signals among both domestically owned and foreign-owned banks in Mexico. Second, point estimates show more volatile lending with respect to GDP by

domestically owned banks, a finding consistent with our earlier conceptualization. Specifically, if healthy domestically owned banks (all else equal) rely more heavily on domestic sources of funding (particularly smaller banks), lending by these banks will be more sensitive to local cyclical conditions than lending by their foreign-owned counterparts. In Mexico, we observe that foreign banks with low ILRs facilitated more overall responsiveness of the financial system to market forces and were important providers of credit during the crisis period and in the subsequent period of financial system weakness. These results appear to confirm that foreign banks thus far have had a stabilizing impact on domestic financial system credit in Mexico and Argentina.

Conclusion

The Asia crisis amply demonstrated a range of deficiencies in local financial systems and precipitated calls for reform in accounting and disclosure practices, bank corporate governance, and home country supervision and regulation. It is often argued that opening domestic financial sectors to increased foreign ownership can meaningfully accelerate improvements in all three areas, and that it should be (and historically has been) a key element of reform efforts in the aftermath of a financial crisis. At the same time, various arguments emphasize the potential adverse effects of foreign ownership. To date, the postcrisis financial landscape in Asia has been characterized only by limited examples of majority foreign ownership of domestic financial institutions.

This article has sought to contribute to the debate on financial sector openness in emerging markets by reviewing the experiences of Mexico and Argentina with regard to foreign bank local lending. We conclude that in both countries, foreign banks exhibited stronger loan growth than all domestically owned banks and had lower associated volatility, contributing to greater stability in overall financial system credit. Additionally, in both countries, foreign banks showed notable credit growth during recent crisis periods and thereafter. In Argentina, there are striking similarities in the portfolio composition of lending and the volatility of lending by private foreign and private domestic banks. In Mexico, there are behavioral similarities in terms of cyclical fluctuations and loan portfolios among banks with comparable, low impaired loan ratios but different ownership. We found that domestically owned and foreign-owned banks with low problem loan ratios behave similarly, and we found no evidence that the foreign

banks were more volatile lenders than their domestic counterparts. The ranking of banks according to their responses to cyclical fluctuations is consistent with an outcome that arises when foreign banks bring to the emerging market a broader, more diversified supply of funds.

Overall, these findings suggest that bank health, and not ownership per se, has been the critical element in the growth,

volatility, and cyclicity of bank credit. Diversity in ownership has contributed to greater stability of credit in recent periods of crisis and financial system weakness. The positive Argentine and Mexican experiences could be broadly instructive for other emerging markets as they contemplate more extensive foreign bank participation in their local economies.

Appendix Tables

Table A1
Argentine Financial System: Total Lending by the Top Twenty-Five Institutions
December 1998

Ranking	Institution	Total Loans (Millions of U.S. Dollars)	Market Share (Percent)	Foreign Owner	Foreign Voting Share (Percent)/Date
1	Banco de la Nación Argentina ^a	10,113	12		
2	Banco de la Provincia de Buenos Aires ^{a,b}	8,932	11		
3	Banco de Galicia y Buenos Aires	6,744	8	O'Higgins Central Hispanoamericano	10.0/1998:4
4	Banco Río de la Plata	5,530	7	Banco Santander Central Hispano	64.3/1997:2
5	BankBoston National Association	5,259	6	BankBoston	100.0/Before 1994:2
6	Banco Francés	5,151	6	Banco Bilbao Vizcaya	58.8/1996:4
7	Citibank	4,524	5	Citibank	100.0/Before 1994:2
8	Banco Hipotecario ^a	4,122	5		
9	HSBC Banco Roberts	2,706	3	HSBC	100.0/1998:1
10	Banca Nazionale del Lavoro	2,326	3	Banca Nazionale del Lavoro	100.0/Before 1994:2
11	Banco Bansud	2,077	3	Banamex	60.0/1995:4
12	Banco Quilmes	1,506	2	Bank of Nova Scotia	70.0/1995:1
13	Banco de la Ciudad de Buenos Aires ^a	1,470	2		
14	Banco Credicoop Cooperativo Limitado	1,264	2		
15	Banco del Suquia	1,122	1		
16	Banco de la Provincia de Córdoba ^a	948	1		
17	Banco Bisel	842	1	Caisse Nationale de Crédito Agricole	30.0/1996:1
18	Banco Tornquist	794	1	O'Higgins Central Hispanoamericano	100.0/1995:4
19	Banco Sudameris Argentina	757	1	Banque Sudameris	99.9/Before 1994:2
20	Banco de la Pampa ^a	700	1		
21	ABN Amro Bank	674	1	ABN Amro	100.0/1995:2
22	Lloyds Bank	666	1	Lloyds Bank	100.0/Before 1994:2
23	Banco de Inversión y Comercio Exterior	649	1		
24	Banco Mercantil Argentino	636	1		
25	Banco Supervielle Société Générale	616	1	Société Générale	75.4/Before 1994:2
	Loan subtotal of top twenty-five institutions	70,128	85	Foreign share of top twenty-five institutions	46.4
	Total system loans	82,544	100		

Source: *Estados Contables de las Entidades Financieras*, Banco Central de la República Argentina.

^a Indicates a state-owned bank through the end of 1998.

^b Data are as of November 1998.

Appendix Tables (Continued)

Table A2
Summary of Argentine Bank Mergers
December 1998

Acquired Bank	Acquiring Bank	Date of Acquisition
Foreign banks acquiring domestic banks		
Banesto Shaw	Banamex, via Bansud	1995:4
Del Sud	Banamex, via Bansud	1995:4
Crédito Argentino	Bilbao Vizcaya	1997:3
Quilmes ^a	Bank of Nova Scotia	1997:4
Roberts	HSBC	1998:1
Río de la Plata	Santander	1997:2
Francés	Bilbao Vizcaya	1996:4
Foreign banks acquiring foreign banks		
Crédit Lyonnais ^b	O'Higgins Central Hispanoamericano	1996:1
Deutsche Bank	BankBoston	1997:1

^aQuilmes was effectively controlled by Bank of Nova Scotia by first-quarter 1995, although a majority stake was not acquired until third-quarter 1997.

^bFormerly Tornquist.

Table A3
Bank Loan Sensitivity to GDP: Argentina
Second-Quarter 1994 to First-Quarter 1996

Type of Bank	Total Loans	Personal Loans	Mortgage Loans	Commercial, Government, and Interbank Loans
Panel A: Unweighted Elasticities				
State-owned	0.10 (0.53)	1.30 (1.63)	2.17 (3.23)	-0.19 (0.58)
Number of observations	52	45	45	45
Domestic privately owned	0.00 (0.38)	-2.50** (1.08)	-3.41 (2.14)	0.52 (0.39)
Number of observations	99	99	98	99
Foreign privately owned	0.37 (0.46)	0.74 (1.30)	0.57 (2.74)	0.33 (0.47)
Number of observations	65	65	59	65
Domestic private equal to foreign private?	Yes	No*	Yes	Yes
Panel B: Elasticities Weighted by Bank Size				
State-owned	0.06 (0.30)	0.87 (1.78)	0.39 (0.32)	-0.24 (0.37)
Domestic privately owned	0.16 (0.30)	-2.90*** (1.09)	-0.28 (0.59)	0.31 (0.32)
Foreign privately owned	0.56 (0.40)	0.63 (1.32)	0.79 (0.76)	0.49 (0.44)
Domestic private equal to foreign private on GDP?	Yes	No**	Yes	Yes

Notes: Standard errors are reported beneath the average elasticities. These results are drawn from ordinary least squares regressions over the percentage change in real loans against individual bank fixed effects, the percentage change in real GDP, and local real interest rate differentials vis-à-vis the United States. The equality test rows ask whether statistically the coefficients on private domestic and private foreign banks are equal to each other. Some outlier observations were omitted from the regression analysis.

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Statistically significant at the 1 percent level.

Appendix Tables (Continued)

Table A4
Summary of Mexican Bank Mergers
December 1998

Acquired Bank	Acquiring Bank	Date of Intervention	Date of Acquisition
Foreign banks acquiring domestic banks			
Merprob	Bilbao Vizcaya	—	1996:1
Oriente	Bilbao Vizcaya	1995:1	1996:3
Cremita	Bilbao Vizcaya	1994:3	1996:3
Mexicano	Santander Mexicano	—	1997:2
Confía	Citibank	1997:3	1998:3
Alianza	GE Capital	—	1997:4
Domestic banks acquiring domestic banks			
Unión	Bancomer	1994:3	1995:2
Obrero	Afirme	1995:2	1997:1
Sureste	Internacional (BITAL)	1996:2	1998:1
Atlántico	Internacional (BITAL)	1997:4	1998:1
Centro	Mercantil del Norte	1995:3	1997:2
Banpaís	Mercantil del Norte	1995:1	1997:3
Foreign banks acquiring foreign banks			
Chemical	Chase	—	1996:2
Santander de Negocios	Santander Mexicano	—	1997:4

Source: Effective dates of acquisitions, mergers, and interventions were compiled by the authors from press reports and data provided by Comisión Nacional Bancaria y de Valores.

Appendix Tables (Continued)

Table A5
Mexican Financial System: Total Lending by Institution
December 1998

Mexican Institution	Total Loans (Millions of Pesos)	Share (Percent)	Foreign Ownership/ Country	Stake (Percent)/ Entry Date
Banamex	186,245	21.3	None	
Bancomer	191,407	21.9	Bank of Montreal/Canada	17/March 1996
Serfin	115,680	13.3	HSBC, J.P. Morgan/United States	29/December 1997
Bital	56,897	6.5	Santander, BCP/Spain	16/September 1993
Santander Mexicano	49,618	5.7	Santander/Spain	52/September 1997 ^a
Bilbao Vizcaya	52,899	6.1	BBV/Spain	67/March 1996 ^a
Centro	21,305	2.4	None	
Mercantil del Norte	25,003	2.9	None	
Banpaís	27,132	3.1	None	
Citibank	16,900	1.9	Citibank/United States	100/December 1991 ^a
Interacciones	3,145	0.4	None	
Inbursa	21,999	2.5	None	
Mifel	2,202	0.3	None	
Invex	1,702	0.2	None	
Banregio	1,358	0.2	None	
Del Bajío	2,912	0.3	Sabadell/Spain	10/December 1998
Quadrum	1,411	0.2	None	
Ixe	2,482	0.3	None	
J. P. Morgan	1,327	0.2	J. P. Morgan/United States	100/September 1996 ^a
Chase Manhattan	9	0.0	Chase Manhattan/United States	100/June 1996 ^a
Afirme	4,991	0.6	None	
Fuji Bank	831	0.1	Fuji Bank/Japan	100/June 1995 ^a
Bank of Tokyo - Mitsubishi	907	0.1	Bank of Tokyo - Mitsubishi/Japan	100/March 1995 ^a
Bank of America	989	0.1	Bank of America/United States	100/June 1995 ^a
ABN Amro Bank	537	0.1	ABN Amro Bank/Netherlands	100/September 1995 ^a
Republic National Bank	605	0.1	Republic National/United States	100/September 1995 ^a
Banco de Boston	518	0.1	Bank of Boston/United States	100/December 1995 ^a
B. N. P.	1,002	0.1	B. N. P./France	100/December 1995 ^a
Bansí	663	0.1	None	
Dresdner Bank	2,414	0.3	Dresdner/Germany	100/March 1996 ^a
Société Générale	445	0.1	Société Générale/France	100/March 1996 ^a
I. N. G. Bank	1,460	0.2	I. N. G. Bank/Netherlands	100/June 1996 ^a
First Chicago	66	0.0	First Chicago/United States	100/September 1996 ^a
GE Capital (Alianza)	1,005	0.1	GE Capital/United States	100/December 1997 ^a
American Express	391	0.0	American Express/United States	100/June 1996 ^a
Nations Bank	64	0.0	Nations Bank/United States	100/December 1996 ^a
Comerica Bank	2,410	0.3	Comerica Bank/United States	100/September 1997 ^a
Total	872,485	100.0		

Source: *Boletín Estadístico de Banco Múltiple*, Comisión Nacional Bancaria y de Valores.

^aForeign controlled.

Endnotes

1. We define foreign-owned as reflecting majority control; this definition does not necessarily imply majority share ownership.

2. Some of these arguments parallel those supporting the repeal in the United States of the McFadden Act, which restricted interstate bank branching and limited diversification of U.S. bank loan portfolios. Meltzer (1998), for example, emphasizes the importance of risk diversification as an argument for removing legal and regulatory obstacles to bank branching internationally.

3. Other research considers the postliberalization dynamics of deposit taking and its responsiveness to bank riskiness in Mexico, Argentina, Chile, and Canada (Martinez Peria and Schmukler 1999; Gruben, Koo, and Moore 1999).

4. Demircug-Kunt, Levine, and Min (1998) present similar results.

5. Burdisso, D'Amato, and Molinari (1998) also show that bank privatization increased Argentine bank efficiency, and that the consolidation of retail banking led to scale-efficiency gains. Privatization led to reduced portfolio risk and more efficient allocation of credit.

6. This section closely follows Goldberg (2000). In a domestic banking system, arguments about lending sensitivity to fluctuations follow the tradition of Peek and Rosengren (1997, 2000) and Hancock and Wilcox (1998).

7. As argued by Peek and Rosengren (1997) and Hancock and Wilcox (1998), local demand deposits are positively correlated with the local business cycle.

8. Of course, increased use of foreign sources of funds can also make lending in emerging markets more sensitive to foreign cyclical fluctuations.

9. This distribution is documented in Table A1; the timing of acquisitions of domestic banks is documented in Table A2.

10. Our sample of Argentine bank data was constructed by identifying and including all data for all banks that were among the twenty-five largest in any sample year. This resulted in a total sample of thirty-seven institutions, with as few as twenty-five and as many as thirty-two in any given quarter. All loan data discussed are measured in real terms, constructed using consumer price index (CPI) deflators. Loan data are from various issues of *Información de Entidades Financieras*

(formerly *Estados Contables de las Entidades Financieras*), a publication of Banco Central de la República Argentina. In addition, Argentine real GDP data are from the Board of Governors of the Federal Reserve System (in thousands of 1986 pesos); the real interest rate was calculated using the nominal interest rate (period average); the CPI series is from *International Financial Statistics*.

11. These findings are consistent with the observations of Burdisso, D'Amato, and Molinari (1999).

12. To compute the reported statistics, we first calculate the percentage change in current loan volumes for each individual bank within each period. Unweighted and weighted averages of these loan growth rates are then constructed by period. The mean and normalized standard deviations of these series over respective periods of time and for respective samples of banks are reported in Table 3 for Argentina and in Table 8 for Mexico.

13. State-owned banks include Banco de la Provincia de Buenos Aires, Banco de la Nación Argentina, Banco Hipotecario, Banco de la Ciudad de Buenos Aires, Banco de las Provincia de Córdoba, Banco de la Pampa, Bice, Caja Ahorro, and Banco Social de Córdoba.

14. Specifically, we perform ordinary least squares regressions over the time-series panels of individual bank data. The percentage change in real loans (nominal loans deflated by the CPI) is regressed against the percentage change in real GDP, levels of real interest differentials vis-à-vis the United States, and bank-specific fixed effects. Regressions test for differences in estimated responses across banks in relation to public, private domestic, or foreign ownership. "Gaps" in loan series—defined as missing observations with nonmissing observations for the time periods immediately before and after them—are filled in by taking the mean of the surrounding observations.

We also have generated results (available from the authors) based on an alternative methodology, using clustering of errors by quarter across all banks. This approach specifies that the observations are independent over time (clusters) but are not necessarily independent within a period. The error-correction algorithm affects the estimated standard errors and variance-covariance matrix of the estimators, but not the estimated coefficients. In general, as implemented, this approach provides a more conservative view of the statistical significance of the estimated elasticities with respect to GDP and other time-series variables. The terms that are marginally significant at the 10 percent level sometimes lose statistical significance at this level.

Endnotes (Continued)

15. In the regression results presented for Argentina and Mexico, we do not report coefficients on interest rate terms. In all regressions, the estimated coefficients are small, so a 1-percentage-point increase in the interest rate differential is associated with a 0.01 to 0.03 percent change in loan volumes. These estimated effects often are not statistically significant. Generally, we cannot reject equality of interest rate coefficients on lending by domestic and foreign banks.

16. This general insensitivity to market signals also characterized the loan volumes of public banks in the precrisis and crisis periods for which we have data: second-quarter 1994 to first-quarter 1996 (Table A3, panels A and B).

17. During the nationalization of the Mexican banking system, only two banks remained independent: Citibank, which had been active in Mexico since 1929, and domestically owned Banco Obrero.

18. See Graf (1999), among others, for an extensive discussion of these reforms.

19. These foreign acquisitions are not reflected in the available data, which ended with 1998.

20. Our sample of Mexican banks includes all banks active in Mexico each year, where data are provided by the Comisión Nacional Bancaria y de Valores. This sample comprises a universe of fifty-nine banks over

the 1990s, although the number of banks active in any given quarter varies because of bank closures, mergers, and acquisitions, as well as the establishment of de novo operations. The number of banks included in the analysis ranges from a low of twenty in 1991 and 1992 to a high of fifty-three in 1996; there were thirty-seven at year-end 1998.

21. Raw Mexican loan data exhibit many extreme observations related to new bank entry, government intervention, mergers, and acquisitions. We eliminate extreme single-quarter changes from our sample.

22. We present results using ILRs above 10 percent. Broadly similar results also arose using higher ratios (20, 30, 50 percent). The main difference is that the higher the ILRs of domestic banks, the lower their estimated responsiveness to cyclical fluctuations. Our regression results for domestic unhealthy banks are potentially biased by the fact that once a bank is intervened by the Mexican government, data for that bank generally become unavailable. We have a total of seventeen intervened banks in our sample; if we had data for all intervened banks through the end of the sample period, we would have an additional 100 observations of unhealthy banks to use in the regressions. If we assume that intervened banks would on average be less responsive to market signals than nonintervened banks, then we would expect to see less responsiveness for this bank class as a whole if we had access to a more complete data set for Mexico.

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Asia's Trade Performance after the Currency Crisis

- Countries experiencing an abrupt shift from large capital inflows to large outflows need to make a matching improvement in their current account balance.
- In 1997-98, the Asian crisis countries achieved such an improvement primarily through lower spending on imports, measured in dollars terms.
- However, a breakdown of trade flows into price and volume components reveals that higher export volumes, as well as lower import volumes, contributed to the current account adjustment.
- Dollar import and export prices fell together, with both tied to world prices.
- Export volumes rose as world demand outside of Asia grew, while import volumes declined sharply with the fall in domestic activity in the crisis countries.

The Asian currency crisis of 1997-98 was characterized by an abrupt reversal of foreign capital flows. Before the crisis, foreign capital inflows had allowed the crisis countries to attain a higher level of investment spending than could have been supported by domestic saving alone. Domestic and foreign investors suddenly lost confidence, liquidating their local asset holdings, and moving their capital to the safety of the United States and other countries. For the crisis countries, the shift from capital inflows to outflows had to be matched by their current account balances moving from deficit to surplus.

The improvement in the crisis countries' current account balances was achieved through lower dollar imports, with dollar exports relatively unchanged. This picture, though, becomes richer when trade flows are viewed in terms of the volume of goods being shipped and the prices for these goods. With this breakdown, the flatness of exports is seen as a result of falling export prices masking increases in export volumes. Dollar imports dropped because both the volume of goods imported and the price of these goods fell sharply.

Simple trade models are used to flesh out the factors that drove the trade adjustment in South Korea and Thailand during the Asia crisis. The price models have dollar import and export prices tied to the country's dollar exchange rate and world prices for tradable goods. Export volumes (dollar exports deflated by dollar export prices) are tied to foreign

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demand and relative prices (export prices divided by foreign prices), while import volumes are tied to domestic demand and relative prices (import prices relative to local prices).

A key observation is that import and export prices roughly tracked each other, with both tracking the behavior of world tradable goods prices. Indeed, trade prices were falling throughout Asia by similar magnitudes, regardless of how much each country's currency depreciated. For both Thailand and Korea, import and export prices largely followed world export prices. For Thailand, the import and export price indexes did not seem to have been influenced much by the baht's value, while those for Korea did appear to have been pushed down further by the won's fall.

If import and export prices tended to move together during the currency crisis, then the bulk of the current account improvement had to be achieved through changes in trade volumes. Export volumes for both countries grew, helped by strong demand growth, on average, in the rest of the world. However, the jump in export volumes from both strong foreign demand and more competitive export prices was not enough to keep the value of exports from falling. With imports, the steep fall in domestic demand caused the volume of imported goods to collapse. Overall, the decline in local economic activity, due to the withdrawal of domestic and foreign capital, was the main factor behind the dramatic improvements in the current account balances of the crisis countries.

Linking Capital Flows and the Current Account Balance

The reversal of capital inflows to Asian countries hit by the crisis and the improvement in the current account balances are two features of the same underlying phenomenon.¹ Specifically, capital flows in or out of a country are related to domestic saving and investment spending as follows:

$$(1) \text{ net foreign investment} = \text{domestic saving} \\ - \text{domestic investment.}$$

Simply put, a country invests abroad when it has more savings than needed to finance domestic investment expenditure.² Such a country sends its surplus saving abroad to buy foreign assets. This stream of surplus saving is net foreign investment or net capital outflow, making the country a net lender to the rest of the world. Correspondingly, a country that invests more than it saves is a net borrower from the rest of the world. Adding up all the countries, the amount of world net borrowing must equal world net lending.

The current account balance also represents the extent of a country's net borrowing or lending.³ A country is lending to the world when the value of the goods it sells abroad (exports) exceeds the value of the goods it receives in exchange (imports). Such a country accepts foreign IOUs, in the form of increased holdings of foreign assets, to finance the gap between exports and imports. Likewise, a country is borrowing from the rest of the world when it buys more than it sells. The change in a country's debt is the same whether viewed as financing the gap between imports and exports or financing the gap between domestic investment and saving. So, the current account balance is related to domestic saving and investment spending:

$$(2) \text{ current account balance} = \text{domestic saving} \\ - \text{domestic investment.}$$

The right-hand side of equation 2 is identical to the right-hand side of equation 1, meaning that a current account surplus is matched by an equal net outflow of investment funds overseas. By the same logic, a current account deficit is matched by an equal net inflow of foreign investment funds. This is a necessary insight for understanding the Asia crisis. Namely, when a crisis country goes from enjoying capital inflows to experiencing capital outflows, there must be a drop in investment spending relative to domestic saving and a swing from a current account deficit to a current account surplus.

Reversal in Foreign Capital Flows

Foreign capital flows into the four crisis-hit Asian countries (AC4)—Indonesia, Korea, Malaysia, and Thailand—were substantial during the precrisis years.⁴ Each experienced large current account deficits, meaning that funds borrowed from abroad (a capital inflow) financed a large portion of domestic investment spending. In 1996, the net capital inflow to these four countries climbed to \$50 billion, allowing these economies to maintain a higher rate of investment spending than could be supported by domestic saving alone (Table 1). Indeed, in 1996, surplus foreign saving financed more than 11 percent of domestic investment spending in Indonesia and Malaysia, 12 percent in Korea, and 20 percent in Thailand.⁵

The reversal of this capital inflow was swift when currency and financial turbulence hit the region, beginning with Thailand in mid-1997.⁶ Net capital inflows declined to \$21 billion for 1997 as a whole, but were close to zero during the second half of the year. In 1998, the AC4 had net capital outflows of \$68 billion.⁷ That is, over the course of two years there was a swing of \$118 billion in international capital flows.

Table 1
Net Capital Flows
Billions of Dollars

Country	1996	1997	1998	Change in 1996-98
Korea	-23.0	-8.2	40.6	63.6
Thailand	-14.7	-3.0	14.2	28.9
Indonesia	-7.7	-4.9	4.0	11.6
Malaysia	-4.6	-4.8	9.5	14.1
Total	-49.9	-20.8	68.3	118.2
Memo:				
United States	-129.3	-143.8	-220.6	-91.3

Source: International Monetary Fund.

Note: Data are based on the current account balances, which include the trade balance for goods and services, the balance for factor services, and unilateral transfers.

Instead of receiving funds, these crisis countries were now required to devote substantially less to investment spending to accommodate investors wanting to take capital out of the AC4 countries.

Matching Reversal in Trade Flows

This article focuses on one part of the Asian currency crisis, namely, the mechanism through which the current account balance improved to match the reversal in capital flows. In particular, we study the question of what forced the merchandise balance—which makes up most of the current account balances—to move from deficit to surplus.

In the Asia crisis, almost all the adjustment in the merchandise trade balance was from steep declines in imports measured in dollar terms. The left column of Table 2 shows that dollar purchases from the United States, Japan, and the European Union fell as the AC4 severely cut back their demand for foreign goods. Dollar exports, listed in the middle column, remained essentially unchanged, although the flatness of the total masks significant differences in sales across countries. While exports to the United States and Europe increased, exports to Japan and the rest of Asia declined due to recessions in those countries.

Table 2
Merchandise Trade: Changes from 1996
to 1998
Billions of Dollars

Country	Imports	Exports	Net
Korea			
United States	-12.9	0.8	13.7
Japan	-14.6	-4.3	10.2
European Union	-10.6	1.3	11.9
Developing Asia	-3.2	-4.1	-0.9
Other and nonspecified	-15.8	9.0	24.8
Total	-57.1	2.6	59.7
Thailand			
United States	-3.3	2.6	5.8
Japan	-9.3	-1.7	7.5
European Union	-4.2	1.2	5.4
Developing Asia	-3.8	-1.5	2.2
Other and nonspecified	-3.8	0.3	4.0
Total	-24.3	0.8	25.1
Malaysia			
United States	-1.3	2.0	3.3
Japan	-8.3	-2.7	5.6
European Union	-4.6	1.2	5.8
Developing Asia	-1.9	-5.2	-3.4
Other and nonspecified	-0.4	1.8	2.2
Total	-16.6	-3.0	13.6
Indonesia			
United States	-2.5	1.8	4.3
Japan	-3.4	-3.0	0.5
European Union	-4.4	1.0	5.3
Developing Asia	0.7	3.3	2.6
Other and nonspecified	-2.3	2.1	4.5
Total	-11.9	5.2	17.2

Source: International Monetary Fund.

The improvement in the trade balances of the AC4 was fairly equally distributed among the United States, Europe, and Japan, with the exception of Indonesia's balance with Japan. Japan accounted for a roughly equal share of the current account improvement in the AC4 even though Japan was buying less from the crisis countries, while the United States and Europe were buying more. This was because export sales from Japan to the AC4 fell more than did export sales from the United States and Europe.⁸

Decomposing Trade Flows into Price and Volume Components

The AC4 countries saw their trade balances improve dramatically, with imports falling sharply while exports were largely flat. To better understand this behavior, it is useful to decompose imports and exports into their price and volume components. For example,

$$(3) \text{ dollar value of exports} = \text{export price (in dollar terms)} \times \text{export volume.}$$

That is, the dollar value of exports equals the dollar price times the volume of goods sold.⁹ Any change in exports can be viewed, then, as some combination of changes in the price of export goods and the volume of export sales.

Table 3 uses this framework to break down dollar trade flows for the AC4 countries into their price and volume components. On the export side, crisis country sales stagnated in dollar terms because moderate-to-robust growth in export volumes was countered by declines in export prices. The offset was almost one-to-one for Korea. From 1996 to 1998, higher export volumes raised sales by \$36 billion, but lower export

Reinforcing price and volume movements resulted in essentially all of the adjustments in [the four crisis countries'] dollar trade balances occurring on the import side.

prices reduced the value of these sales by \$33 billion. The offset was more than one-to-one for Thailand, Indonesia, and Malaysia. The increase in export volumes was not enough to counter the price decline causing the dollar value of export sales to fall. These offsetting price and volume movements explain why little or none of the adjustments in AC4 dollar trade balances occurred on the export side despite the currency depreciations, which improved the price competitiveness of AC4 goods in the world markets.

Both import prices and volumes for the AC4 countries fell, with the exception of a reported increase in import volumes for Indonesia.¹⁰ For Korea, the decline in import volumes lowered imports by \$28 billion, while lower import prices pushed down the dollar value of imports by an additional \$29 billion. The pattern was much the same for the other crisis countries. These reinforcing price and volume movements resulted in essentially all of the adjustments in AC4 dollar trade balances occurring on the import side.

Table 3
Merchandise Trade: Decomposition of Changes in Balance
Billions of Dollars

Country	Exports	Imports	Balance
Korea			
1996	129.7	150.3	-20.6
1998	132.3	93.3	39.0
Change	2.6	-57.0	59.6
Price effect	-33.4	-29.4	-4.0
Volume effect	36.0	-27.7	63.7
Thailand			
1996	55.8	72.4	-16.6
1998	54.8	43.1	-22.3
Change	-1.0	-29.3	28.3
Price effect	-8.8	-7.4	-1.4
Volume effect	7.8	-21.9	29.7
Indonesia			
1996	49.8	42.9	6.9
1998	48.8	27.3	-22.3
Change	-1.0	-15.6	14.6
Price effect	-18.3	-17.9	-0.4
Volume effect	17.3	2.3	15.0
Malaysia			
1996	92.3	90.9	1.4
1998	82.7	66.9	-22.3
Change	-9.6	-24.0	14.4
Price effect	-14.0	-11.5	-2.5
Volume effect	4.4	-12.4	16.8

Source: International Monetary Fund.

Notes: The trade flow and price data refer to merchandise imports and exports for Korea and Thailand, and to national income and product accounts (NIPA) for imports and exports for Indonesia and Malaysia. NIPA trade figures include trade in nonfactor services.

Table 4 places AC4 export and import price movements in a broader setting, comparing them with price movements elsewhere in the Pacific Rim region and with an index for the world as a whole. Dollar export price indexes were down substantially in the AC4 countries from 1996 to 1998, ranging from a 14.7 percent decline for Thailand to a 30.4 percent decline for Indonesia. Notably, however, the declines in dollar export prices fell far short of the corresponding declines in currency values. In addition, dollar export prices also declined substantially elsewhere in the Pacific Rim, despite far more modest currency depreciations. Indeed, large currency declines for Thailand and Malaysia did not cause their prices to move out of line with prices in other noncrisis Asian countries. (Export prices for the Philippines are an exception.) A similar

Table 4
Trade Prices after the Crisis
Percentage Change: 1996–98

Country	Export Prices	Import Prices	Exchange Rate
Crisis countries			
Indonesia	-30.4	-39.9	320.7
Korea	-22.3	-21.8	79.8
Malaysia	-14.8	-13.7	56.3
Thailand	-14.7	-12.2	62.3
Other Pacific Rim countries			
Australia	-18.7	-14.9	24.5
Hong Kong	-5.3	-7.2	0.1
Japan	-14.2	-15.0	20.3
Philippines	11.3	-3.4	56.0
Singapore	-18.6	-18.5	18.7
Taiwan	-11.6	-18.5	21.9

Memo: World prices after the Asia crisis

	Percentage Change 1996-98
Manufactures	-10.8
Oil	-37.8
Non-oil commodities	-17.6

Source: Oxford Economic Forecasting.

Notes: All data refer to percentage changes in dollar prices from 1996 to 1998. The trade price data refer to merchandise imports and exports, where possible. Due to data limitations, the price data for Indonesia, Malaysia, and the Philippines are from national income and product accounts, so imports and exports include merchandise trade and trade in nonfactor services. The world price of manufactured exports is calculated by Oxford Economic Forecasting as a trade-weighted average of the dollar export price of nonfuel exports for twenty-three countries, with the weights based on shares of world exports. The oil price series refers to the dollar spot price of a barrel of Brent crude. The series for world non-oil commodity prices is a dollar-based aggregate constructed by the International Monetary Fund in its *International Financial Statistics*.

pattern holds for dollar import prices, with large declines in both the AC4 countries and elsewhere in the Pacific Rim.

Trade prices fell worldwide during this period. Oxford Economic Forecasting calculates an index of export prices for merchandise goods from twenty-three of the largest exporting countries.¹¹ This world index fell 10.8 percent between 1996 and 1998. One factor was the drop in world prices for oil and non-oil commodities during this period, in part because of the slowdown in Japan and the rest of Asia. This global price decline raises the question, were the export and import price declines for the AC4 driven by the countries' steep currency

depreciations, or were they largely following global trends?¹² To answer this question, in the following section we examine the relative importance of world prices and exchange rate developments in explaining the behavior of trade prices.

Exchange Rates and Prices

In the early months of the Asian currency crisis, many observers predicted that the United States and other industrial countries would soon be flooded with a wave of cheap goods from the AC4. The argument was that reduced currency values would allow AC4 producers to lower their dollar export prices while maintaining healthy profit margins, since their production costs are largely denominated in local currency terms. As seen above, dollar prices for AC4 exports did fall significantly, but in some cases not by much more than those of other Asian countries that had more modest currency declines.

One factor to consider in interpreting pricing behavior is that developing countries often export commodity-like products, such as raw materials, steel, or textiles, for which close substitutes are available. As a result, local producers of these goods have little or no influence over the dollar prices of their exports, which are instead set by world supply and demand conditions. Output is sold at the prevailing world dollar price and the exchange rate for any particular country has no consequences on the price competitiveness of its commodity-like exports.

A currency collapse can, nevertheless, boost export volumes of commodity-like goods by lowering a country's production costs. Firms tend to set export sales at a level where their marginal cost of production equals the world price. A currency depreciation may not change the dollar price of exports, but it does lower the dollar costs of labor and other inputs. Consequently, domestic exporters have a profit incentive to produce more exports, up to the point where the higher marginal cost from increased production equals the dollar export price.

The magnitude of any such increase in export production is limited by how much costs fall with a currency decline. The dollar cost of domestic labor and other local inputs shrinks, but the dollar price of imported inputs must be considered along with any sensitivity in domestic input prices, as well as the cost of capital to exchange rate movements. If dollar production costs fall less than these considerations, then there is less profit incentive for firms to increase their export sales. Dependency

on imported inputs therefore restrains export volumes from rising following a currency decline.

This observation holds for exports from factories that assemble imported components and then ship these items back out of the country. Such products will have stable dollar production costs and consequently stable export prices following a currency crisis because local labor and material costs are a small share of the item's value.¹³

The discussion of pricing behavior can be broadened to include items for which close, but not perfect, substitutes are available elsewhere. A firm producing a noncommodity-like

The export-pricing behavior of firms in developing countries is influenced by world export prices and the local exchange rate.

good has some control over its prices because it has less direct competition. The profit-maximizing strategy for such a firm is to set the level of prices according to how responsive foreign demand is to changes in dollar prices. For exporting firms, dropping the dollar price of their exports in proportion to the local currency's decline in value would move them away from the profit-maximizing dollar price based on the demand characteristics of their foreign customers. As a consequence, firms in a crisis country moderate any decline in dollar export prices. They therefore gain both a higher export volume from the modest price discount and a higher profit margin on each item exported.¹⁴

In sum, the extent of any fall in dollar export prices following a currency crisis is limited by various factors. For commodity-like goods, dollar export prices are dictated by world supply and demand conditions. These prices are largely unaffected by a specific country's devaluation, although for a broad-based phenomenon like the Asia crisis, there can be feedback to world prices through lower global activity. Prices for noncommodity-like goods are not as closely tied to world prices and can change in response to any currency swing. The extent of any price adjustment to exchange rates, though, is limited since exporters of these goods want to keep dollar prices stable near the level dictated by foreign market conditions.

The Korean and Thai Experiences

Import and Export Prices

Data were collected for Korea and Thailand for a more detailed examination of import and export pricing behavior (see Box 1 for an empirical analysis). The two countries provide some contrasts in the level of development and export orientation. Korea is a relatively large, middle-income country, and a major exporter of metal products, automobiles, and electronic equipment. Thailand is a smaller, newly industrializing country, and remains primarily a commodity exporter, although it also functions as an assembly platform for electronic components produced elsewhere.

As discussed above, the export-pricing behavior of firms in developing countries is influenced by world export prices and the local exchange rate. A country that exports mostly commodity-like goods would have dollar export prices move proportionally to world dollar export prices, leaving prices relatively unaffected by the exchange rate. A more developed country, with a greater share of noncommodity-like exports, would have its export prices more affected by any change in currency values.

Chart 1 depicts graphically Korean and Thai export prices and the index of world export prices found in Table 4. The dollar exchange rates are also included, although note that the exchange rates are inverted to dollar/won and dollar/baht rates so that prices and exchange rates move in the same directions. For the first half of the 1990s, exchange rates were fairly stable, particularly in Thailand, and each country's export prices were largely unchanged, as was the world export price index. With the crisis, Korean export prices fell with the won at the end of 1997, dropping below the world export price index, suggesting that Korean exporters took advantage of the currency decline to boost their price competitiveness on world markets. The story is somewhat similar for Thailand, with its export prices falling relative to the world price index. The decline, though, is not as large as it was for Korean export prices, even though the baht and the won weakened to about the same extent. This is consistent with the observation that Thai exports tend to be more commodity-like or more dependent on imported components than Korean goods and thus less prone to deviate from world export prices.

Import prices in each country largely followed export prices (Table 4). Korean import prices fell below world export prices

when the won depreciated, while Thai prices fell less sharply, implying that foreign firms were more likely to discount prices in Korea than in Thailand. One explanation for the difference in price behavior is that there is a greater range of locally produced alternatives in Korea, which put more pressure on foreign suppliers to cut prices in order to maintain sales. In addition, the assembly operations in Thailand rely on components from parent operations for which the issue of price discounting is not relevant.

Trade Volumes

Trade volumes depend on both the overall demand and the price of the goods being traded relative to domestically produced alternatives. Demand reflects all purchases, for both domestic and imported goods. For example, if local demand falls, then import volumes tend to fall along with the rest of the economy. Relative prices influence, for any given level of demand, consumer choice between foreign and domestic

Box 1

Empirical Analysis of Long-Run Pricing Behavior

Export Prices

To model export price behavior, consider an equation of the form:

$$(1) \quad x_t = \alpha_0 + \alpha_1 \times wpx_t + \alpha_2 \times e_t + \varepsilon_t,$$

where px_t is the country's export price index at time t , measured in dollar terms, and wpx_t is an index of world export prices, also measured in dollar terms. (These series were used in Table 4.) The exchange rate is e_t , in units of local currency per dollar, and ε_t is a random error term. (All variables are in natural logarithms.)

The cointegration method is used to measure the long-run relationship for the three variables.^a For Korea, both world prices and exchange rates are important in determining the long-run behavior of Korean export prices (see table).^b The estimates

indicate that Korean dollar export prices respond essentially one-to-one to a change in world dollar prices. The won is also an important factor, with the estimate indicating that a 1.0 percent won depreciation is correlated with a 0.25 percent decline in dollar export prices. The error-correction coefficient indicates that any gap between actual and "long-run" values for dollar export prices erodes at a rate of about 15 percent per quarter. Ignoring any effects of the exchange rate on world export prices, this implies that roughly 50 percent of any divergence disappears, on average, over four quarters, and 75 percent disappears over eight quarters. The results for Thailand show that Thai export prices are also tied to world prices, but appear to be unaffected by the exchange rate as the coefficient on the exchange rate is statistically insignificant from zero.

Import and Export Price Regressions

	Korea		Thailand	
	Dollar Export Prices	Dollar Import Prices	Dollar Export Prices	Dollar Import Prices
World export prices	1.04 (.06)	0.94 (.07)	1.14 (.08)	1.54 (.07)
Exchange rate	-0.25 (.06)	-0.24 (.06)	.01 (.24)	-.09 (.07)
Adjusted R ²	0.93	0.85	0.91	0.95
Error-correction coefficient	-0.15 (.06)	-0.43 (.19)	-0.14 (.05)	-0.23 (.05)
Trace statistic	33.9	35.6	36.1	42.3
5 percent critical value	34.9	34.9	34.9	34.9
Observations	68	68	68	68

Source: Authors' calculations, based on data from Oxford Economic Forecasting.

Notes: The sample period is 1982:1 to 1998:4. All variables are in natural logarithms. World export prices are a trade-weighted average of the dollar price of nonfuel exports for twenty-three countries, with the weights derived from relative shares of total world exports. For Korea, this index was adjusted to exclude Korean data. Thailand is not in the index. For imports, world export prices are a weighted average of the dollar price of nonfuel exports for fifteen trading partners, with the weights derived from relative shares of Korean or Thai imports in 1995. The Johansen (1991) trace statistic tests for the presence of a cointegrating relationship among the variables studied. The Newey-West adjusted standard errors are in parentheses.

Import Prices

The estimated equation treats dollar import prices as a function of world dollar prices and the exchange rate:

$$(2) \quad m_t = \alpha_0 + \alpha_1 \times wpxm_t + \alpha_2 \times e_t + \varepsilon_t,$$

where pm_t is the country's import price, measured in dollar terms, $wpxm_t$ represents world dollar export prices, also measured in dollar terms, and ε_t is a random error term.

The measure of world prices for the import price equations differs somewhat from the one used for export prices to make it more specific to each country's trade flows. The import-weighted world export price measure is an average of export prices for fifteen Korean and Thai trading partners, with the weights based on 1995 import shares.

The coefficient estimates suggest that both world prices and exchange rate variables are important in understanding the pricing behavior of foreign producers selling in Korea. A 1.0 percent increase in world export prices is estimated to raise dollar import prices by roughly 1.0 percent over the long run, while a 1.0 percent currency depreciation is estimated to lower dollar import prices by 0.25 percent.^c Foreign firms apparently respond to a weaker won

by cutting dollar prices and lowering their profit margins in order to moderate any drop in sales volumes.

The exchange rate's impact on Thai import prices is not evident, as the coefficient on the baht exchange rate is not statistically distinct from zero. The estimates indicate that a 1.0 percent increase in the world dollar price raises Thai import prices by 1.6 percent. This is higher than expected, since it would seem that Thai prices should move fairly proportionately to world prices. One possible explanation is that there are significant differences in the composition of the two indexes with the goods in the Thai import price index being more volatile than the goods included in the world price index.

The conclusion from these regressions is that import and export prices in both countries are tied to world prices over the long run. Korean import and export prices also react to the won exchange rate, while Thai prices do not respond to the baht over the long run. In addition, these estimates suggest that import and export prices tend to move together over time in both countries, so that adjustments to the trade balance in the long run come largely through changes in import and export volumes.

^aSee Stock and Watson (1993) for a discussion of dynamic ordinary least squares (DOLS). DOLS modifies basic ordinary least squares estimation by including both leads and lags of the first difference of all explanatory variables. These additional regressors are necessary because estimates in a single-equation model can be biased by endogeneity among the variables. Two leads and three lags were used, with the longest leads and lags eliminated if they were statistically insignificant. At least one lead and one lag were included. The coefficients on these variables are not included in the table because they have no economic significance. The residuals used for the error-correction coefficient are calculated from the long-run coefficients estimated by DOLS, but without the first-difference variables. Following Caporale and Chui (1999), the Johansen (1991) trace statistic tests for cointegration (using four lags and a constant), while DOLS is used for estimation because it performs better for small samples (see Stock and Watson [1993]). The Johansen results are similar, with the exception of the relative price terms in the volume regressions. The Johansen estimates are zero for the two Korean equations and implausibly high for Thailand.

^bThe trace statistic just misses the 5 percent critical value for Korean export prices. It is well above the 10 percent critical value.

^cHung, Kim, and Ohno (1993), using a different specification estimated from 1970 to 1989, found a coefficient of around 0.4 for the exchange rate.

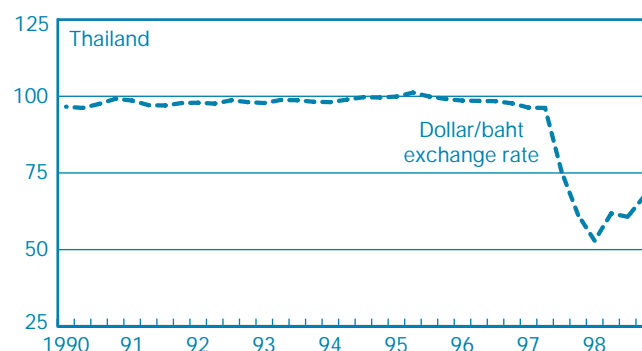
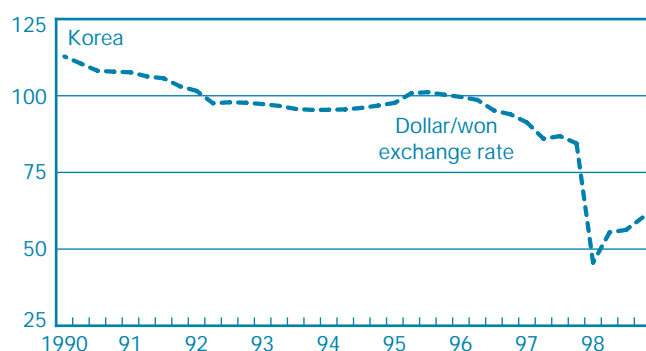
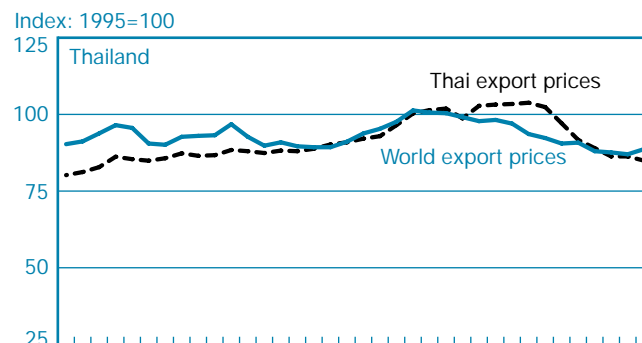
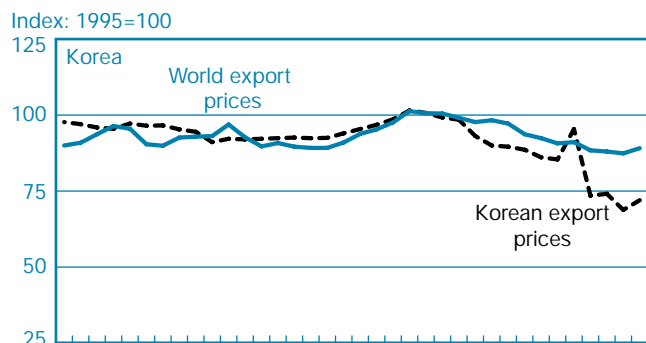
goods. Because import prices tend to rise relative to local prices following a currency depreciation, demand tends to shift from imported to domestic goods, putting additional downward pressure on imports during a crisis. Similar intuition applies to export volumes, with the two determinants being foreign demand and the price of exports relative to prices in foreign markets. (See Box 2 for an empirical analysis.)

Supply-side factors, unfortunately, can complicate the story of how relative prices affect trade volumes. For example, a depreciation that raises relative import prices also lowers the costs of labor and local inputs in foreign currency terms,

increasing the incentives for domestic exporters to boost their foreign sales. As a result, these firms may choose to purchase more imported materials and components despite higher import prices, particularly if there are few domestically produced alternatives.

Korea and Thailand had somewhat different experiences when it came to export volume growth during the crisis. Both were helped by strong foreign growth outside of Asia and lower relative export prices. Korean firms, though, did particularly well, with exports up roughly 20 percent over the course of 1998. As discussed above, the won's decline boosted Korean

Chart 1
Export Prices and Foreign Exchange Rates:
Korea and Thailand



Source: Oxford Economic Forecasting.
Note: The chart is based on the data in the Box 1 table.

competitiveness by allowing firms to lower their export prices relative to world export prices. In addition, Korean firms were able to shift production from the domestic market to stronger foreign markets. By comparison, Thailand's exports were only up slightly. One factor is that its export prices did not fall as much as Korea's, for reasons discussed above. In addition, because of differences in the stages of economic development, Thai exporters were less likely than their Korean counterparts to also serve the local market. As a consequence, the collapse in local demand freed up less capacity in Thailand that could be used for exports.

As for import volumes, lower domestic demand and higher import prices relative to domestically produced goods both worked to drag down the demand for imported goods during the crisis. Over the second half of 1997, the change in relative import prices was dramatic, with import prices up 30 percent in Korea relative to domestic prices and up 40 percent in

Thailand. Higher domestic inflation, though, quickly moderated the change in relative prices, and thus any consequences for import demand, as the gap between import and domestic prices diminished in both countries to roughly 10 percent by mid-1998 relative to mid-1997 levels.

A more clear-cut influence on import volumes was the drop in domestic consumption and investment during the currency crisis that quickly choked off the demand for imported goods in both Korea and Thailand. Chart 2 shows how imports rose steadily during the first half of the 1990s, growing faster than the domestic economy in both countries. With the beginning of the crisis in mid-1997, import volumes dropped in line with the steep decline in domestic demand experienced by both countries. It was the collapse in consumption and investment spending—as capital was pulled out and domestic interest rates jumped—that was a key factor in the large swing in each country's current account balance during the crisis.

Empirical Analysis of Long-Run Trade Volume Behavior

The impact of changes in foreign demand and relative prices on export volumes can be evaluated using a model of the form:

$$(1) \quad xv_t = \alpha_0 + \alpha_1 \times fdd_t + \alpha_2 \times rpx_t + \varepsilon_t.$$

In the expression above, xv represents export volumes, fdd represents foreign domestic demand, and rpx represents the price of exports relative to foreign producer prices.^a Growth in foreign domestic demand should raise export volumes, implying $\alpha_1 > 0$; higher export prices (relative to foreign prices) should reduce sales abroad, so that $\alpha_2 < 0$. Note that the regression is a reduced form, so the estimate of α_2 also includes any supply response to changes in relative prices. A similar expression can be used for imports, except that the demand variable is now own-country domestic demand, and the price variable is the common-currency price of imports relative to domestic prices.

The coefficients for export volume highlight the importance of foreign demand (see table). For Korea, a 1.0 percent increase in foreign domestic demand is estimated to bring a 2.5 percent increase in export volume. The foreign demand elasticity for Thailand is even higher, at 3.3 percent. For Korea, a 1.0 percent decline in relative export prices is estimated to raise export volumes by 0.5 percent over the long run, while for Thailand, the corresponding figure is 0.6 percent.^b Both coefficients for relative prices, however, have relatively large standard errors, raising questions about their statistical significance. The low coefficient estimates might be regarded as surprising since a profit-maximizing firm would not choose a point on its demand curve at which the elasticity of demand is below unity. The price coefficient, though, represents the reduced form estimate of how a change in relative prices affects trade volumes, and as such includes both supply- and demand-side factors.

Turning to imports, the estimates indicate that a 1.0 percent increase in Korean domestic demand raises import volumes by about 1.5 percent, with the corresponding figure for Thailand slightly higher, at 1.6 percent.^{c, d} On the price side, a 1.0 percent increase in relative import prices is estimated to lower import volumes over the long run by 0.3 percent for Korea and 0.5 percent for Thailand. Again, large standard errors for the relative price

coefficient raise questions about their statistical significance. As with exports, the low coefficients imply that a drop in import prices relative to domestic prices tends to lower the dollar value of imported goods over the long run since import volumes do not rise enough to compensate for the lower price.

Trade Volume Regressions

	Korea		Thailand	
	Import Volumes	Export Volumes	Import Volumes	Export Volumes
Demand (domestic demand for imports, foreign demand for exports)	1.48 (.03)	2.50 (.06)	1.61 (.06)	3.25 (.19)
Relative price (imports/local for imports, exports/foreign for exports)	-0.30 (.25)	-0.46 (.10)	-0.54 (.38)	-0.62 (.88)
Adjusted R ²	0.99	0.98	0.98	0.98
Error-correction coefficient	-0.45 (.14)	-0.27 (.08)	-0.21 (.08)	-0.18 (.06)
Trace statistic	32.2	46.2	35.0	40.7
5 percent critical value	34.9	34.9	34.9	34.9
Observations	68	68	68	68

Source: Authors' calculations, based on data from Oxford Economic Forecasting.

Notes: The sample period is 1982:1 to 1998:4. All variables are in logarithms. Volumes refer to dollar levels divided by dollar trade prices. Volume data, as well as home-country demand data, were seasonally adjusted using X-11. For Korean imports, the national income and product accounts for domestic demand is the demand measure. Due to data constraints, industrial production is the demand variable for Thai imports. For exports, the demand variable is a trade-weighted average of domestic demand for sixteen major countries with weights based on 1995 export shares. The relative price in the export equation refers to export prices in dollars divided by the foreign producer price index, also in dollars. The latter variable is calculated using the same export weights for sixteen countries. The Johansen (1991) trace statistic tests for the presence of a cointegrating relationship among the variables studied. The Newey-West adjusted standard errors are in parentheses.

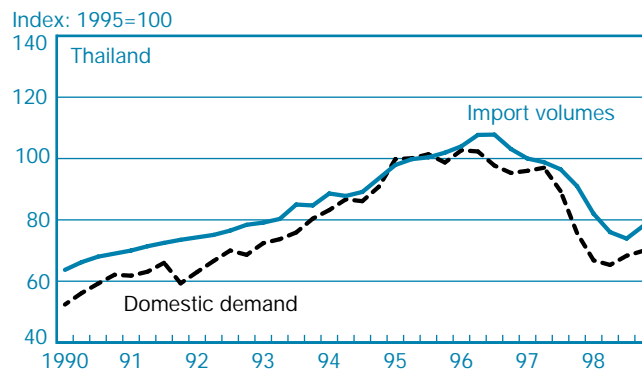
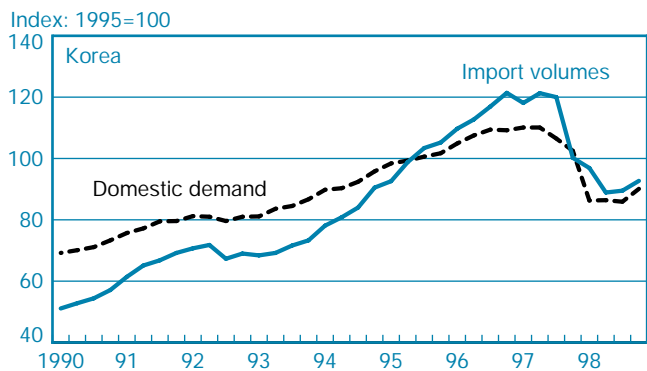
^aThe relative price term is the export price index relative to a weighted average of foreign producer prices, with all price indexes converted into dollar terms. It is meant to track changes in the price competitiveness of goods exported to those produced in the foreign market as seen by foreign customers.

^bIt is debatable whether the ratio of price levels can continue to diverge over the long run. Statistically, relative price variables are nonstationary in this sample period, which is necessary to use the cointegration methodology. Other papers that use cointegration for estimating trade models also find that relative import and export prices are nonstationary. See Caporale and Chui (1999) and Hooper et al. (1998).

^cThe trace statistic just misses the 5 percent critical value for Korean import volumes. It is within the 10 percent critical value.

^dIt is an empirical regularity that import demand elasticities for developing countries are smaller than export elasticities. The opposite tends to be true for developed countries. Since developing countries tend to grow faster, this difference in demand elasticities works to stabilize the trade balance between the two groups of countries. See Krugman (1989).

Chart 2
 Import Volumes and Domestic Demand:
 Korea and Thailand



Source: Oxford Economic Forecasting.
 Note: The chart is based on the data in the Box 2 table.

Conclusion

The shift from capital inflows to capital outflows during a currency crisis requires a country's current account balance to go from deficit to surplus. In terms of dollar import and export values, the countries of Indonesia, Korea, Malaysia, and Thailand achieved almost all of this improvement in current account balances through lower imports. By breaking down trade flows into their price and volume components, however, we see that the current account adjustment came from both lower import volumes and higher export volumes. Dollar import and export prices fell together in crisis countries, minimizing the direct impact on the current account balance from any exchange-rate-driven changes in prices. The burden was therefore left to trade volumes. Export volumes rose, fueled

by lower export prices relative to foreign prices and growth in foreign domestic demand outside of Asia. On the import side, volumes declined sharply, hit by higher import prices relative to local prices and, more importantly, by dramatic contractions in domestic demand.

Of all the changes in trade flows during a currency crisis, a drop in import volumes is the one change most likely to be responsible for the majority of the current account improvement. Any success in boosting export volumes helps, since exports support domestic production and employment, while lower imports reflect the local economy's weakness. In Asia, the four crisis countries benefited from their exporters' ability to overcome the soft local demand during the crisis and increase their export volume sales to the world when their economies were being hit by investment capital outflows.

Endnotes

1. See Higgins and Klitgaard (1998) for a more detailed exposition of the national income accounting relationships discussed here.
2. Domestic saving is the sum of private saving and government saving. Private saving includes both individuals' saving and business-retained earnings. Government saving refers to tax receipts less expenditure on current goods and services. Domestic investment is private and government investment.
3. The current account balance includes the trade balance for goods and services, the balance for factor services, and unilateral transfers.
4. The current account balance, derived primarily from trade statistics, is used to measure capital flows. The matching capital account balance is believed to be a much less accurate measure.
5. All four countries devoted a large share of output to investment spending. In 1996, investment as a share of GDP was 31 percent in Indonesia and Thailand, 37 percent in Korea, and 42 percent in Malaysia.
6. See Pesenti and Tille (2000) for theories of why these countries suffered a loss of investor confidence.
7. The capital outflows from the four Asian crisis countries must be matched by an increase in net financial inflows for other economies. The United States was a major recipient of these inflows, which helped boost domestic investment spending. See van Wincoop and Yi (2000).
8. The deterioration in Japan's trade balances with the AC4 countries did not keep Japan's overall current account surplus from rising substantially during this period. Its balance improved because the local recession freed up more savings to export to the rest of the world. So, while a close trading partner to a crisis country will suffer from lower exports to that market, it is not at all necessary that the total current account balance of the noncrisis country deteriorates.
9. Prices are measured using available import and export price indexes denominated in local currency terms for the AC4 countries. These indexes are then converted into dollar price indexes using prevailing dollar exchange rates. For example, the Thai dollar export price is the dollar price per unit of Thai exports.
10. The reported rise in Indonesian import volumes during a severe recession raises doubts about the reliability of this data series.
11. The measure of world dollar prices is calculated by Oxford Economic Forecasting as a trade-weighted average of nonfuel merchandise export price indexes for twenty-three industrial and newly industrializing economies, converted into dollar terms. The weights correspond to shares of total world merchandise exports. There are weaknesses with this measure, since export price indexes across countries differ in the types of goods included and in the statistical methodologies used. Unfortunately, a world price measure that is identical in nature to the export price index of the crisis country is not available.
12. The broad-based nature of the Asian currency crisis makes it likely that world export prices were pushed down by the steep drop in output throughout the region.
13. The increase in export volumes is also limited by available capacity. These factories tend to produce exclusively for the export market. Capacity is therefore not freed up by the fall in domestic demand.
14. See Goldberg and Knetter (1997) for a review of models of export-pricing behavior. See Marston (1990), Knetter (1993), and Klitgaard (1999) for empirical studies of U.S. and/or Japanese export pricing behavior. See Hung, Kim, and Ohno (1993) for a study that includes estimates for Korea and Taiwan. They find that exchange rates are important in export-pricing behavior for Korea, but not for Taiwan.

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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

The Asia crisis was expected to contribute negatively to U.S. growth. The U.S. net export deficit did, in fact, increase. . . . However, the increase in the deficit was more than offset by increased spending on consumer goods and producers' durable equipment.

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.

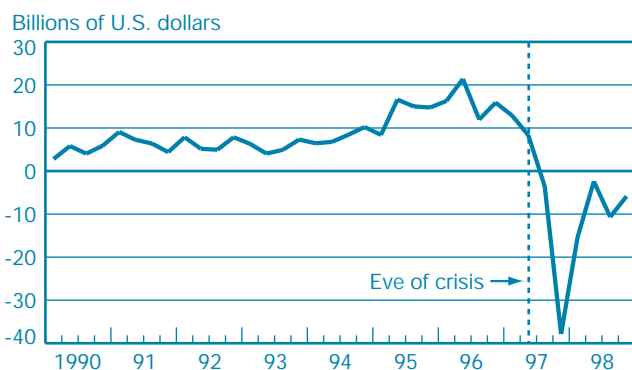
If we divide the financial account (we use this term and capital account interchangeably) into portfolio flows, foreign direct investment (FDI) flows, and “other” flows, we see that the bulk of outflows since the onset of the crisis consisted of

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

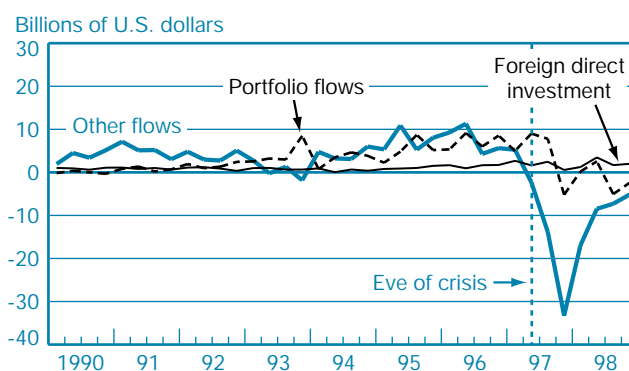
Chart 1
Financial Account of the Asia-4 Countries



Source: See Appendix 1.

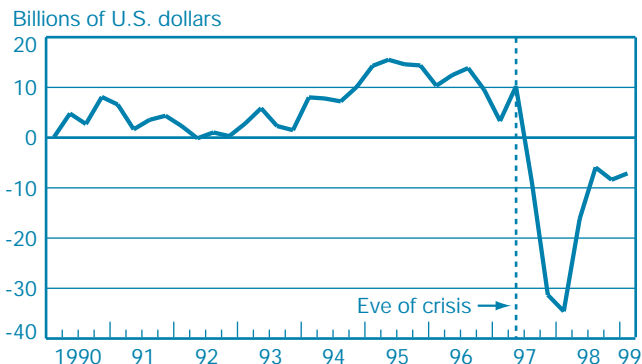
Note: The financial account is net capital inflows—that is, the net sum of direct, portfolio, and other investment balances.

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

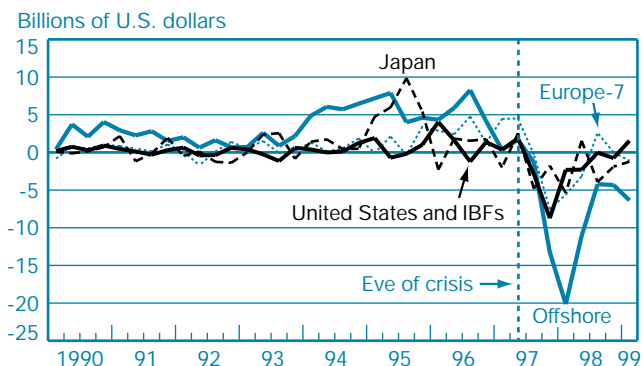


Source: See Appendix 1.

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.

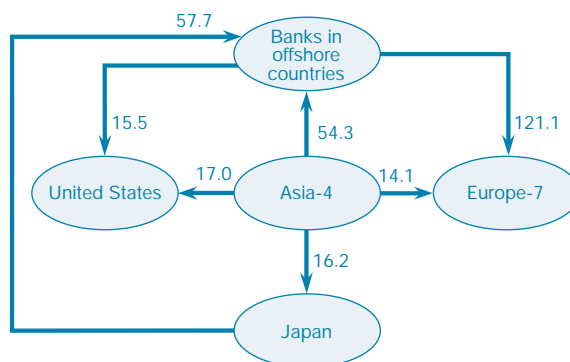
Although banks in all four regions reduced their net lending to the Asia-4, the reductions by banks in Japan, the Europe-7, and the United States typically were on the order of several billion dollars per quarter. The chart clearly shows that the majority of outflows from the Asia-4 was accounted for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

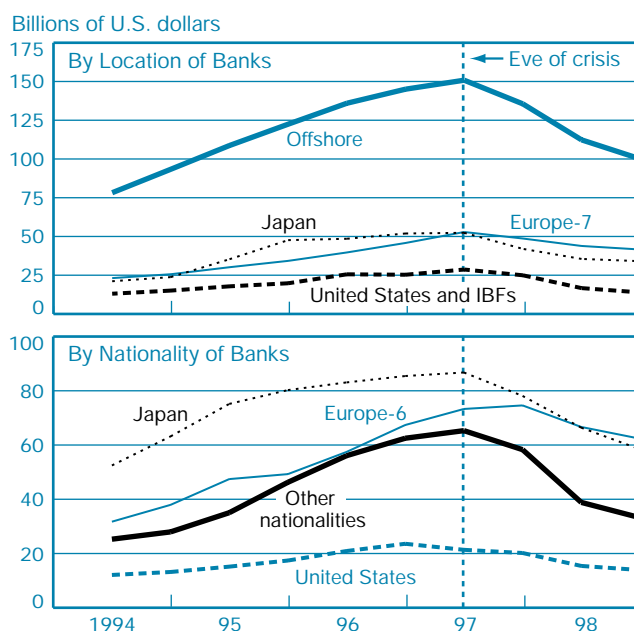
Source: Bank for International Settlements.

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)

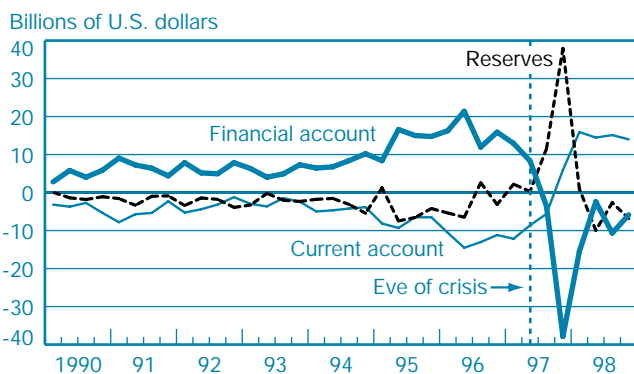
Banks played a large role in the immediate outflows from Asia, most of which went to offshore center banks.

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.

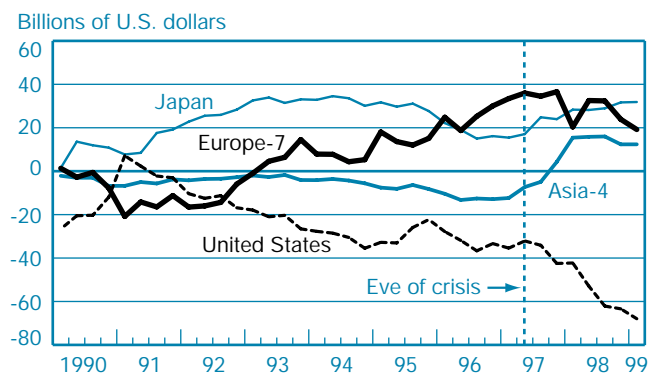
banks. These banks, in turn, played a large role in funneling the outflows to banks in Europe. Once the money reached Europe, it became part of a vast pool of capital, rendering the trail difficult to follow from there. Consequently, we now focus on how the capital flows entered the United States.

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



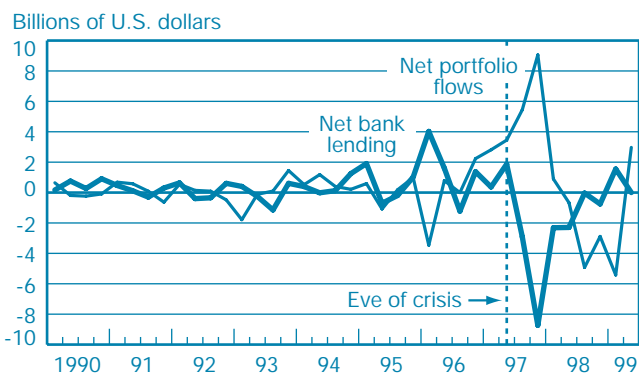
Source: See Appendix 1.

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



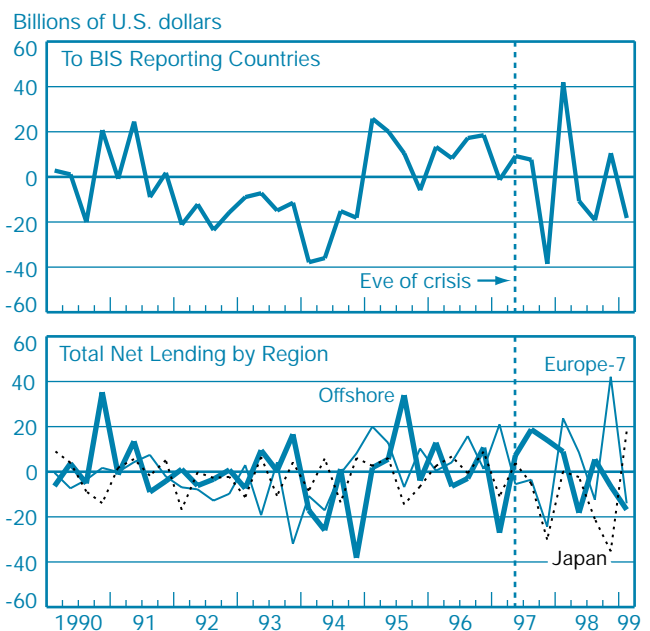
Source: See Appendix 1.

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



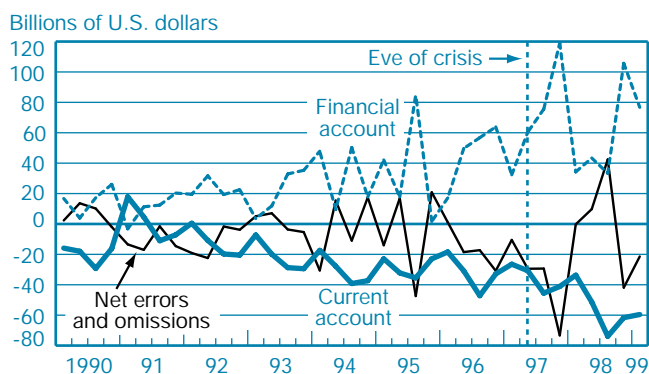
Source: See Appendix 1.

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

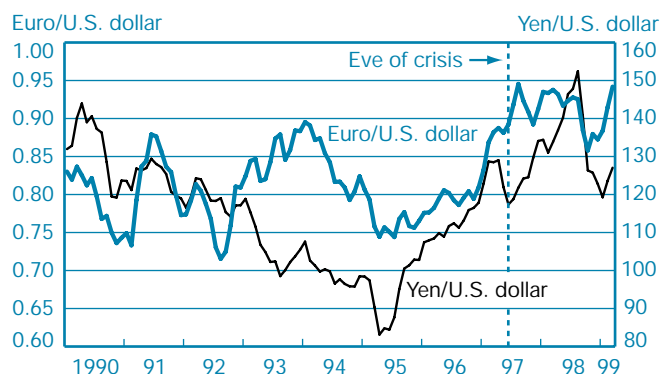
Chart 10
U.S. Balance of Payments



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

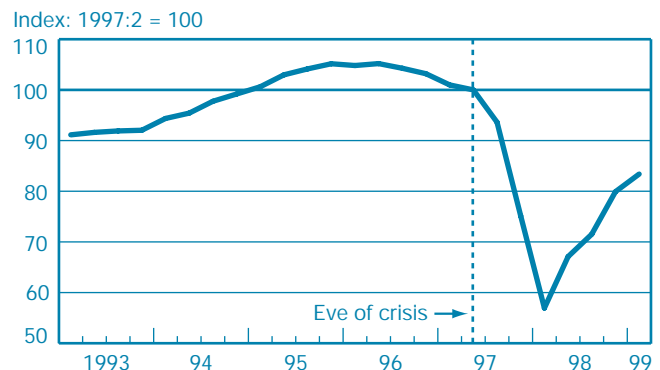
other words, does not overturn the implications of our basic scenario. However, we also show that the decline in Asian domestic demand leads Asian real interest rates to fall relative to U.S. real interest rates, a finding that is inconsistent with the evidence. We therefore conclude that our basic “capital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

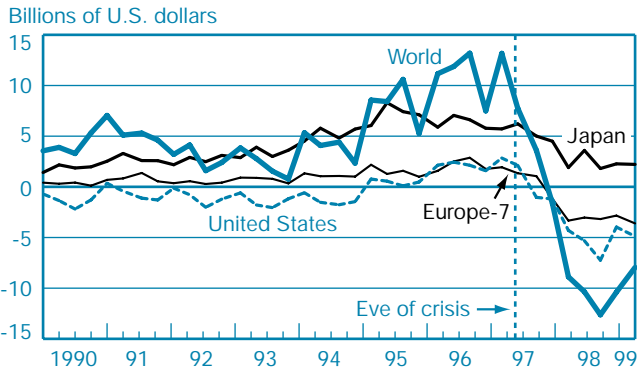
Chart 12
U.S. Dollar/Asia-4 GDP-Weighted
Real Exchange Rate



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

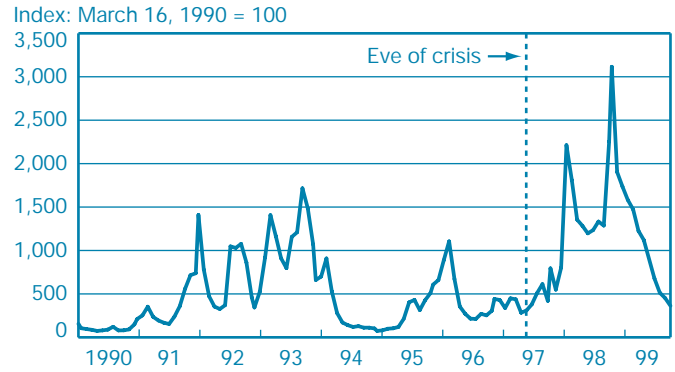


Source: See Appendix 1.

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 15
Number of U.S. Mortgage Refinancings

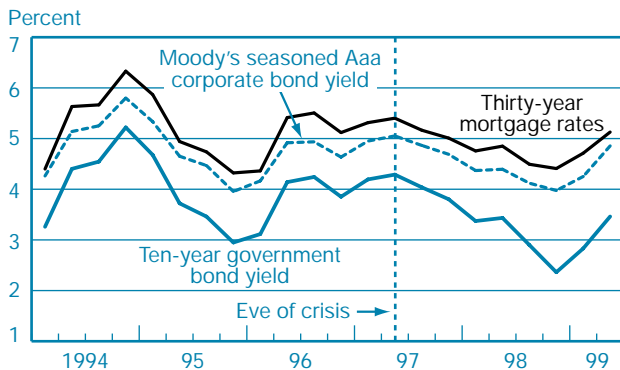


Source: See Appendix 1.

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

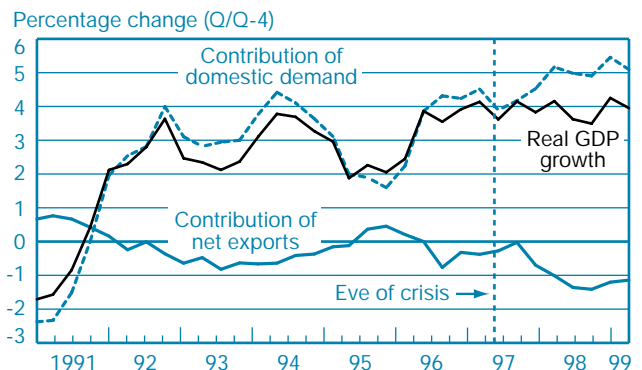
Our framework implies that we would expect to see a drop in the contribution to GDP growth coming from net exports (the first channel) while we would expect to see a rise in the contribution from domestic demand. Chart 16 indicates that this is exactly what occurred. Although the GDP growth rate of 4 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 14
U.S. Interest Rates less the Core CPI



Source: See Appendix 1.

Chart 16
Composition of U.S. Growth

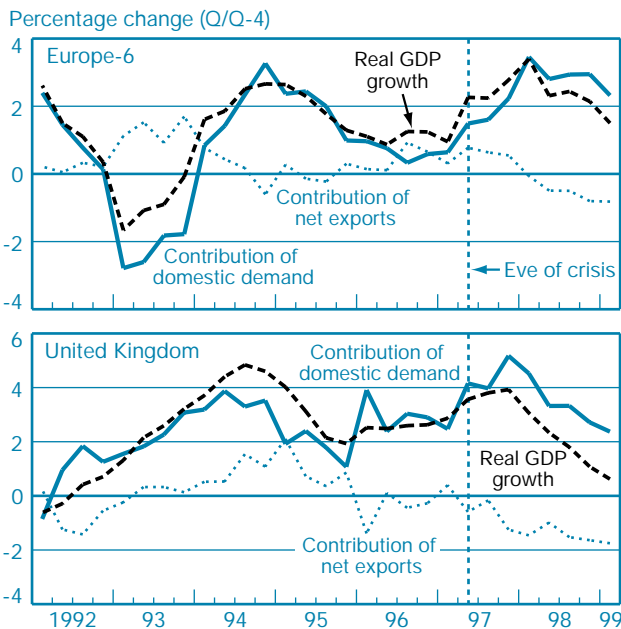


Source: See Appendix 1.

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.

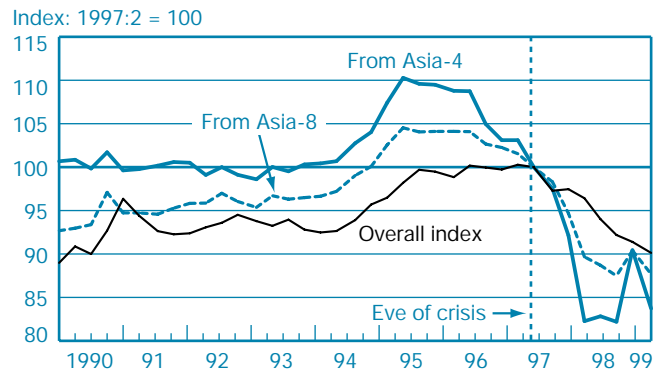
The third channel depends on both the change in the relative price of imports (the reciprocal of the real exchange rate) and on the elasticity of supply with respect to the relative price of imports. Here, we provide evidence on the relative price of imports; in the next section, we derive the elasticity 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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The Impact of the Asia Crisis on U.S. Industry: An Almost-Free Lunch?

- The large devaluations experienced by Korea, Malaysia, Thailand, and Indonesia beginning in the summer of 1997 raised concerns that imports from these countries would soar while demand for U.S. exports weakened, causing U.S. industries to suffer.
- As it turned out, manufactured imports from the four countries rose only slightly, and the decline in U.S. exports was not large enough to have a significant effect on trend output for most industries.
- The one exception to this pattern was the steel industry: there, sharply rising imports and falling exports led to a drop in output and prices.
- Overall, the United States enjoyed an “almost-free lunch” in the wake of the Asia crisis. Cheaper imports benefited consumers, and domestic production and employment were largely unhurt.

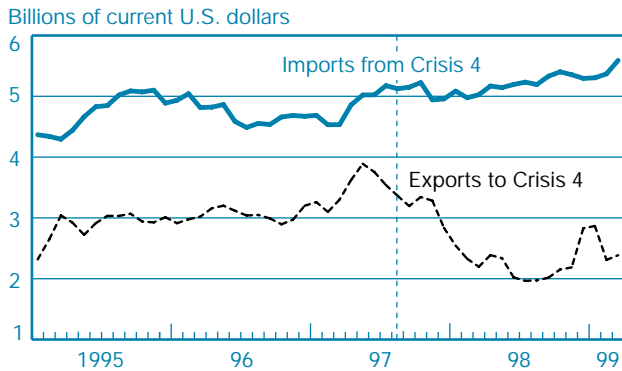
When the Asia crisis erupted in the summer of 1997, many forecasters predicted that one effect would be an end to the economic boom in the United States. Surely, it was argued, the drop in demand for U.S. exports combined with surging import volumes would finally be enough to slow the U.S. economy. It did not happen. Indeed, the Asia crisis’ overall effects on the United States were small.¹ In terms of trade flows, total manufactured imports from the Asian countries affected by a currency collapse—Indonesia, Korea, Malaysia, and Thailand, which I will refer to as the “Crisis 4” countries—grew only slightly, while exports to these countries fell sharply (Chart 1).²

Although the overall effects of the Asia crisis on the United States were modest, they could have obscured other, larger effects in particularly vulnerable U.S. industries. Accordingly, this article looks beyond the aggregate data associated with the crisis and instead focuses on these potentially larger effects at the sector level. It arrives at four key findings. First, dollar prices of imports from the Crisis 4 countries fell substantially after the currency collapses of summer 1997. In a few cases, the drops were accompanied by a fall in U.S. relative output prices. Second, most U.S. industries experienced a decline in exports to Asia, but in no case was the decline in export demand big enough to have a noticeable impact on the trend in U.S. shipments. Third, in only a few cases was there a sharp rise in import volumes resulting from the crisis. And finally, in only one case—the steel industry—was there clear evidence of a

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Chart 1
Total U.S. Manufacturing Trade with the
Crisis 4 Countries



Source: United States International Trade Commission.

Notes: The Crisis 4 countries are Indonesia, Korea, Malaysia, and Thailand. The dashed line indicates the start of the Asia crisis.

pattern of rising imports, falling exports, and an associated drop in domestic prices and employment.

These findings suggest, for the most part, that imports from Asia do not compete directly with U.S. production. Therefore, an appreciation in the dollar with respect to Asian currencies leads to gains in consumption with little or no domestic pain. (For example, consumer videocassette recorders are not produced in the United States, so a fall in their price benefits consumers without pressuring U.S. producers.) This consumption feast amounts to an almost-free lunch.

Analytical Framework

The basic supply-and-demand framework is adequate for presenting a discussion of the sectoral impact of the Asia crisis. In such a framework, the analysis looks at prices and quantities for one industry or firm at a time, holding all other prices (including wage costs and the prices of competing goods) constant. From the point of view of U.S. industry, the crisis represents a drop in demand for two reasons. First, demand by Asians for U.S. imports decreases due to the recessions in Asia and the higher Asian currency prices of U.S. imports after the devaluations of the Asian currencies. Second, demand by Americans for U.S.-produced goods falls because the dollar price of Asian goods, which are substitutes for U.S.-produced goods, also falls. This means that if we hold other factors that

affect demand and cost constant, we should expect to see a drop in U.S. shipments and in U.S. prices (Exhibit 1). The fall in domestic output and prices is a measure of the crisis' impact on U.S. industry.

However, there are problems with applying this framework to the events of the last three years. The most obvious one is that, for whatever reason, domestic aggregate demand in the United States has continued to grow briskly in the wake of the Asia crisis. (Indeed, as van Wincoop and Yi [2000] observe, the growth in domestic demand may in part be an endogenous response to the crisis.) The growth in domestic aggregate demand may have offset, or even reversed, the decline in industry demand caused by the crisis. It is important to keep this caveat in mind as we look at the data.

Although I do not focus on the effects of the crisis on Asian exporters, it is helpful to clarify the empirical results to consider the effects of a currency devaluation on them.³ From the exporters' perspective, a devaluation increases their domestic currency price for any given dollar price received in the world market. From the standpoint of the U.S. market for Asian goods, this change amounts to an outward shift in the supply of Asian goods (Exhibit 2). Generally, this change will prompt exporters to raise the profit margin on their exports, which would lower their dollar price less than proportionately with the devaluation.⁴ Thus, we would expect to see falling import prices and rising import volumes in the United States.

The fall in dollar prices should also lead to a rise in import values, since the elasticity of demand with respect to price in

Exhibit 1
Effect of Asian Devaluations on Demand
for U.S. Goods

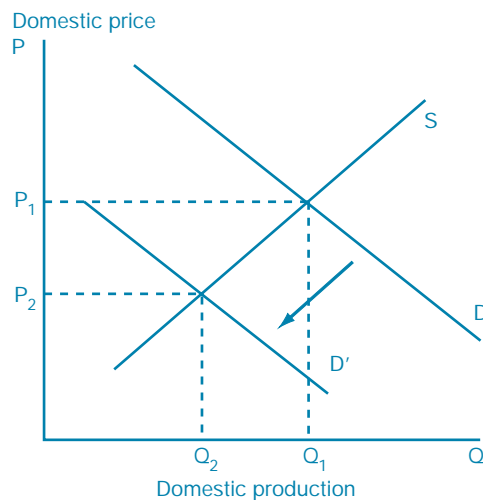
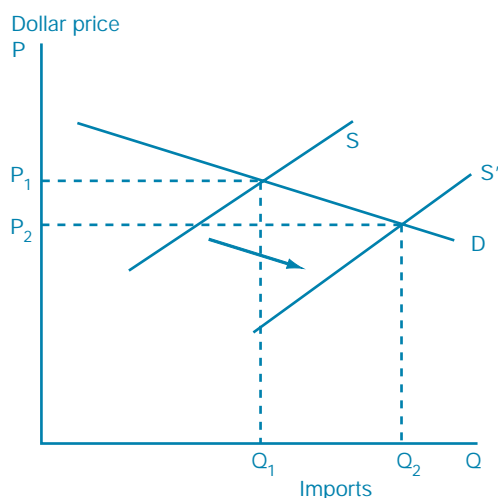


Exhibit 2
Effect of Asian Devaluations on U.S. Imports



imperfectly competitive markets is greater than one: Exhibit 2 shows that a 1 percent drop in price will lead to a more than 1 percent increase in imports, and hence an increase in the dollar value of imports (price \times quantity).⁵ Although a devaluation certainly will increase domestic currency revenues for Asian exporters, it may also directly increase their costs if the exporters import many of their inputs. This cost-increasing effect of a devaluation comes about because the local price of imported inputs will increase with the devaluation. Even in such a case—which might be relevant for sectors in which Asian export industries are based on the assembly of imported parts—the rise in cost will not outweigh the effects of the rise in demand, and Asian exporters will increase their shipments to the United States. Consequently, the dollar value of exports to the United States will rise.

The above analysis assumes that the elasticity of demand facing exporters is greater than one, which will be the case for individual firms. However, what is true for an individual firm need not be true for the market as a whole. If all exporting firms were to expand their output at the same time, total market demand might increase only slightly. In such a situation, firms would find themselves lowering prices at the same time as their competitors, so that each individual firm's gain in sales in the export market would be lower than it would be if it was the only firm cutting prices. If total market demand is inelastic, then the dollar value of exports will fall, as prices decrease proportionately more than the quantities sold increase.

In summary, this brief theoretical discussion suggests that U.S. import volumes from Asia should rise as dollar import

prices fall, with the dollar value of imports either rising (the most likely case) or falling (if total import demand is inelastic). It also suggests that U.S. production, U.S. output prices, and U.S. exports to Asia should fall.

Data Construction and Definitions

The Asia crisis began in the summer of 1997 with the devaluation of the Thai baht, followed closely by currency collapses in Korea, Malaysia, and Indonesia. Although the timing across countries varied, for consistency of analysis I use August 1997 as the first month of the crisis. To evaluate the impact of the crisis on U.S. industries, I look at monthly data on manufacturing production and trade at the finest possible level of detail. An important limitation, however, is the absence of reliable U.S. data on the prices of imports and exports, particularly at the industry level.

For U.S. production, data on output and prices are available for the two-digit Standard Industrial Classification industries.

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I deflate production by the appropriate industry-level producer price index (PPI). Data on the value of imports and exports are available at a somewhat finer degree of detail.

A partial solution to the lack of reliable U.S. import and export price data is to look at export prices in the Crisis 4 countries. Korea, Malaysia, and Thailand have some sectoral data (Korea's are the most detailed), although no data at all are available for Indonesia. These prices are reported in the domestic currencies and are converted to dollars using the nominal exchange rate.

To construct real import and export data, I deflate nominal exports by the domestic PPI, which is a good approximation if exports do not differ much from goods sold domestically. I deflate imports from Korea, Malaysia, and Thailand by the most appropriate sectoral export price index from each

country; for imports from Indonesia, I use an import-weighted average of prices from the other three countries.

All data series are seasonally adjusted. To smooth some of the noise left over even after removing seasonal factors, I use data that are a two-month moving average. That is, for each month, the value of the series in question is equal to an average of the current month's and the previous month's value.

Prices

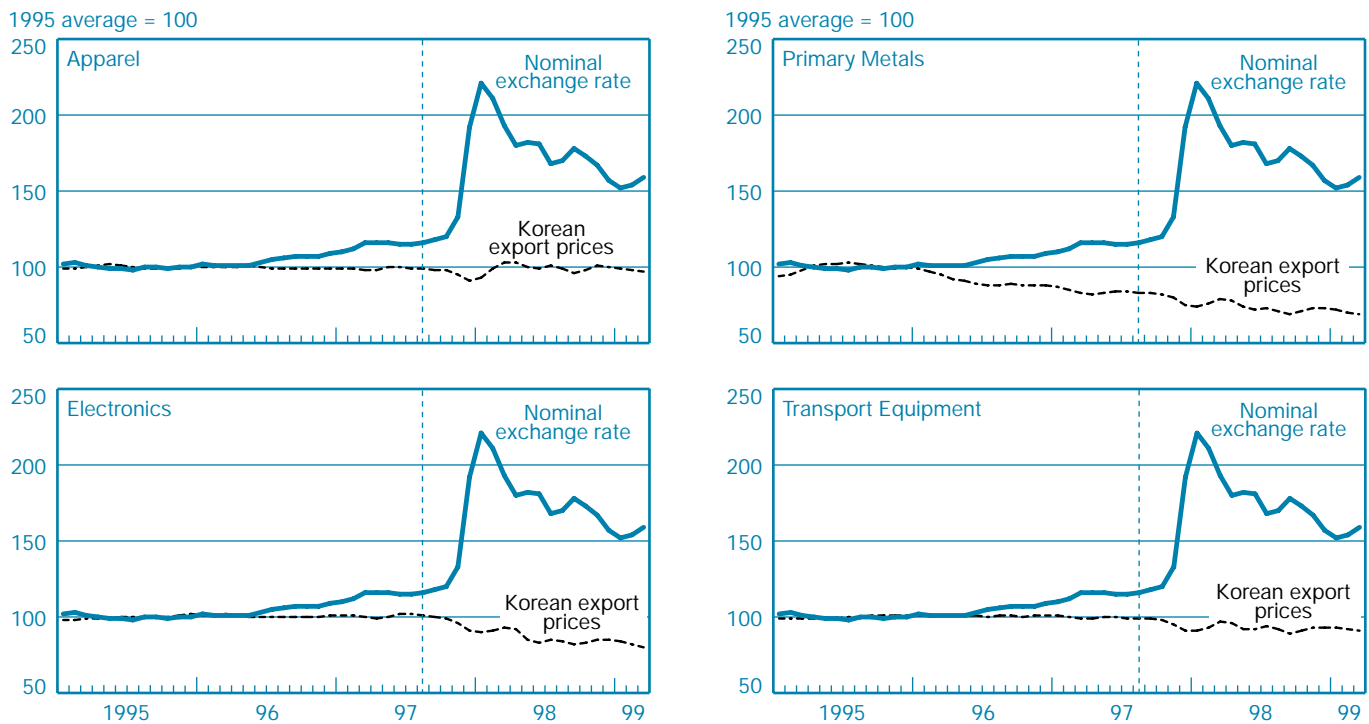
As expected, the fragmentary data that are available confirm that Crisis 4 export prices from Asia generally fell quickly after the currency devaluations. Chart 2 presents dollar export prices for selected Korean export industries plotted against the won exchange rate. In every sector, dollar prices fell when the won collapsed. What is striking about the Korean data is the

evidence that prices in many sectors had been falling even before the won collapsed. For example, prices of apparel and transport equipment began to drop shortly after the won started to depreciate in the summer of 1996. Malaysian dollar export prices also fell rapidly when that country's currency

The decline in the prices of goods imported from Asia . . . did not have much impact on output prices in the United States.

collapsed (Chart 3). The evidence for Thailand is mixed: a small response of export prices to the baht devaluation occurred in the manufacturing (other than machinery) sector, and there was no response at all for machinery (Chart 4).

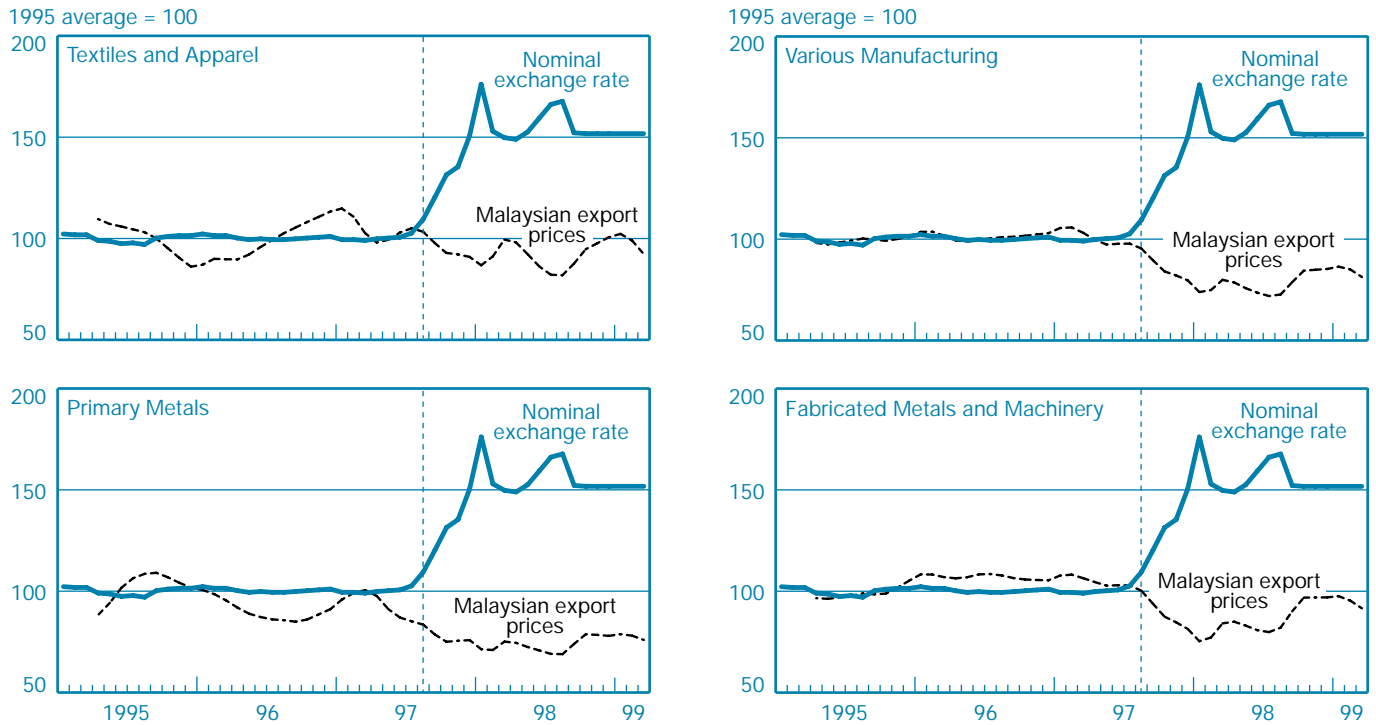
Chart 2
Korean Export Prices and the Nominal Exchange Rate
Selected Industries



Source: Data Resource International, Asia.

Notes: Standard Industrial Classification codes: apparel, 23; electronics, 36; primary metals, 33; transport equipment, 37. The dashed lines indicate the start of the Asia crisis.

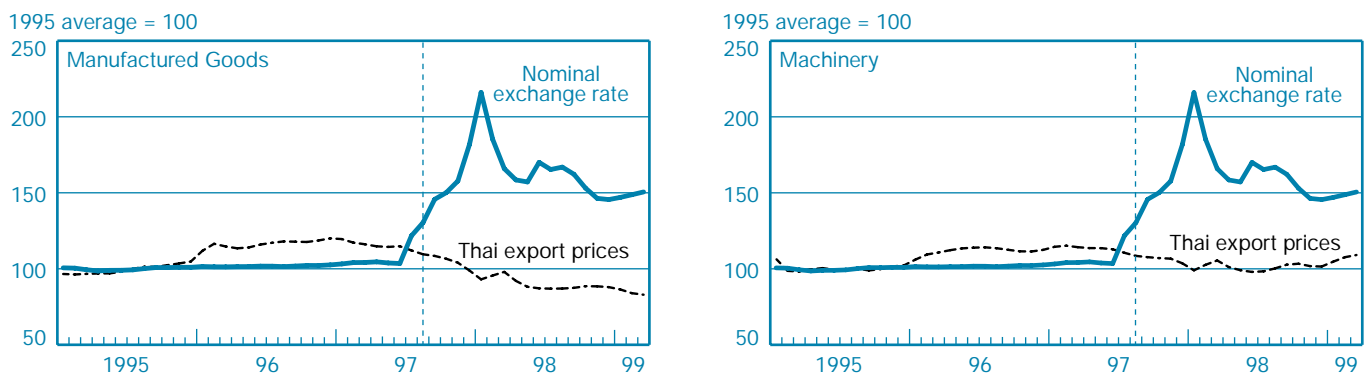
Chart 3
Malaysian Export Prices and the Nominal Exchange Rate
 Selected Industries



Source: Data Resource International, Asia.

Notes: Standard Industrial Classification codes: textiles and apparel, 22, 23; primary metals, 33; various manufacturing, 29, 32, 38, 39; fabricated metals and machinery, 34-37. The dashed lines indicate the start of the Asia crisis.

Chart 4
Thai Export Prices and the Nominal Exchange Rate
 Selected Industries



Source: Data Resource International, Asia.

Notes: Standard Industrial Classification codes: manufactured goods, 22, 23, 26, 34; machinery, 35-37. The dashed lines indicate the start of the Asia crisis.

The decline in the prices of goods imported from Asia, however, did not have much impact on output prices in the United States. Chart 5 shows the relative price of sectoral output for selected industries, where each industry's price is expressed relative to the consumer price index for the entire U.S. economy.⁶ As illustrated by the downward trends in the chart, manufacturing prices have been falling relative to nonmanufacturing prices for many years.⁷ The onset of the Asia crisis might have been expected to accelerate this trend, as falling prices for imports put pressure on U.S. manufacturers. In fact, this did not occur in most sectors. For example, the path of prices in the transport equipment sector was unchanged after August 1997. Even the electronics sector simply saw a continuation of the long-term (and steep) decline in relative prices.

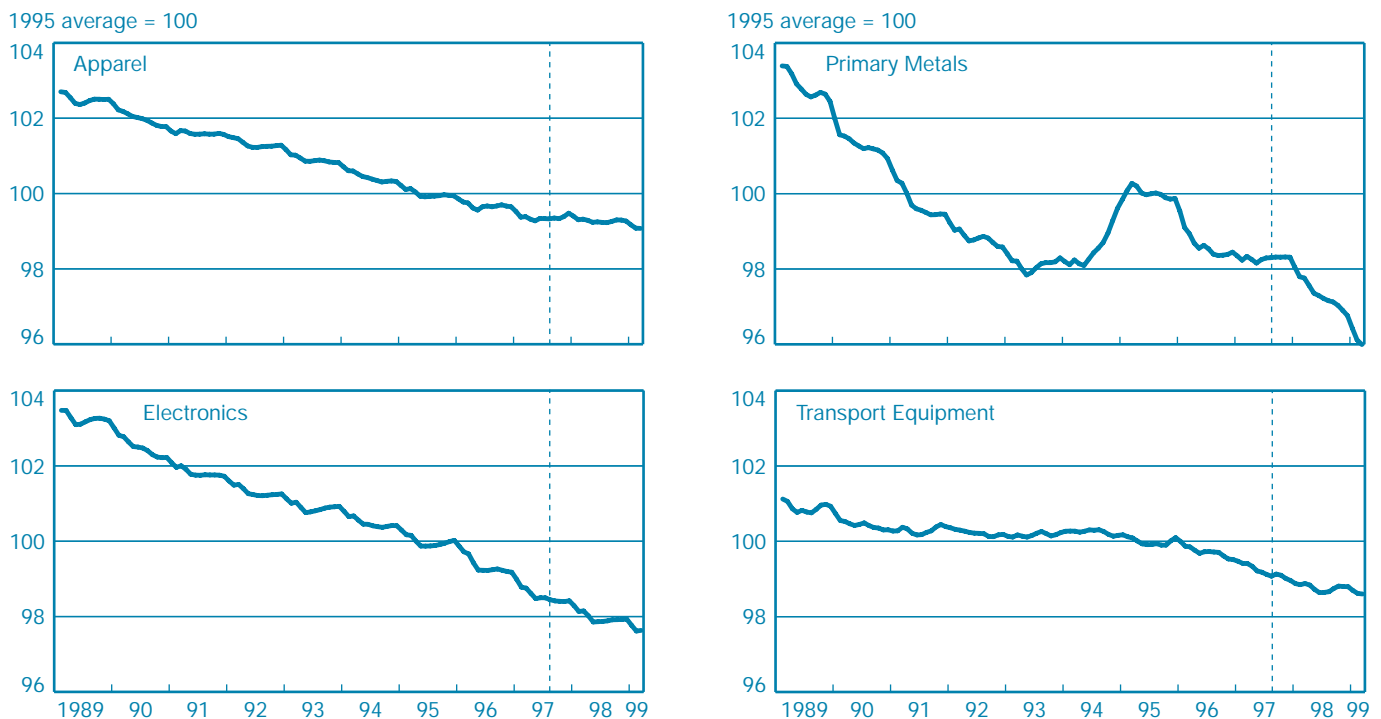
The one major exception was the primary metals sector, where the collapse in steel prices clearly coincided with the onset of the crisis and can plausibly be linked to import

competition, as I will show. Two other sectors, not shown here, that saw price declines are food and paper. The share of imports from Asia in U.S. domestic consumption of these products was near zero, however, so it is clear that imports were not responsible for the price declines.⁸ Nevertheless, the Asia crisis may have affected these prices less directly: the recession in Asia was accompanied by a drop in world commodity prices, which likely helps to explain the drop in domestic food and paper prices.

Imports and Exports

In most cases, prices of imports into the United States fell after August 1997 without corresponding drops in U.S. domestic prices. Such a pattern should be associated with an increased

Chart 5
U.S. Domestic Relative Output Prices
Selected Industries



Source: United States Department of Commerce.

Notes: Standard Industrial Classification codes: apparel, 23; electronics, 36; primary metals, 33; transport equipment, 37. The dashed lines indicate the start of the Asia crisis.

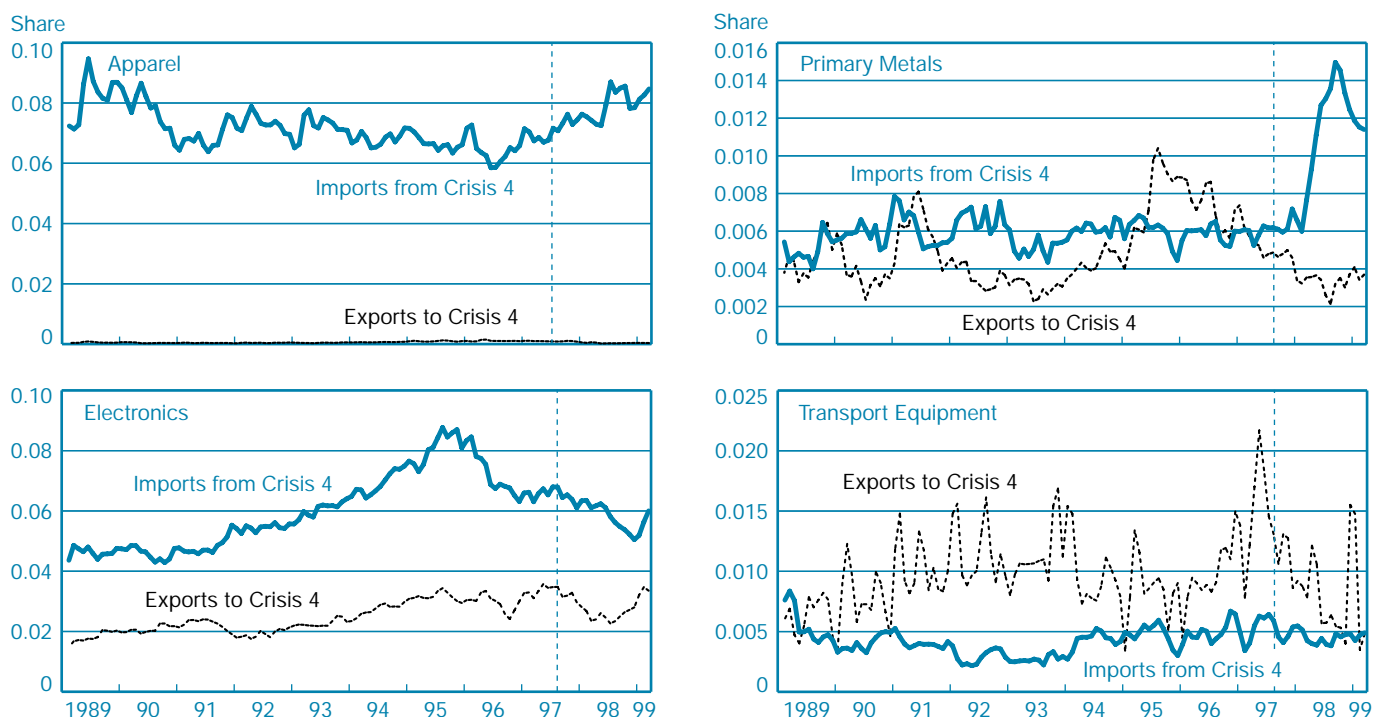
share of imports in domestic consumption. At the same time, the devaluations and recessions in the Crisis 4 countries should trigger a drop in U.S. exports to those countries. Chart 6 shows imports and exports divided by domestic shipments for selected industries. (I scale by domestic shipments to give a sense of how important import competition is for each sector.) In three sectors—paper (not shown), primary metals (a sector that includes the steel industry), and nonelectrical machinery (not shown)—the pattern of rising imports and falling exports is very clear. The surge in imports is most dramatic in primary metals, but this surge underestimates the pressure that the sector was experiencing in the wake of the crisis since it does not include imports from the rest of the world, which were also rising at this time. The sharp drop in primary metals imports in late 1998 came in the wake of antidumping duties, which were imposed during the summer of 1998, along with strong political pressure from U.S. trade negotiators.

In the apparel sector, exports were near zero, so they could not fall much, but imports rose. A common pattern of sharply falling exports but no deviation from trend imports is evident in a number of sectors not shown here, including textiles, chemicals, fabricated metals, and precision instruments.

The most surprising pattern occurs in the electronics sector, where import values actually *fell* in the wake of the crisis. Two-thirds of the decline is accounted for by a fall in the value of semiconductor imports, with the remainder attributed to a drop in household audio-video equipment. Certainly in the case of semiconductors, and most likely in the case of audio-video equipment, these drops in import value reflect steep drops in prices: even though real imports most likely rose, the value of imports fell because prices fell more quickly than the quantities imported increased.

As the example of electronics trade illustrates, the absence of reliable, comprehensive import price data makes it difficult to

Chart 6
U.S. Trade with the Crisis 4 Countries as a Share of Domestic Output
Selected Industries



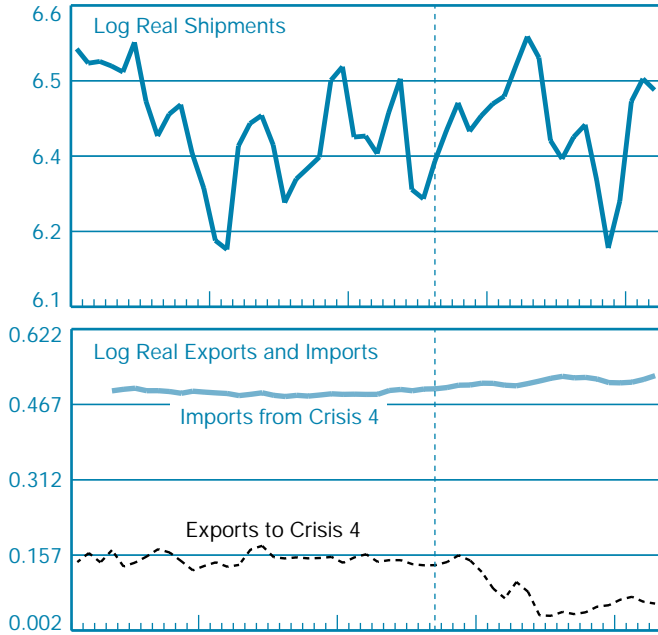
Sources: United States International Trade Commission; United States Department of Commerce.

Notes: The Crisis 4 countries are Indonesia, Korea, Malaysia, and Thailand. The chart depicts total imports from and exports to the Crisis 4, divided by domestic shipments. Standard Industrial Classification codes: apparel, 23; electronics, 36; primary metals, 33; transport equipment, 37. The dashed lines indicate the start of the Asia crisis.

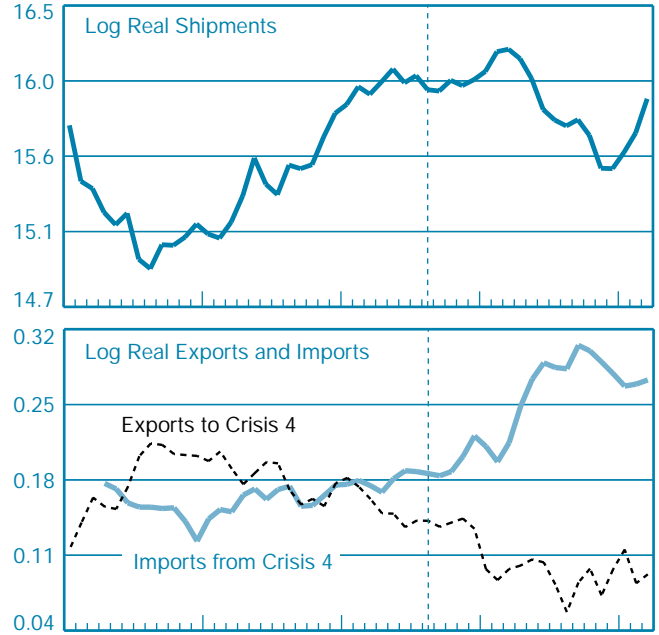
Chart 7

Domestic Shipments and Exports to and Imports from the Crisis 4 Countries
Selected Industries

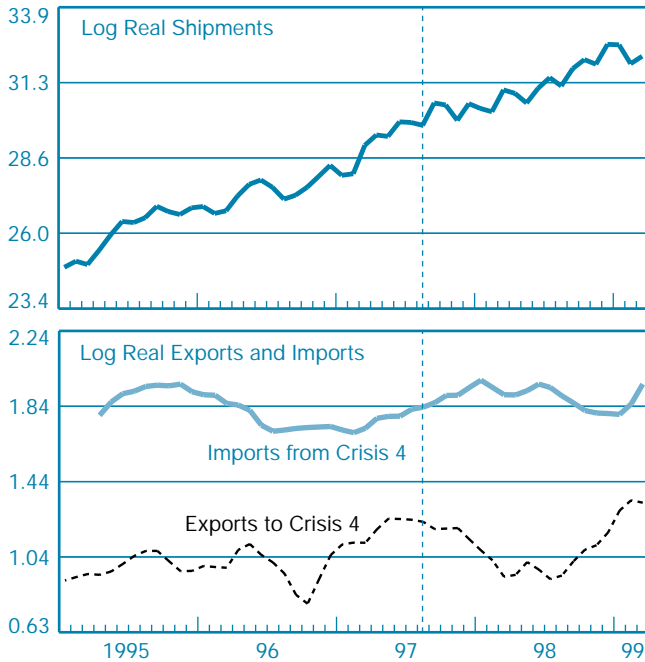
Apparel (billions of 1995 U.S. dollars)



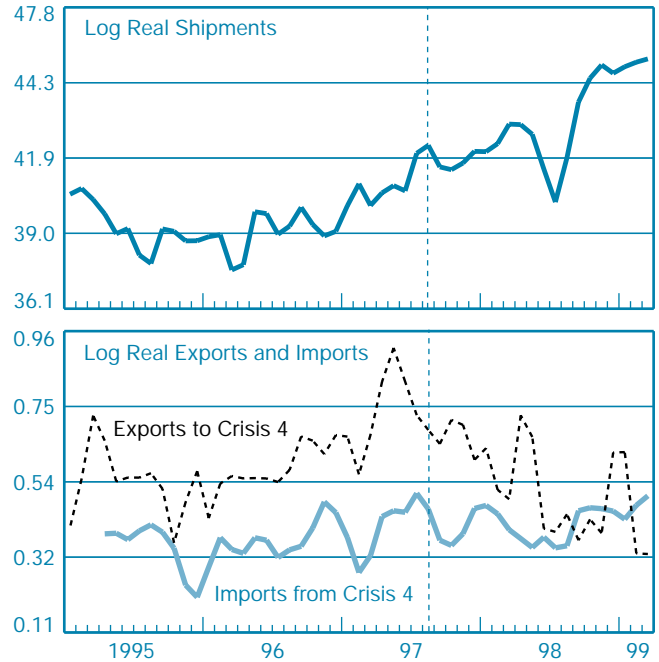
Primary Metals (billions of 1995 U.S. dollars)



Electronics (billions of 1995 U.S. dollars)



Transport Equipment (billions of 1995 U.S. dollars)



Sources: United States International Trade Commission; United States Department of Commerce; Data Resource International, Asia.

Notes: The Crisis 4 countries are Indonesia, Korea, Malaysia, and Thailand. Standard Industrial Classification codes: apparel, 23; electronics, 36; primary metals, 33; transport equipment, 37. The dashed lines indicate the start of the Asia crisis. Variables are scaled by 100 times the average value of the log real shipments in 1995.

interpret changes in import values. The fairly modest growth in import values may be obscuring large increases in real imports accompanied by falling prices. What is clear, though, is that the bulk of the trade response to the Asia crisis is accounted for by falling exports, rather than rising imports.

Domestic Production

I now present a brief examination of the changes in domestic shipments. Chart 7 depicts real domestic shipments from 1995 through early 1999, along with real exports and real imports. These real trade data should be viewed skeptically because true price deflators are not available, as noted earlier.

In several sectors, there was a slowdown in shipments in 1998, and in some cases the timing of the slowdown coincided with changes in the Crisis 4 countries' imports and exports. Examples of this pattern in sectors not shown in Chart 7 are textiles, paper, and chemicals: in each industry, production slowed soon after exports to the Crisis 4 fell. The clearest example, however, is primary metals, where a drop in exports to the Crisis 4, a substantial import surge, and a falling of domestic prices and shipments all coincided in the first half of 1998.

In many other sectors, however, there was no discernible impact of the Asia crisis on shipments. Output growth in transport equipment showed continued strength through 1998 and into 1999. Among industries not shown in Chart 7, fabricated metals, nonelectrical machinery, electronics, and instruments all exhibited a similar pattern.⁹ This pattern occurred despite the fact that Crisis 4 exports fell sharply in most of these sectors and real imports from the Crisis 4 countries held steady or grew.

Conclusion

The impact of the Asia crisis on U.S. industries was small and localized. Only one sector, the steel industry, experienced falling prices and output in the wake of the crisis, and political action mitigated this impact within a few months. Although the Crisis 4 countries of Indonesia, Korea, Malaysia, and Thailand cut back on their purchases of U.S.-manufactured goods across the board starting in late summer 1997, the drop in foreign demand was offset by strong domestic demand as well as demand by noncrisis foreign countries in almost every sector.

Import volumes from the Crisis 4 expanded only modestly after the onset of the crisis, an outcome that is likely due in part to relatively inelastic U.S. demand for Crisis 4 exports. The increased supply drove prices down almost as much as it increased sales in most instances; in the case of semi-conductors, prices fell so fast that the value of exports actually fell.

Two key points can be derived from this analysis. First, imports from developing Asia do not seem to compete directly with most U.S. manufacturing sectors. This phenomenon is evident from the modest impact that the currency devaluations of 1997 had on U.S. output prices and shipments, even as U.S. consumers benefited from less expensive imports. In this sense, the crisis was good news: consumers got lower prices and producers did not suffer. The only exception was the steel industry, which was directly hit by the crisis. Second, U.S. export markets in developing Asia are still so small that even a collapse in demand there does not have a large effect on total demand for U.S.-manufactured goods.

Endnotes

1. These effects are discussed extensively in van Wincoop and Yi (2000). The small impact should not have come as a complete surprise. In 1996, exports to the four Asian countries affected by the crisis accounted for only 0.6 percent of U.S. GNP, while imports from these countries represented 0.8 percent of GDP. Even if exports had fallen by half and imports had doubled, the effect on U.S. GDP would have been a slowing of growth by only 1 percentage point.
2. As a share of total U.S. imports, the imports from the Crisis 4 hardly grew at all, while the share of total U.S. exports to the Crisis 4 declined from almost 8 percent when the crisis hit to slightly more than 4 percent by mid-1998.
3. Throughout this article, “devaluation” refers to a devaluation of Asian currencies with respect to the dollar: an increase in the Asian currency price of one U.S. dollar or, equivalently, a fall in the dollar price of an Asian currency.
4. For the simple analytics of exchange rate pass-through, see Marston (1990). This result holds if marginal costs are constant.
5. Throughout this article, “elasticity” refers to the magnitude of the change in demand for a good with respect to a change in the price of the good.
6. The relative price compares the output price of a sector with the overall price level. This is the relevant comparison, since we want to know how each sector is doing compared with the economy as a whole. Conceptually, it would be better to express industry prices relative to the GDP deflator, but the GDP deflator is not available monthly. Changes in the CPI, which *are* available monthly, are extremely highly correlated with changes in the GDP deflator.
7. Charts 5-7 focus on only four industries: apparel, electronics, primary metals, and transport equipment. These sectors are representative of the behavior of other sectors, as shown in a longer version of this study available from the author.
8. A similar pattern of falling prices and domestic output starting in late summer 1997 is visible in the oil sector, where the share of imports from East Asia is zero.
9. The drop in output of the transport equipment sector in mid-1998 was due to a strike at General Motors.

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Marston, R. C. 1990. "Pricing to Market in Japanese Manufacturing." *Journal of International Economics* 29, nos. 3-4: 217-36.

van Wincoop, Eric, and Kei-Mu Yi. 2000. "Asia Crisis Postmortem: Where Did the Money Go and Did the United States Benefit?" *Federal Reserve Bank of New York Economic Policy Review* 6, no. 3: 51-70.

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