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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) *net foreign investment = domestic saving - 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) *current account balance = domestic saving - 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) *dollar value of exports = export price (in dollar terms) × 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 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.

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.

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 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]

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

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:

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

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	0.94	1.14	1.54
	(.06)	(.07)	(.08)	(.07)
Exchange rate	-0.25	-0.24	.01	-.09
	(.06)	(.06)	(.24)	(.07)
Adjusted R^2	0.93	0.85	0.91	0.95
Error-correction coefficient	-0.15	-0.43	-0.14	-0.23
	(.06)	(.19)	(.05)	(.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.

Box 1 (Continued)

Import Prices

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

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

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.

[a]See 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.

[b]The trace statistic just misses the 5 percent critical value for Korean export prices. It is well above the 10 percent critical value.

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

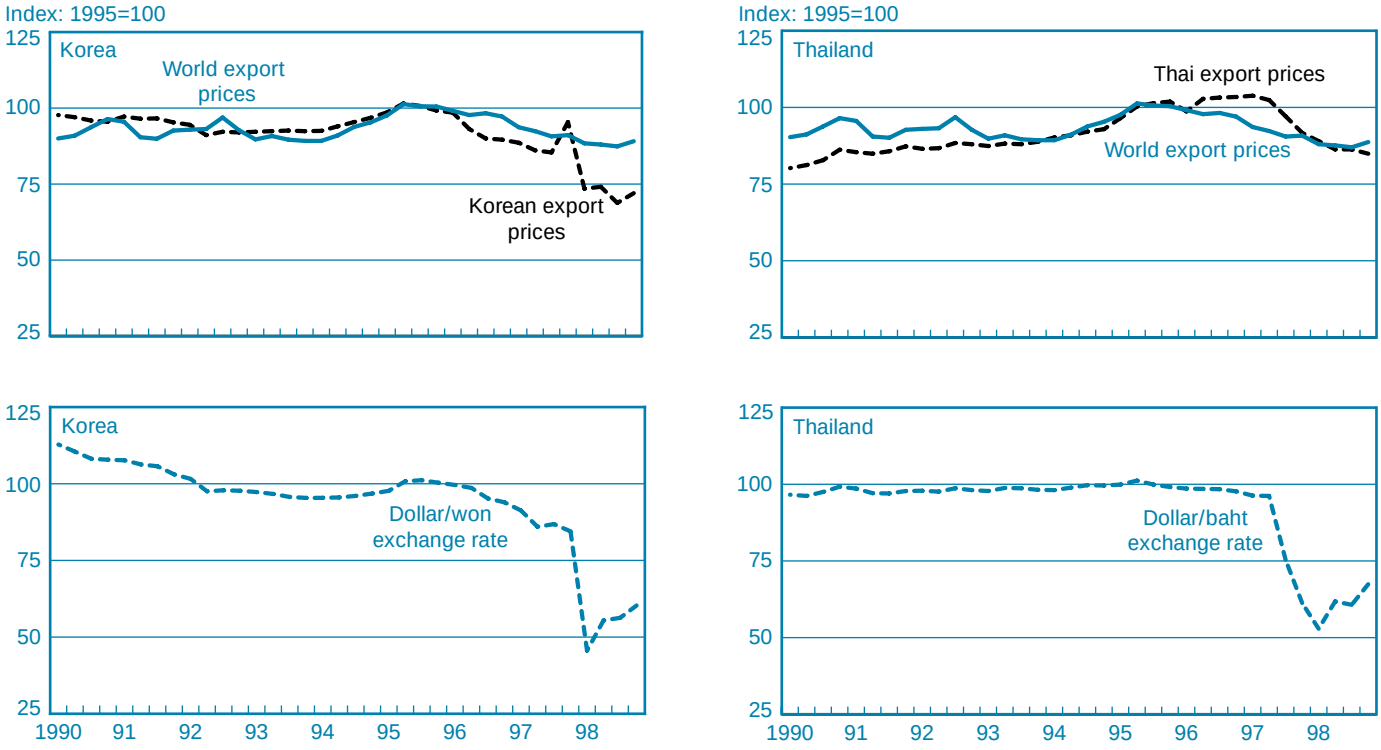
goods. Because import prices tend to rise relative to local prices following a currency depreciation, demand tends to shift from imported to domestic goods, putting additional downward pressure on imports during a crisis. Similar intuition applies to export volumes, with the two determinants being foreign 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.

Box 2

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:

$$(1) \qquad xv_t = \alpha_0 + \alpha_1 \times fdd_t + \alpha_2 \times rpx_t + \varepsilon_1.$$

In the expression above, exv 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.

[a] The 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.

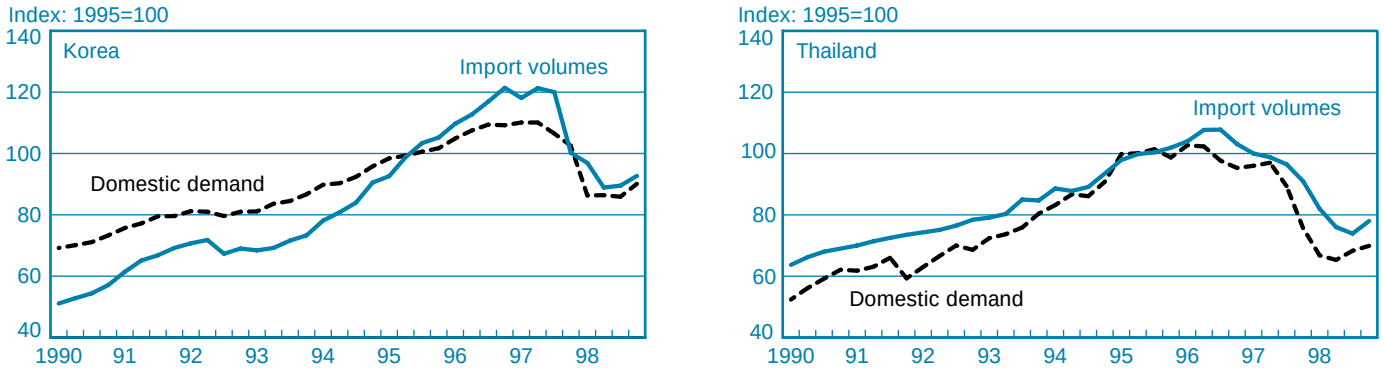
[b] It is debatable whether the ratio of price levels can continue to diverge over the long run. Statistically, relative price variables are nonstationary in this sample period, which is necessary to use the cointegration methodology. Other papers that use cointegration for estimating trade models also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

[c] The trace statistic just misses the 5 percent critical value for Korean import volumes. It is within the 10 percent critical value.

[d] It 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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