

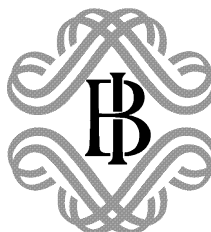
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**International Transmission Via Trade Links:  
Theoretically Consistent Indicators of Interdependence  
for Latin America and South-East Asia**

by Chiara Bentivogli and Paola Monti



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**INTERNATIONAL TRANSMISSION VIA TRADE LINKS: THEORETICALLY  
CONSISTENT INDICATORS OF INTERDEPENDENCE  
FOR LATIN AMERICA AND SOUTH-EAST ASIA**

by Chiara Bentivogli<sup>\*</sup> and Paola Monti<sup>\*\*</sup>

**Abstract**

The empirical work on the role of trade linkages in the transmission of economic disturbances has been limited to tests on the significance of variables of simple trade shares of partners, both bilateral and in common markets. This approach ignores additional elements deriving from the new open economy macroeconomics, such as country size, the pricing policy of exporters and the substitutability of exports. It also only considers the “first victim” country as the one transmitting the crisis to the others, leaving out the action of all other intra-regional links. This paper bridges this gap by producing theoretically-backed indicators of vulnerability due to trade linkages in a multilateral setting. These indicators are then used to compare the size of trade linkages in Latin America and in South-east Asia, two regions that were affected by financial crises in the 1990s. The proposed indexes show that Latin America is much less vulnerable than Asia to an international transmission of economic disturbances from a country in the same region. This is due to the relatively smaller size of Latin American countries, to the higher share of raw materials in their exports and the lower degree of similarity both of the manufactures exported inside their region and of those exported to their common industrial markets. Moreover, South-east Asian countries are more likely than Latin American ones to transmit economic disturbances to industrial countries due to the higher substitutability of their manufactured exports with those of more advanced economies.

JEL classification: F14, F15.

Keywords: trade linkages, currency crises.

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## 1. Introduction and main conclusions<sup>1</sup>

The study of international transmission mechanisms has attracted a renewed interest after the wave of currency crises of the 1990s, whose general feature has been their propagation from one or some countries to whole regions. Financial markets, the banking sector and trade have been identified as the main ‘culprits’ of the contagion, because of their role as channels linking different countries.

This paper concentrates on trade linkages as a channel for spreading the effects of currency crises or, more generally, economic disturbances, from one “source” country to other countries, and compares the degree of vulnerability to external shocks of five Latin American countries and five Asian crisis countries by means of theoretically consistent indicators of trade linkages. Although the linkages through capital and exchange rate markets can be more significant in the short run, because of the high speed of reaction typical of these markets, trade links, even when they are smaller in magnitude, may produce more long lasting effects on the “infected” economies.<sup>2</sup> We consider trade linkages in their two dimensions: structural, i.e. the repercussions on the domestic economy of a disturbance arising elsewhere due to trade links, and strategic, i.e. the probability of a devaluation in countries producing exports similar to those of the source country. Indeed, a government’s decision to devalue the currency as a response to a shock in a partner country depends mostly on the dimension of the trade links with the latter.

Available empirical work has identified and measured trade links simply by means of total export shares, either bilateral or in common markets. The recent wave of theory on the effects of

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<sup>2</sup> Other members of the research group of the International Division of the Research Department of the Bank of Italy on “The international transmission of crises” have worked on these topics. See Corsetti et al. (2000b, 2001), Sbracia and Zaghini (2001), Zaghini (2000). Another interesting link that would deserve further investigation is the connection between the credit market and trade (see, for example, Kiyotaki and Moore, 1997). In what follows we use the term contagion as a synonym for transmission.

devaluation of one currency on countries linked through trade has suggested many refinements to this standard approach.

In what follows we use the theoretical results of the more recent open macroeconomics models to develop consistent indicators of trade links. In our view, these additional indicators are better suited than those used up to now to assess the extent to which trade has played and might play a role in transmitting economic disturbances within a region.

Our analysis uses a Centre-Periphery framework<sup>3</sup> that assumes a devaluation in country A of the Periphery as a specific disturbance and examines how it affects another country B in the same area, via direct trade links or trade competition in the Centre country C. Such a framework reveals the following key factors in explaining the type and the relevance of transmission effects: country and region size, degree of trade integration within the region and of competition in third markets, product composition of trade, pricing policies of exporters (local currency pricing versus seller's foreign currency pricing, for example).<sup>4</sup> In our analysis the Periphery consists of a group of geographically close countries, and we interpret the pattern of interactions that the model identifies for Periphery countries as a possible description of the kind of interdependencies existing among geographically close countries. This assumption is consistent with the fact that contagion has displayed regional features.<sup>5</sup>

We seek to compare and explain the vulnerability to economic disturbances arising in a neighbour country for the two main regional emerging markets groups that were affected by financial crises in the 1990s: Latin America and Asia. We therefore construct trade indicators for five major Latin American countries (Argentina, Brazil, Chile, Mexico and Venezuela) and five Asian countries affected by the currency crisis in 1997-98 (Indonesia, Korea, Malaysia, the Philippines and Thailand) and we use them to assess how some specific features of their trade

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<sup>3</sup> See Corsetti et al. (2000a), Gerlach and Smets (1995).

<sup>4</sup> For a more detailed survey of this kind of model in the context of contagion through trade, see Bentivogli and Monti (2000).

<sup>5</sup> Geographical proximity is considered here only as a factor strengthening trade links; in fact it can also summarise other linkages among countries: common institutional settings, common culture, etc.

structure could affect the ex-ante vulnerability of the countries in each area. We also compare our results with those deriving from the indexes used in the previous empirical work on contagion.

The indexes we calculate tend to show that Latin American countries are much less vulnerable than South-east Asian ones to an economic disturbance arising in a country in the same region. This is due to many factors. A first group of factors, mentioned in the literature, is related to a region's size and the extent of bilateral trade and competition in common markets. Indeed, although Latin American economies as a whole are bigger in terms of their share of world output, they are less open than Asia to international trade. Moreover, intra-regional trade shares are bigger for Asian countries, which also compete more strongly in several industrial markets.

A second group of factors that our indicators emphasise is related to the structure of trade. First, the share of exports in Latin American manufactures is smaller than that in Asian economies. This implies that, in the case of a devaluation of a regional member in Latin America, the degree of pass-through is rather limited and hence the trade channel is less active. The limited evidence shows that the pass-through is higher in Asian countries for manufactures, too, due to the fact that export prices are mostly fixed in their national currencies, while in Latin America exports and imports are mostly invoiced in dollars. Second, considering manufactures only, Latin American countries appear to be less vulnerable due to the lower degree of similarity of their export structure. A simple comparison of Glick and Rose indexes of total trade, heretofore the most widely used in empirical analysis, and the same indicators calculated for manufactures only, show that the indications change markedly, with the former showing higher bilateral links and lower competition in common markets than the latter.

Another dimension of trade structure which is relevant in assessing a country's impact from transmission through trade is product substitutability, since it determines the size and the direction of the demand switching effects. In order to measure product substitutability we compute export similarity indexes, both bilateral and in three common external markets, the United States, the European Union and Japan. For trade in manufactures, the bilateral indexes show a higher degree of similarity among the Asian crisis countries than among Latin American ones. Interestingly, Mexico's trade structure is much more in line with that of Korea and Thailand than with any country

in its region. These results are confirmed by the indexes computed for trade in the three common markets. Moreover, this second group of similarity indexes contributes with some caveats to the indications given by the simple export shares in common markets computed in the first part of the paper. In particular, even if the United States is the most relevant common market, in terms of total export shares, for most of the countries analysed, some Latin American countries have a higher similarity index in their exports to the European Union. Similarly, Japan appears to be a significant centre of transmission, having, for some Asian countries, indexes higher than those for the United States.

A limitation of the similarity indexes is that they are symmetric so that they can be quite misleading if considered alone as a measure of the degree of transmission of economic disturbances through trade. This is clearly unrealistic, and is due to the fact that the similarity index does not take into account the other factors mentioned by the theory as relevant in measuring the dimension of the trade channel, such as relative size and relative trade shares.

This shows once again that no single factor can be considered by itself as determining the extent of the trade transmission mechanism. As the theory emphasises, a complete picture of trade linkages among countries can be given only by the plurality of indicators we present here.

In conclusion, the empirical analysis suggests that trade can play a greater role in transmitting economic disturbances among Asian countries than among Latin American ones. It also shows that, in testing the relative importance of trade and financial channels of transmission, the former should be captured by a more comprehensive and sophisticated set of indicators than has been used in the empirical literature so far.

The paper is organised as follows: in section 2 we derive some indications on the relevant factors that help to evaluate the degree of a country's vulnerability to the transmission of economic disturbances through trade; section 3 summarises the indicators used in previous work, discusses their consistency with the theoretical results, and defines the characteristics that an informative index should have; in section 4 we discuss the results arising from our indexes and compare them with earlier work.



## 2. The theory of crisis transmission via trade links

Does more trade interdependence bring about a higher risk of transmission of economic disturbances? Intuitively, since trade is a channel linking countries' production, consumption, and investment, yes may seem the obvious answer. The stronger trade links are, the more likely it is that disturbances arising in one country will be transmitted to its trade partners. The theory developed during the last wave of currency crises shows that this is not always the case and that, even when this broad conclusion applies, it must be qualified.

According to the theory, the relevant factors to assess the likelihood of transmission of a crisis through trade are:

- i) the size of the 'ground zero' country, that is the country where the economic disturbance took place first;
- ii) the extent of bilateral/regional trade;
- iii) the degree of competition in third markets;
- iv) the degree of exchange rate pass-through;
- v) the degree of product substitutability.

Most of these factors are interrelated. For example, the extent of pass-through depends, among other things, on product substitutability. However in what follows we will discuss each of them separately.

### 2.1 *Country size and openness*

Country size is relevant in assessing the extent to which the trade channel will operate for two reasons. First, the larger the size of the 'ground zero' country, the greater, other things being equal, the systemic effects of a shock on other countries or areas via trade links. Second, the Corsetti et al. (2000a) Centre-Periphery model suggests that the larger the size of a region, the stronger will be the incentive for a trade partner belonging to that region to match the devaluation of a country in the same region. The theory assumes GDP, world population and world trade shares

are coincident in equilibrium.<sup>6</sup> In reality, these shares can differ substantially, due to different degrees of trade openness. In this case, the most relevant indicator in assessing the magnitude of the impact is the trade share. Indeed, shocks arising in large GDP countries may have small repercussions in the world when their trade share is low.<sup>7</sup>

Latin America as a region represents 8.6 per cent of world output (measured at current PPPs) and 5.4 per cent of world trade at current prices (Table 1). It is smaller than emerging and developing Asia, which represents 16 per cent of world output and 9.9 per cent of world trade.<sup>8</sup> The five major Latin American countries' share of world output stands at 6.6 per cent at current PPPs, that of the Asian crisis countries at 5.1. However, the five Latin American countries have a slightly smaller share of world trade than the Asian crisis economies.

A broad inspection of the evolution of the degree of openness confirms these observations (Figures 1 and 2). On average, the five major Latin American countries are less open than the Asian crisis countries. A notable exception is Chile, whose degree of openness in the nineties was comparable to that of Korea, the Philippines and Thailand. Argentina and Brazil's degrees of openness were among the lowest in the region, at somewhat less than 30 per cent.

If one had to interpret this preliminary evidence in terms of systemic risk, one could conclude that, on average, Asian countries appear to be riskier than Latin American ones.

## 2.2 *Extent of bilateral and intra-regional trade*

Another factor that determines a country exposure to an international transmission of economic disturbances is the geographical direction of its trade, in particular with countries in the same region.

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<sup>6</sup> See Corsetti et al. (2000a). In fact, the authors define size only in terms of share of world output, but in their model all goods are traded internationally, therefore implying very open countries.

<sup>7</sup> This is the case, for example, for China, which accounts for 10.2 per cent of world GDP but for only 3.4 per cent of world trade since it is a very closed economy.

<sup>8</sup> Here and in the rest of the paper emerging and developing Asia includes developing Pacific countries, Singapore and Hong Kong and excludes South Asia.

Traditionally, strong intra-regional or bilateral trade links have been considered an element of vulnerability, due to the negative demand switching effects of a devaluation by a competitor. More recent contributions have emphasised the positive effects of the improvement in the terms of trade of the partner of the devaluing country. In particular, in the case of full pass-through,<sup>9</sup> a devaluation in country A causes an improvement in country B's terms of trade vis-à-vis A, with positive effects on B's welfare directly related to its trade share with A.

The intra-group trade of the five major Latin American countries is low (10.7 per cent), but it rises to 18.6 per cent when considering trade with the whole Latin American region. Intra-group trade for the Asian crisis countries is even lower (8.9 per cent), possibly due to the role of Hong Kong and Singapore as re-export hubs in East Asia, but it is quite high for trade with the whole Asian region (37.1 per cent; Table 2).<sup>10</sup>

Among the five major Latin American countries, intra-regional trade share is heterogeneous, with the highest share for Argentina (37.3 per cent) and the lowest for Mexico (2.2 per cent). Argentina is also the most "dependent" on exports to regional countries, with Brazil as its most important export market within the area, with a bilateral export share of 27.8 per cent. Mexico, by contrast, does not appear among its first 15 export markets (Table 3). Brazil and Chile send 25.4 and 20.5 per cent of total exports, respectively, to the Latin American region. The single most important regional market for Brazil is Argentina, with a share of 11.5 per cent.

The Asian crisis countries show a more homogeneous degree of intra-group and intra-regional integration. Many Asian countries appear among their main export markets. Singapore and Hong Kong are among the leading outlets for each Asian crisis country. Given the role of Hong Kong as re-export market, the fact that 75 per cent of its exports to Asia are actually directed to China shows that the five Asian crisis countries are actually more integrated with China than

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<sup>9</sup> With full pass-through we refer to a situation in which, in the short run, prices are set in the currency of the producing countries, so that any exchange rate movement of that currency will fully pass through to the prices of the importing country.

<sup>10</sup> We computed export shares as five-year averages (1995-99) in order to remove short-term variability.

appears in the data. Similar considerations also apply to Singapore for exports to China and Malaysia.

Summing up, the share of intra-regional trade is lower for Latin American countries as a whole. Argentina appears to be the most vulnerable to regional shocks, having two Latin American countries as its first and third main export markets, with a cumulative share of about 35 per cent.

### *2.3 Competition in third markets*

Trade links operate not only bilaterally, but also through competition in common markets. A devaluation in country A, in the presence of some degree of pass-through, leads to an improvement in its competitiveness and to an increase in its exports vis-à-vis other competitors (B) in common markets.<sup>11</sup> Thus, competition in third markets can exert a negative effect on partner countries. This might indeed be the case of Latin American countries competing for market share in the US market.

Table 3 lists the first 15 export markets for each of the five major Latin American countries and the Asian crisis countries. It confirms that the United States is the main export market for all of them, though with shares ranging from 16.8 to 84.9 per cent. Argentina is an exception, with the United States following Brazil in the second place, but with a significantly smaller share (about 8 per cent). The United States is also the main common market for the Asian crisis countries except Indonesia, with Japan following as an important outlet. If we consider the European Union countries as a group, then while the United States remains the most important market for Mexico and Venezuela, the European Union becomes the leading export market for Chile and Brazil, and the second after Brazil for Argentina. For the Asian crisis countries, the European Union is always the second most important market (the third for Malaysia, after Singapore).

Again considering the European Union as a group, Japan is the third export market for Chile, with a share of 15.5 per cent; it is the fourth and fifth respectively for Mexico and Brazil and has

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<sup>11</sup> This is true under quite general conditions, that is when A's and B's goods are very similar, but the elasticity of substitution between Centre and Periphery goods is low. See Corsetti et al. (2000a).

more modest importance for Argentina and Venezuela. For Asian crisis countries, Japan is the most important market for Indonesia, but it follows the United States and the European Union for all the other countries.

Summing up, for both groups of countries considered, competition in common markets takes place in the industrial area and it is particularly strong in the United States and the European Union. The importance of these markets for each Latin American country is nevertheless very different and in some cases trade is very polarized (Mexico and Venezuela). For the Asian crisis countries the relevance of these common markets is very similar both between them and within each country.

#### *2.4 Exchange rate pass-through*

A fundamental issue in assessing the relevance of trade as a transmission channel is the degree to which exchange rate changes are passed through to prices. The standard Keynesian view is that, in the short run, prices are fixed in the sellers' currencies, so that any movement in the exchange rate of a given country is fully transmitted to its import prices, while its export prices do not change. This means that devaluations involve deteriorations in its terms of trade.<sup>12</sup> In this case, more trade between A and B reduces the risk of negative repercussions on B from a devaluation of A, because the improvement in B's terms of trade compensates for the decline in B's export volumes. Completely different implications can be drawn in models that assume local currency pricing. In this case, the devaluing country actually experiences an improvement in its terms of trade, while its competitive position is not affected. This situation increases the incentive of partner countries to match the devaluation.

The degree of pass-through is strongly influenced by the commodity structure of trade, and in particular by the share of manufactures in total trade. This is due to the fact that raw materials prices are generally set in dollars internationally. Therefore, except for the United States, raw materials trade is likely to be affected mostly by global commodity price changes rather than a country's exchange rate changes. This implies that changes in the exchange rate of a commodity exporter will

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<sup>12</sup> Terms of trade are defined here as the ratio between the prices of exports and those of imports.

not affect its competitiveness and, probably, its terms of trade. This suggests that the analysis of vulnerability should only consider trade in manufactures, for which the pricing behaviour of producers may lead to a devaluation having a very different effect on the terms of trade and competitiveness.

The actual behaviour of the terms of trade in response to exchange rate movements is a matter of empirical investigation. A preliminary examination of manufactures' terms of trade for Mexico and Korea, for which OECD data are available, shows a negative correlation between exchange rate and terms of trade changes in both cases. This can be interpreted as supporting evidence for the Keynesian view. Considering the corresponding recent crisis period for each of them, the correlations are very different in size however: -0.06 for Mexico and -0.49 for Korea. While the results for Korea are very similar to those estimated for industrial countries,<sup>13</sup> Mexico looks like an outlier. A possible explanation is that Mexican exports are heavily concentrated on the US market, where the invoice currency is usually the US dollar; at the same time Mexican manufacturing imports are mainly from the United States, and it is very unlikely that US firms set their prices in pesos rather than dollars. This asymmetry in the behaviour of Mexican and US firms, mainly related to the different structure and size of the two markets, can explain the very low (negative) correlation between the exchange rate and the terms of trade observed for Mexico.

This in turn implies that Mexican devaluations would have, other things being equal, low spill-over effects in the Latin American region.

### *2.5 Product substitutability*

The degree of substitutability of the different internationally-traded goods is relevant in assessing a country's impact from transmission because it determines the size and the direction of the demand switching effects.

For example, when countries of the same region produce goods that are very similar/substitutes in consumption, then changes in the exchange rate of one of them may

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<sup>13</sup> See Obstfeld and Rogoff (1999).

significantly reduce the welfare of its regional trading partners due to the sharp reduction in the demand for their exports.

Substitutability in production also matters and may have different effects from that in consumption. For example, if trade within a region consists mainly of products that are complementary in production, then a devaluation by one country improves the competitiveness of the “joint product” for all countries in the region.

For the substitution effects to occur, some degree of pass-through must take place. This implies that, as noted previously, the analysis of substitution effects applies mainly to countries producing manufactures.

The direction and magnitude of the demand switching effects, as summarised by the degree of pass-through together with the price elasticities of substitution between goods, have been greatly emphasised in the theory but have been underestimated in the empirical analysis. We intend to fill this gap by presenting some trade indicators that take these theoretical suggestions into account.

### **3. Testing vulnerability due to trade links: Glick and Rose trade indexes**

Following the currency crises of the 1990s, numerous empirical tests of the relevance of trade as a transmission channel have been conducted. Nevertheless, the methodologies used only partially take the theoretical results set out in the preceding sections into account. In particular, they measure trade links between countries simply by using various combinations of total trade shares and neglect the commodity composition of trade.

Glick and Rose (1998) trade indexes have been used most extensively in these empirical tests.<sup>14</sup> They compute the following indicators:

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<sup>14</sup> For other interesting empirical works testing the relevance of trade as a transmission mechanism see Eichengreen, Rose and Wyplosz (1996), Caramazza et al. (1999), Van Rijckeghem and Weder (1999), Kaminsky and Reinhart (1999).

$$Trade_i = \sum_k \left( \frac{x_{0k} + x_{ik}}{x_0 + x_i} \right) \left( 1 - \frac{|x_{0k} - x_{ik}|}{x_{0k} + x_{ik}} \right)$$

$$DirectTrade_i = 1 - \frac{|x_{i0} - x_{0i}|}{x_{i0} + x_{0i}}$$

$$TotalTrade_i = \left[ 1 - \frac{x_{i0} + x_{0i}}{x_i + x_0} \right] Trade_i + DirectTrade_i \left[ \frac{x_{i0} + x_{0i}}{x_0 + x_i} \right]$$

$$TradeShare_i = \sum_k \left( \frac{x_{0k} + x_{ik}}{x_0 + x_i} \right) \left( 1 - \frac{\frac{|x_{0k} - x_{ik}|}{x_0} - \frac{|x_{ik} - x_{i0}|}{x_i}}{\frac{x_{0k} + x_{ik}}{x_0} + \frac{x_{ik} + x_{i0}}{x_i}} \right)$$

where  $x_{ik}$  are exports from country  $i$  to country  $k$  ( $k \neq i, 0$ ),  $0$  is the “first victim” country,  $x_0$  are total exports of country  $0$  and  $x_i$  are total exports of country  $i$ . Trade is an indicator of the contribution of third markets for the first victim country and for country  $i$ , DirectTrade is a measure of bilateral trade, TotalTrade is a weighted index of bilateral trade and trade in common markets, and TradeShare is an index similar to Trade but adjusted for trade shares to control for the different size of the countries. Using these indexes to estimate contagion regressions, Glick and Rose (1998) find strong evidence in favour of the hypothesis that currency crises spread from one country to another because of trade.<sup>15</sup> Moreover their results are relatively insensitive to the exact index used.

These and similar indexes used in empirical estimates of transmission of crises, do not fully exploit the insights of the theory we discussed previously.<sup>16</sup> In particular, while they emphasise the direction of trade, they do not at all measure the product composition of exports, thus overlooking

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<sup>15</sup> His finding does not seem to be robust to alternative specifications of contagion regressions. For example, Van Rijckeghem and Weder (1999), add variables to the regression that measure the competition for bank funds in the first crisis country and that take a form similar to, alternatively, the Trade and Tradeshare indexes of Glick and Rose (1998), with bank lending instead of trade. With this specification, they find that trade is much less significant than competition for funds as a channel of transmission. For Asian countries trade is found to be not significant at all.

<sup>16</sup> In addition, they might convey distorted indications. As Caramazza et al. (1999) note, with almost balanced trade, for example, the DirectTrade measure hints at a very large link even if the bilateral flows are very small.



the role of product substitutability and the (likely) degree of pass-through. Besides, for each crisis episode, these indexes are computed with reference to a “ground zero” or “first victim” country that is assumed to be the only one transmitting the crisis to the others in the region. In our view, this is a limitation for two main reasons. First, because the country where the crisis breaks out might well be the one where the symptoms are felt at a later stage. Second, because once the crisis has started, it is the whole intra-regional trade network that is relevant as a transmission channel, not only the first victim’s trade structure.

As a first step to include the product composition of trade, we computed Glick and Rose (1998) TradeShare (measuring competition in third markets) and DirectTrade (measuring direct trade linkages) indexes for the five major Latin America economies, the Asian crisis countries and the G7, both for total trade and for trade in manufactures only. Note that our measures of total trade linkages are not identical to those computed by Glick and Rose because we use a different data set and we consider different countries.<sup>17</sup>

Table 5 shows that when the two indexes are computed for total trade and trade in manufactures, they do not change much for G7 countries, given the high manufactures content of their trade; by contrast, they differ substantially for other areas.

Let’s consider Latin America and indexes computed for the 1994 crisis, assuming Mexico as the “ground zero” country. Trade links in manufactures come out lower than those measured on total trade for bilateral links (direct trade), while they are higher for links in common markets. A possible explanation is that, although Latin America trade has a high raw materials content, competition with Mexico in third markets is mostly in manufactures. Only for Venezuela, an oil exporter like Mexico, do trade links in third markets decrease strongly when only manufactures are considered. Oil price shocks would affect both of them equally and, since oil is quoted in dollars internationally, a devaluation of the Mexican peso (which is what we are interested in) would not change their relative competitive position in oil markets. Similar results hold for the 1997 crisis: the

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<sup>17</sup> We use the WTA Statistics Canada database, while Glick and Rose use IMF Direction of Trade Statistics. For the list of third markets considered, see Appendix I.

direct trade index in manufactures is much lower for Korea and Philippines; the one measuring competition in third markets is higher for all the Asian crisis countries except the Philippines.

This simple exercise suggests that, for the two regions analysed here, considering total trade instead of manufactures only in the construction of trade indicators implies very different results: the first group of indexes show higher bilateral links and lower competition in common markets than the second. This confirms that taking the structure of trade into account has important implications for the assessment of the vulnerability of a country to a crisis.

#### **4. Indicators of vulnerability linked to trade structure**

Our first extension tries to overcome the limitation of considering only the “first victim” country as a partner. We therefore compute indexes of the commodity specialisation of each country’s exports by using the world average as a benchmark. Tables 6 and 7 contain the specialisation indexes for each of the five Latin American countries and the five Asian crisis countries. We consider the export specialisation of each country both in the total world market and in some specific countries or areas, including the regions of which our countries are part. The indexes are calculated as

$$SI_{ij} = (x_{ij}^a / x_{ij}) / (x_{wj}^a / x_{wj}) * 100$$

where the numerator is the export share of each country  $i$  of commodity group  $a$  to area of destination  $j$ ; the denominator is the corresponding world share. The index is equal to 100 when the country trade structure is similar to the world average, and it is greater (lower) than 100 when the country trade share in commodity  $a$  to the specific region  $j$  is greater (lower) than the world share.

The specialisation indexes show that, in general, Latin American countries are specialised in food, metals and fuels; only Mexico's trade share of manufactures is near the world average. Asian crisis countries have, with the exception of Korea, a marked specialisation in agricultural raw materials, but they also score high in manufactures trade.

Considering only manufactures, for the Latin American countries the index shows, with the exception of Mexico, higher relative specialisation inside the region than in the world markets, while

for the Asian crisis countries intra-regional trade specialisation is similar to their total trade specialisation. This would suggest that, controlling for other factors (like transport costs), for the Latin American countries the trade channel operates more strongly within the region than between the region and the rest of the world, whereas for the Asian crisis countries the trade channel operates broadly with the same intensity both inside and outside the region. This is an indication that economic disturbances arising in Asian crisis countries are more likely to be transmitted outside the region than those starting in Latin America.

Some interesting features emerge when we look at the relative specialisation in the main common external markets: the United States, the European Union and Japan. With the exception of Venezuela, Latin American countries' relative specialisation in manufacturing is much higher in the United States than in the European Union and in Japan, where trade remains specialised in primary products. This result qualifies the data we presented in section 2.3: even if Latin American countries have a high share of total trade directed to the European Union, if one looks at specialisation in manufacturing the United States appears to be far more relevant as a third market from which economic disturbances arising in one Latin American country can be transmitted to others. More heterogeneity emerges for the Asian crisis countries, where in some cases the specialisation index for manufactures is higher in the Japanese market than in the United States. This shows that Japan plays an important role in the transmission of crises throughout Asia even for countries for which it is not the largest market in terms of exports shares.

Summing up, the specialisation indexes indicate that the Asian crisis countries might prove more sensitive to economic disturbances arising in trade partners due to their higher specialisation in manufactures. Moreover, a change in Asian competitiveness may have stronger effects on industrial countries than a similar change in Latin America, where crises are likely to be more regional in nature.

Though it is a step forward in comparison to simple trade shares indicators, the specialisation index has a major limitation: the very low differentiation in the product group. Considering manufactures as a single group hampers an assessment of the degree of substitutability between the goods traded and thus of the demand switching effects following a change in the terms of trade.

Table 8 gives a first insight in this direction. It lists the first ten 3-digit SITC commodities exported by each of the five major Latin American countries and the five Asian crisis countries and gives an indication of the degree of ‘world market’ power<sup>18</sup> for each product. The national export shares of each commodity proxy the importance for the country of demand switching effects that could arise from devaluation by a competitor in that specific product market. They show that in Latin America the only two pairs of countries in the region where a change in the terms of trade in one of them can determine strong demand switching effects in the other are Mexico and Argentina (due to competition in passenger vehicles), and Brazil and Mexico (for motor vehicle parts). A very different picture emerges for the Asian crisis countries, which compete against each other in numerous markets.

The shares in the world market can instead be used as a proxy for the impact that changes in the terms of trade of a specific country could have on its world competitors in those specific markets. Again, Latin America does not appear to be a big player in any manufactured goods market: world export shares above 10 per cent can be found only for iron and steel processing for Brazil and electrical equipment and television receivers for Mexico. The Asian crisis countries, excluding the Philippines and Thailand, are instead major world exporters in four manufactures markets.

One way of summarising the substitutability of each country’s exports is the export similarity index. It is defined as:

$$ES_{ij} = \sum_a [\min(x_{ai}, x_{aj})] * 100$$

where  $x_{ai}$  and  $x_{aj}$  are export shares of, respectively, country  $i$ ’s and  $j$ ’s manufactures exports in industry  $a$ . We used 3-digit SITC data in order to ensure a sufficient level of detail in export composition. The index ranges between 0 and 100, with 0 indicating complete dissimilarity and 100 identical export composition. This specification of the index gives a synthetic picture of the degree of substitutability of goods traded between two countries. In terms of the Centre-Periphery model of Corsetti et al. (2000a), the higher the elasticity of substitution between the goods produced in the

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<sup>18</sup> Measured as a share of a country’s exports of that commodity in world exports.

two Periphery countries (A and B), the larger the positive demand switching effect towards the devaluing country.<sup>19</sup> If the elasticity of substitution among goods produced in one country is higher than the one across goods produced in each of the two Periphery countries, then after a devaluation by A the demand switch from B to A exceeds, in terms of welfare effects, the improvement in B's terms of trade. Therefore, the higher the similarity index, the more negative the effect transmitted to B from A through trade.

Table 9 shows the similarity indexes for 1997 for raw materials and for manufactures. A first indication given by these indexes is that the export structure is generally less homogeneous for raw materials than for manufactures even for countries in the same region. The only exceptions are Mexico and Venezuela, both big oil exporters and, among the Asian countries, Malaysia and Indonesia, which produce a wide range of common raw materials. This means that, for example, both areas are likely to be affected more by a devaluation by a trade partner exporting manufactures than by a common shock in a raw material market.

For trade in manufactures, the indexes show a higher degree of similarity among the Asian crisis countries than among Latin American ones. Among the second group, Argentina and Brazil are the most similar, with an index of 59.4, while Chile and Venezuela show very low substitutability indexes. Interestingly, Mexico's trade structure is much more in line with that of Korea and Thailand than with any country in its region. This implies that, as far as the trade channel is concerned, Latin America should be quite well insulated from an economic disturbance arising in Mexico and vice-versa.

In order to derive a more synthetic measure of the degree of vulnerability of each country, we averaged its similarity indexes with each of the 81 partner countries we used to compute the Glick and Rose indexes. We weighted each bilateral similarity index by the world export shares in manufactures of the partners. The data, shown in the bottom line of Table 9, indicate that Mexico and Korea, with a similarity index of, respectively, 54 and 53, are the economies for which the trade transmission channel is most powerful. These levels are quite high, if one considers, for

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<sup>19</sup> Here we are implicitly assuming, as our theoretical reference model does, that all goods produced are traded.

example, that the similarity index between Italy and Germany is 67. On the other hand, Venezuela, Chile, the Philippines and Indonesia appear to be relatively more sheltered from crises starting elsewhere.

In addition to the similarity between goods produced by each of the two Periphery countries, the theory finds that it is also important to consider the elasticities of substitution between the goods produced in the Periphery and those produced in the Centre. After a devaluation by country A and in the presence of at least partial pass-through, the partner B in the Periphery loses in terms of welfare if A's and B's products are similar and the substitutability between the Periphery's and the Centre's goods is low. This is due to the fact that the increase in the Centre's demand for the Periphery goods will be low and will mainly be directed to country A.

To check the degree of substitutability between goods exported in common markets we compute the similarity indexes using (instead of total export shares) the export shares of each country in the three main markets of the areas under analysis: the United States, the European Union and Japan. For all of them the indexes confirm that the similarity among the Asian crisis countries exports is much higher than that among the five Latin American countries. In each of the three common markets, only Brazil has significant linkages with the other Latin American countries (Argentina again appears to be the most closely linked to it). By contrast, all the Asian crisis countries compete heavily against each other in all the markets (Table 10). In terms of the theoretical model we refer to, these results indicate that competition in common markets is relevant for the transmission of crises in both areas and especially for the Asian crisis countries.

The similarity indexes in the three common markets considered contribute, with some caveats, to the results of section 2.3 on competition in common markets. In particular, even if the United States is the most relevant common market, in terms of total export shares, for most of the countries analysed, some Latin American countries have a higher similarity index in their exports to the European Union. Similarly, Japan appears to be a significant centre of transmission, having, for some Asian countries, indexes higher than those for the United States.

A limitation of the bilateral similarity indexes showed above is that they are symmetric, so that they can be quite misleading if considered alone as a measure of the degree of transmission of

economic disturbances through trade. For example, an economic disturbance arising in Brazil is supposed to have the same welfare effect on Argentina as a similar disturbance taking place in Argentina could have on Brazil. This is clearly unrealistic, and it is due to the fact that the similarity index does not take into account the other factors mentioned by the theory as relevant in measuring the dimension of the trade channel, such as relative size and relative trade shares.

This shows once again that no single factor can be considered by itself as determining the extent of the trade transmission mechanism. As the theory emphasises, a complete picture of trade linkages among countries can be given only by the plurality of indicators we present here. The evaluation of their relative importance is indeed an empirical matter that could be useful to investigate in future work.

Tables and Figures

**LATIN AMERICA: EVOLUTION OF THE DEGREE OF OPENNESS (1)**  
(percentages)

Fig. 1

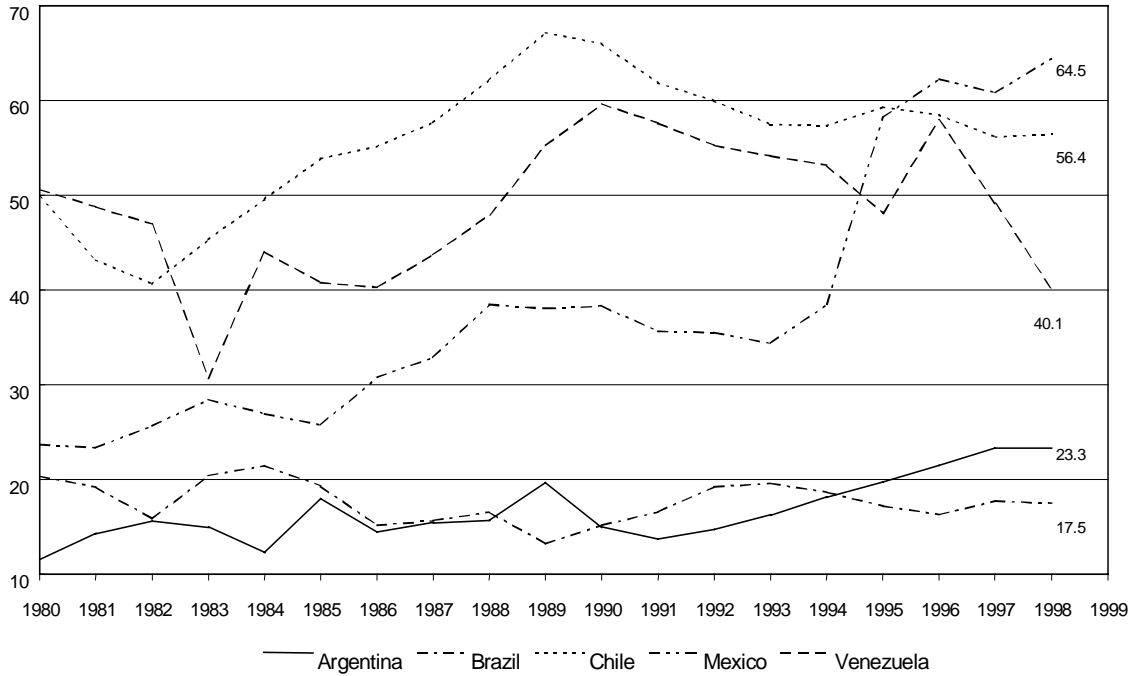
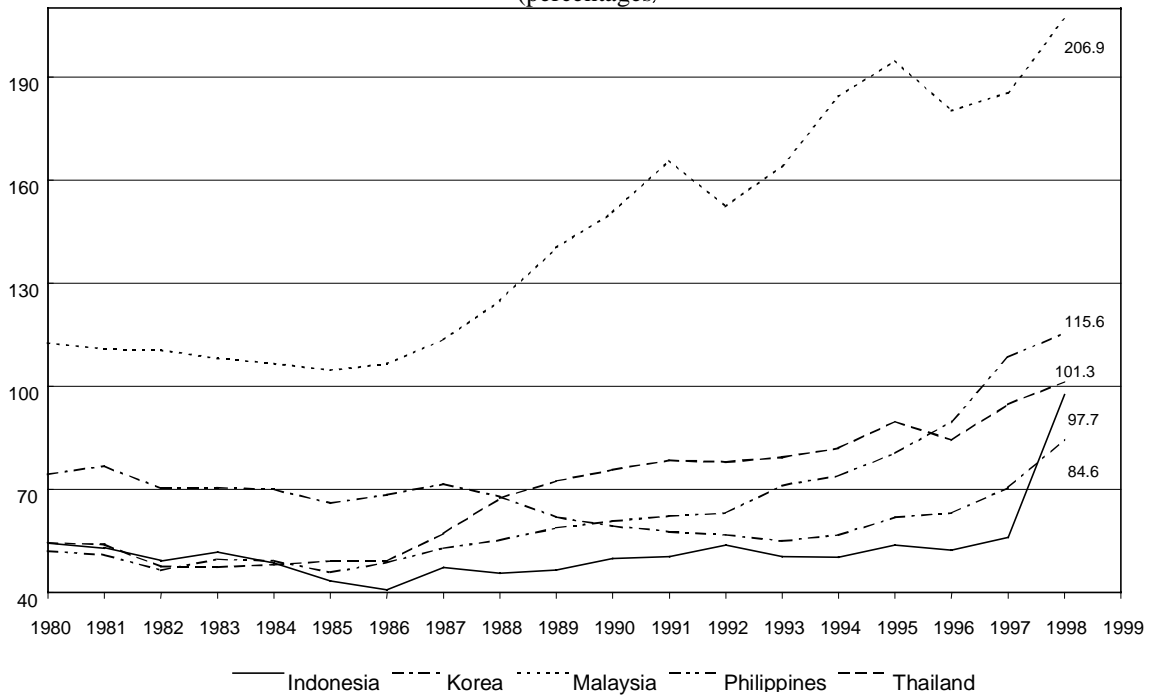


Fig. 2

**ASIAN CRISIS COUNTRIES: EVOLUTION OF THE DEGREE OF OPENNESS (1)**  
(percentages)



Source: World Bank, *World Development Indicators*, 2000.

(1) Ratio of imports plus exports of goods and services to GDP at constant 1995 dollars.



Table 1

**INDICATORS OF COUNTRY SIZE FOR SOME INDUSTRIALISED AND EMERGING COUNTRIES IN 1998**

	Share of :			Level of per-capita GNP current PPPs US\$
	World GNP current PPPs	World population	World trade current US\$ (1)	
<b>G7</b>	45.8	11.6	48.5	24,841
United States	21.3	4.6	12.5	29,240
Canada	1.9	0.5	4.0	22,814
Japan	8.0	2.1	6.9	23,592
France	3.4	1.0	5.6	21,214
Germany	4.9	1.4	10.0	22,026
Italy	3.2	1.0	4.5	20,365
United Kingdom	3.3	1.0	5.0	20,314
<b>LATIN AMERICA</b>	8.6	8.5	5.4	6,340
of which:				
Five major Latin American countries	6.6	5.7	4.2	7,347
Argentina	1.1	0.6	0.5	11,728
Brazil	2.9	2.8	0.9	6,460
Chile	0.3	0.3	0.3	8,507
Mexico	1.9	1.6	2.2	7,450
Venezuela	0.4	0.4	0.3	5,706
<b>EMERGING AND DEVELOPING ASIA (2)</b>	16.0	30.8	9.9	3,280
of which:				
China	10.2	21.0	3.4	3,051
Asian crisis countries	5.1	6.9	6.2	4,640
Indonesia	1.3	3.5	0.9	2,407
Korea Rep.	1.7	0.8	2.4	13,286
Malaysia	0.5	0.4	1.3	7,699
Philippines	0.8	1.3	0.5	3,725
Thailand	0.9	1.0	1.0	5,524

Source: World Bank, *World Development Indicators*, 2000.

(1) Merchandise exports. – (2) Excludes South Asia and includes Pacific developing countries, Singapore and Hong Kong.

Table 2

**LATIN AMERICA AND ASIA: BILATERAL EXPORT SHARES BY DESTINATION IN  
1995-99 (1)**

Partner Report	Latin America		Emerging and developing Asia		Industrial countries		Other Countries
		Five major Latin American countries		Asian crisis countries		EU	
<b>Five major Latin American countries</b>	18.6	10.7	5.0	1.8	72.0	13.0	4.4
Argentina	47.5	37.3	10.8	2.9	30.9	18.8	10.8
Brazil	25.4	16.4	8.6	3.5	55.4	27.8	10.6
Chile	20.5	13.1	15.8	7.1	59.9	25.5	3.8
Mexico	5.6	2.2	1.1	0.2	92.8	3.7	0.5
Venezuela	32.5	7.0	0.6	0.2	64.1	8.1	2.8
<b>Asian crisis countries</b>	3.1	1.7	37.1	8.9	52.2	14.5	7.6
Korea	5.8	3.0	35.9	8.1	46.7	12.5	11.6
Indonesia	1.7	1.2	35.5	11.3	57.1	15.4	5.7
Malaysia	1.5	1.0	44.3	9.2	50.3	14.8	3.9
Philippines	1.2	0.4	26.7	8.8	70.3	17.7	1.8
Thailand	1.2	0.8	35.6	7.9	55.7	16.3	7.5

Source: IMF, *Direction of Trade Statistics*.

(1) Share of each partner country in total exports of each report country. Emerging and developing Asia includes developing Pacific countries.

**FIVE MAJOR LATIN AMERICAN COUNTRIES AND ASIAN CRISIS COUNTRIES:  
MAIN EXPORT MARKETS (1)**  
(percentages)

<b>Brazil</b>		<b>Mexico</b>		<b>Argentina</b>		<b>Venezuela</b>		<b>Chile</b>	
United States	19.6	United States	84.9	Brazil	27.8	United States	51.6	United States	16.8
Argentina	11.5	Canada	2.6	United States	8.3	Colombia	6.7	Japan	15.5
Netherlands	6.3	Japan	1.1	Chile	7.0	Brazil	4.2	United King.	6.3
Japan	5.6	Spain	0.8	Netherlands	4.5	Dominic. R.	3.3	Brazil	5.5
Germany	5.0	Germany	0.8	Spain	3.2	Canada	2.7	Korea	4.8
Italy	3.5	Brazil	0.7	Italy	3.1	Germany	1.7	Germany	4.4
Belgium	3.2	United King.	0.6	Uruguay	3.0	Peru	1.6	Argentina	4.3
United King.	2.7	Chile	0.6	China	2.5	Japan	1.5	Italy	3.6
Paraguay	2.5	Belgium	0.5	Germany	2.5	Mexico	1.4	France	3.0
France	2.3	Venezuela	0.5	Paraguay	2.4	Ecuador	1.2	Netherlands	2.6
Chile	2.2	Guatemala	0.4	Japan	2.3	United King.	1.1	Peru	2.3
Spain	2.1	Colombia	0.4	Iran	2.1	Spain	1.1	China	2.3
China	2.0	Switzerland	0.4	Bolivia	1.4	Chile	1.1	Mexico	2.2
Uruguay	1.6	France	0.4	Egypt	1.4	Netherlands	1.0	Spain	2.0
Mexico	1.6	Argentina	0.4	Venezuela	1.4	Italy	1.0	Belgium	2.0
<b>Total</b>	<b>71.7</b>	<b>Total</b>	<b>95.1</b>	<b>Total</b>	<b>72.9</b>	<b>Total</b>	<b>81.2</b>	<b>Total</b>	<b>77.6</b>
<b>Indonesia</b>		<b>Korea</b>		<b>Malaysia</b>		<b>Philippines</b>		<b>Thailand</b>	
Japan	22.9	United States	18.1	United States	20.2	United States	34.6	United States	20.1
United States	14.7	Japan	11.3	Singapore	18.9	Japan	15.8	Japan	15.2
Singapore	10.0	China	9.2	Japan	12.1	Singapore	6.4	Singapore	10.8
Korea	5.9	Hong Kong	7.7	Hong Kong	5.2	Netherlands	5.9	Hong Kong	5.3
China	4.3	Singapore	4.1	Netherlands	3.8	United King.	5.0	Malaysia	3.5
Hong Kong	3.2	Germany	3.6	United King.	3.6	Hong Kong	4.5	United King.	3.4
Germany	3.2	United King.	2.8	Thailand	3.6	Germany	3.9	China	3.3
Netherlands	2.8	Malaysia	2.8	Germany	2.9	Thailand	3.2	Netherlands	3.3
Australia	2.8	Indonesia	2.0	Korea	2.8	Malaysia	3.2	Germany	2.9
United King.	2.5	Panama	1.8	China	2.6	Korea	1.9	Indonesia	1.8
Malaysia	2.5	Philippines	1.7	Australia	1.9	China	1.4	France	1.7
Spain	1.6	Australia	1.6	India	1.8	Canada	1.2	Australia	1.7
Italy	1.6	Thailand	1.6	Indonesia	1.5	France	1.0	Belgium	1.4
Thailand	1.6	Switzerland	1.3	Philippines	1.3	Australia	0.7	Korea	1.4
United Ar. E.	1.3	Netherlands	1.3	Belgium	1.1	United Ar. E.	0.5	United Ar. E.	1.2
<b>Total</b>	<b>80.9</b>	<b>Total</b>	<b>70.9</b>	<b>Total</b>	<b>83.3</b>	<b>Total</b>	<b>89.2</b>	<b>Total</b>	<b>77.0</b>

Source: IMF, *Direction of Trade Statistics*.

(1) Average export shares in 1995-99.

Table 4

**CONTEMPORANEOUS CORRELATIONS BETWEEN QUARTERLY  
CHANGE IN EXCHANGE RATE VIS-À-VIS THE DOLLAR AND THE  
TERMS OF TRADE (1)**

Country	Period		
	8602-9903	9001-9803	9701-9803
Korea			
manufactures	-0.15	-0.15	-0.49
raw materials	-0.26	-0.35	-0.55
food and agric.	-0.39	-0.44	-0.51
	<b>8602-9703</b>	<b>9001-9703</b>	<b>9401-9504</b>
Mexico			
manufactures	-0.02	-0.03	-0.06
raw materials	0.15	0.19	0.26
food and agric.	0.15	0.17	0.26

Source: OECD, *International Trade and Competitiveness Indicators*, various issues.

(1) Terms of trade are calculated as the ratio of the price of exports to the price of imports. Data exclude energy products.

**GLICK AND ROSE TRADE LINKAGES  
WITH RESPECT TO MEXICO (1994) AND  
THAILAND(1997)**

Countries	Competition in third markets		Direct linkages	
	(TradeShare <sub>i</sub> )		(DirectTrade <sub>i</sub> )	
	Total	Manufactures	Total	Manufactures
<b>With respect to Mexico (1994)</b>				
Argentina	0.25	0.37	0.94	0.61
Brazil	0.34	0.40	0.53	0.51
Chile	0.32	0.34	0.91	0.37
Venezuela	0.68	0.49	0.86	0.80
Indonesia	0.26	0.32	0.32	0.40
Korea	0.30	0.29	0.15	0.12
Malaysia	0.30	0.35	0.05	0.05
Philippines	0.55	0.58	0.54	0.78
Thailand	0.31	0.31	0.39	0.44
Canada	0.88	0.91	0.65	0.50
France	0.14	0.12	0.44	0.35
Germany	0.14	0.11	0.27	0.23
Italy	0.16	0.14	0.15	0.10
Japan	0.29	0.28	0.44	0.23
United Kingdom	0.18	0.15	0.61	0.39
United States	0.22	0.21	0.96	0.95
<b>With respect to Thailand (1997)</b>				
Argentina	0.38	0.31	0.86	0.56
Brazil	0.54	0.49	0.65	0.94
Chile	0.60	0.39	0.44	0.19
Mexico	0.31	0.33	0.98	0.96
Venezuela	0.25	0.33	0.21	0.21
Indonesia	0.74	0.82	0.96	0.99
Korea	0.66	0.71	0.62	0.37
Malaysia	0.78	0.80	1.00	0.98
Philippines	0.69	0.67	0.94	0.42
Canada	0.38	0.37	0.68	0.61
France	0.36	0.39	0.88	0.97
Germany	0.37	0.40	0.76	0.69
Italy	0.39	0.41	0.86	0.75
Japan	0.71	0.71	0.72	0.53
United Kingdom	0.44	0.46	0.83	0.90
United States	0.47	0.46	0.81	0.84

Source: our calculations on WTA Statistics Canada database.

(1) See Glick and Rose (1998) for the methodology. For the list of third markets considered see Appendix I.

Table 6

**FIVE MAJOR LATIN AMERICA COUNTRIES: SPECIALIZATION INDEX BY MAJOR  
COMMODITY GROUPS IN 1997 (1)**

Destinations  Commodity groups	World	Industrial countries			Developing and emerging countries				
		EU	USA	Japan	Latin America	Asia	Eastern Europe, Russia, Turkey		
<b>Argentina</b>									
Food	587.7	708.4	772.5	701.4	479.6	570.9	363.0	1152.6	749.4
Agricultural raw mat.	120.8	159.7	223.9	56.7	110.6	112.2	162.4	38.2	30.6
Ores and metals	48.1	102.2	44.1	71.3	429.9	29.1	46.1	24.6	4.4
Fuels	155.4	103.4	5.7	276.0	0.1	199.2	257.1	83.9	0.9
Manufactured goods	46.9	31.1	21.1	47.7	7.2	54.6	62.1	28.2	19.1
<b>Brazil</b>									
Food	372.0	414.1	514.0	322.8	211.5	327.1	102.3	629.0	623.5
Agricultural raw mat.	164.2	219.5	223.8	253.3	164.9	96.8	70.9	211.9	23.5
Ores and metals	313.8	372.2	346.9	210.8	700.4	246.0	179.7	425.0	269.6
Fuels	8.4	6.1	4.9	8.9	0.0	12.1	19.2	0.2	2.8
Manufactured goods	71.8	59.0	40.7	89.0	41.5	88.4	108.2	52.6	29.0
<b>Chile</b>									
Food	299.2	326.4	191.4	809.1	210.4	264.0	305.4	219.4	485.2
Agricultural raw mat.	433.6	451.9	356.0	529.5	308.7	414.1	226.0	511.4	380.9
Ores and metals	1548.3	1483.5	1720.8	1367.5	949.4	1726.0	1289.8	2067.6	1198.4
Fuels	4.0	1.2	0.0	4.0	0.1	8.7	17.4	0.1	0.0
Manufactured goods	19.4	10.4	9.7	17.3	4.5	32.3	55.0	4.1	6.1
<b>Mexico</b>									
Food	74.2	70.6	148.7	115.3	133.0	87.5	58.7	137.3	148.2
Agricultural raw mat.	46.0	35.4	86.9	40.3	40.8	146.2	99.1	338.1	233.2
Ores and metals	61.5	56.4	289.0	64.0	211.3	70.5	92.3	51.2	346.4
Fuels	133.8	123.6	341.1	100.6	252.7	156.7	171.4	14.2	13.0
Manufactured goods	109.6	107.6	66.1	105.1	37.4	110.5	101.5	102.1	96.2
<b>Venezuela</b>									
Food	29.6	16.1	45.8	20.8	99.9	62.2	60.4	75.6	0.0
Agricultural raw mat.	6.6	2.1	14.5	1.0	0.8	17.9	20.6	76.6	0.0
Ores and metals	73.4	63.2	178.6	66.5	658.1	98.5	119.9	327.5	844.6
Fuels	1109.5	1104.8	1103.2	984.8	112.7	1069.4	1023.3	615.7	715.3
Manufactured goods	16.2	9.1	21.7	7.4	50.0	32.7	30.8	55.6	5.3

Source: our calculations on WTA Statistics Canada database.

(1) The index is computed as  $SI = (x_{ikj} / x_{kj}) / (x_{iwj} / x_{wj}) * 100$ , where the numerator is the export share of each country  $k$  of commodity group  $i$  to area of destination  $j$ ; the denominator is the corresponding world share.

Table 7

**ASIAN CRISIS COUNTRIES: SPECIALIZATION INDEX BY MAJOR  
COMMODITY GROUPS IN 1997 (1)**

Destinations Commodity groups	World	Industrial countries			Developing and emerging countries				
		EU	USA	Japan	Latin America	Asia	Eastern Europe, Russia, Turkey		
<b>Indonesia</b>	128.2	122.2	158.1	195.1	64.8	139.4	153.5	171.6	321.9
Food	205.8	186.9	146.7	429.2	51.8	239.8	997.6	177.7	729.5
Agricultural raw mat.	144.1	152.4	186.7	1.0	139.5	131.7	225.5	113.1	0.0
Ores and metals	317.2	294.4	54.0	66.9	246.7	366.1	70.5	449.9	0.0
Fuels	60.5	59.7	71.5	78.0	54.6	62.1	50.2	52.7	47.2
Manufactured goods									
<b>Korea</b>	23.1	37.7	5.0	15.5	78.0	10.1	3.8	16.1	17.5
Food	56.7	34.4	25.9	32.4	30.6	80.3	11.9	97.4	32.6
Agricultural raw mat.	36.0	22.9	13.2	15.0	30.9	53.9	15.3	64.8	9.4
Ores and metals	40.6	38.5	0.8	6.4	61.3	46.0	4.5	75.1	14.5
Fuels	105.0	120.0	129.3	121.9	130.3	93.6	121.8	106.7	135.4
Manufactured goods									
<b>Malaysia</b>	103.9	49.9	66.0	37.7	34.6	162.4	75.6	175.7	266.4
Food	198.5	197.9	256.6	67.5	185.3	206.7	455.2	140.3	596.5
Agricultural raw mat.	39.2	26.1	18.3	16.7	33.6	58.4	6.7	46.9	5.2
Ores and metals	108.2	92.6	3.5	13.8	144.6	134.1	0.3	153.9	0.1
Fuels	103.9	109.1	113.0	120.8	104.1	100.8	107.8	92.3	82.1
Manufactured goods									
<b>Philippines</b>	96.9	98.9	86.0	156.3	72.9	87.1	47.8	96.6	137.9
Food	44.2	40.8	81.7	16.7	25.8	52.4	310.3	37.6	111.8
Agricultural raw mat.	71.1	38.5	2.2	2.5	90.5	175.6	93.6	140.9	4.5
Ores and metals	16.1	6.1	0.2	0.6	10.5	47.8	0.0	52.7	0.0
Fuels	60.1	63.5	63.7	59.6	86.3	49.2	67.2	42.7	42.0
Manufactured goods									
<b>Thailand</b>	220.7	218.7	150.0	303.1	192.6	228.1	134.5	264.7	190.6
Food	181.5	177.5	132.1	125.9	181.5	191.4	249.0	165.2	405.4
Agricultural raw mat.	31.0	24.3	13.0	23.5	30.0	43.2	0.6	37.9	0.0
Ores and metals	31.4	4.3	0.2	0.5	4.4	73.9	1.2	91.4	0.0
Fuels	96.2	96.9	101.3	101.9	109.6	96.4	105.8	88.1	98.4
Manufactured goods									

Source: our calculations on WTA Statistics Canada database.

(1) The index is computed as  $SI = (x_{ikj} / x_{kj}) / (x_{ijw} / x_{wj}) * 100$ , where the numerator is the export share of each country  $k$  of commodity group  $i$  to area of destination  $j$ ; the denominator is the corresponding world share.

**LATIN AMERICA AND ASIA: EXPORT STRUCTURE BY FIRST 10 COMMODITIES**  
**AT SITC REV.2 (1)**  
(percentages)

	Product	Share of country exports	Share on world Market		Product	Share of country exports	Share on world market
<b>Argentina</b>	081 Feed for animals	8.5	8.4	<b>Indonesia</b>	333 Crude petroleum	10.9	2.8
	333 Crude petroleum	8.3	0.9		341 Gas	8.7	10.6
	041 Wheat etc.	4.8	6.4		634 Veneers, plywood	8.0	26.1
	044 Maize	4.4	8.9		851 Footwear	3.9	4.5
	423 Vegetable oils	4.2	17.5		232 Natural rubber	3.4	25.4
	424 Fixed vegetable oils	4.1	7.0		287 Base metal ores	3.4	9.7
	611 Leather	4.0	5.6		931 Special transactions	3.3	1.0
	011 Meat	3.5	2.0		842 Outer garments	3.0	2.9
	781 Passenger vehicles	3.2	0.3		424 Fixed vegetable oils	2.7	10.0
	222 Seeds	2.9	5.5		764 Telecom equip.	2.6	0.8
	47.9			50.0			
<b>Brazil</b>	281 Iron ore	5.6	33.1	<b>Korea</b>	776 Transistors	13.9	8.9
	071 Coffee	5.5	17.1		781 Passenger vehicles	5.7	2.7
	081 Feed for animals	5.3	11.7		653 Wov.man-made fabr.	4.8	16.8
	061 Sugar and honey	3.3	12.3		764 Telecom equip.	4.8	3.8
	851 Footwear	3.2	3.7		793 Ships,boats	4.0	13.6
	784 Motor vehicles parts	2.9	1.2		752 Automatic data proc.	3.4	2.8
	674 Iron, steel plates	2.8	2.1		999 Non-identified prod.	3.3	3.4
	222 Seeds	2.8	10.9		778 Electr. machinery	3.0	4.6
	684 Aluminium	2.8	3.3		674 Iron, steel plates	3.0	5.3
	672 Iron, steel	2.8	13.1		583 Polymerization prod.	2.5	3.9
	36.9			48.4			
<b>Chile</b>	682 Copper	29.6	14.3	<b>Malaysia</b>	776 Transistors	17.8	7.0
	287 Base metals	13.2	12.0		764 Telecom equip.	8.7	4.2
	057 Fruit, nuts	6.5	3.6		751 Office machines	6.5	4.8
	251 Pulp-waste paper	5.6	4.2		424 Fixed vegetable oils	4.9	26.9
	034 Fish, fresh, chilled	4.9	3.8		752 Automatic data proc.	4.6	2.2
	081 Feed for animals	4.0	2.8		762 Radio receivers	4.1	14.4
	971 Gold	2.5	1.6		333 Crude petroleum	3.8	1.5
	248 Wood shaped	2.2	1.2		761 Television receivers	2.7	8.5
	112 Alcoholic beverages	1.8	1.0		341 Gas	2.5	4.2
	931 Special transactions	1.6	0.2		634 Veneers, plywood	2.5	12.0
	72.0			58.1			
<b>Mexico</b>	333 Crude petroleum	10.2	4.7	<b>Philippines</b>	931 Special transactions	28.7	4.4
	781 Passenger vehicles	9.3	3.5		776 Transistors	15.3	1.5
	773 Electr. equipment	4.6	13.7		752 Automatic data proc.	4.2	0.5
	764 Telecom equip.	4.3	2.6		764 Telecom equip.	3.9	0.5
	778 Electr. machinery	3.9	4.5		424 Fixed vegetable oils	3.1	4.5
	761 Telev. Receivers	3.7	14.9		751 Office machines	3.1	0.6
	782 Vehicles transp. goods	3.2	4.0		773 Electr. equipment	2.6	1.7
	713 Engines	3.1	5.1		842 Outer garments	2.1	0.8
	784 Motor vehicles parts	3.0	2.2		845 Outwear knit	2.0	1.0
	752 Automatic data proc.	2.7	1.6		057 Fruit, nuts	1.9	1.3
	48.0			67.0			
<b>Venezuela</b>	333 Crude petroleum	52.0	5.6	<b>Thailand</b>	752 Automatic data proc.	6.7	2.4
	334 Petroleum products	27.4	6.3		776 Transistors	5.5	1.6
	684 Aluminium	3.4	1.7		751 Office machines	5.4	2.9
	674 Iron, steel plates	1.2	0.4		036 Crustaceans, molluscs	4.0	12.7
	781 Passenger vehicles	1.0	0.1		232 Natural rubber	3.9	32.0
	672 Iron, steel	0.9	1.7		764 Telecom equip.	3.8	1.4
	512 Alcohols	0.7	1.1		042 Rice	3.4	26.9
	671 Pig iron	0.7	1.7		037 Fish prepared, pres.	3.0	17.8
	516 Other organic chemicals	0.6	1.2		851 Footwear	2.6	3.2
	583 Polymerization prod.	0.6	0.2		842 Outer garments	2.2	2.3
	88.4			40.5			

Source: our calculations on WTA Statistics Canada database.

(1) Average shares in 1994-97.



Table 9

**INDEXES OF EXPORT SIMILARITY FOR SOME LATIN AMERICAN AND ASIAN  
COUNTRIES IN 1997**

Countries	Argentina	Brazil	Chile	Mexico	Venezuela	Indonesia	Korea	Malaysia	Philippines	Thailand
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**On raw materials at 3-digit SITC levels in % of total raw materials exports**

Argentina	...	34.8	21.1	35.1	21.5	36.6	24.1	34.8	31.4	31.4
Brazil		...	21.3	19.1	6.0	16.3	17.0	13.8	22.9	25.8
Chile			...	20.8	3.1	17.3	25.5	13.9	35.8	18.3
Mexico				...	55.9	39.6	26.4	33.0	25.9	25.9
Venezuela					...	32.9	35.1	25.6	10.2	10.8
Indonesia						...	18.7	61.9	35.1	28.1
Korea, Rep.							...	19.3	36.3	33.1
Malaysia								...	43.1	24.9
Philippines									...	42.5
Thailand										...

**On manufactures at 3-digit SITC levels in % of total manufactures exports**

Argentina	...	59.4	40.7	49.7	41.2	27.5	41.3	24.3	19.1	32.0	
Brazil		...	46.3	49.2	50.9	38.5	46.1	29.6	23.0	37.9	
Chile			...	36.7	44.1	37.4	33.5	26.5	23.0	32.8	
Mexico				...	32.7	40.5	52.8	46.0	47.1	56.7	
Venezuela					...	22.7	34.7	16.5	15.0	22.7	
Indonesia						...	42.9	38.9	42.4	51.5	
Korea, Rep.							...	58.5	53.9	60.0	
Malaysia								...	67.0	62.8	
Philippines									...	56.2	
Thailand										.....	
Average (1)		46.2	49.5	37.5	54.0	34.1	38.3	53.0	42.4	38.7	50.9

Source: our calculations on WTA Statistics Canada database.

(1) Weighted average of manufactures similarity indexes with respect to the 81 partners listed in Appendix I. The weights are the world manufactures export shares of each partner.

Table 10

**INDEXES OF EXPORT SIMILARITY FOR SOME LATIN AMERICAN AND ASIAN  
COUNTRIES IN 1997**

(on manufactures at 3-digit SITC levels in % of total manufactures exports)

Countries	Argentina	Brazil	Chile	Mexico	Venezuela	Indonesia	Korea	Malaysia	Philippines	Thailand
<b>Export market: USA</b>										
Argentina	...	35.5	26.6	23.2	23.7	15.5	19.8	17.6	13.5	15.3
Brazil		...	25.9	31.9	34.0	30.7	23.3	18.3	13.8	21.5
Chile			...	23.2	21.8	21.0	22.9	14.4	17.8	19.2
Mexico				...	17.9	33.4	46.9	37.9	41.2	50.5
Venezuela					...	8.6	12.7	5.5	7.0	8.5
Indonesia						...	28.7	33.0	47.5	49.6
Korea, Rep.							...	62.0	52.2	55.3
Malaysia								...	65.7	54.8
Philippines									...	65.1
Thailand										...
<b>Export market: EU</b>										
Argentina	...	42.2	15.1	36.3	20.8	17.2	17.4	14.7	12.7	19.7
Brazil		...	21.3	43.6	29.8	30.5	29.6	18.3	19.2	29.0
Chile			...	13.2	44.9	11.7	8.8	8.8	6.9	10.4
Mexico				...	17.6	27.1	39.6	31.5	29.7	38.6
Venezuela					...	5.5	7.1	6.9	3.9	9.0
Indonesia						...	28.2	23.7	31.0	42.2
Korea, Rep.							...	54.9	42.7	53.6
Malaysia								...	64.4	51.2
Philippines									...	46.7
Thailand										...
<b>Export market: Japan</b>										
Argentina	...	22.6	21.7	20.2	22.2	11.5	12.6	12.7	6.1	11.8
Brazil		...	31.5	15.0	31.3	18.4	27.9	13.6	9.2	16.1
Chile			...	13.5	24.4	23.4	7.3	20.5	5.7	5.3
Mexico				...	1.4	25.3	36.8	34.1	35.4	39.8
Venezuela					...	2.0	1.6	2.9	1.8	3.3
Indonesia						...	38.3	48.0	32.7	48.5
Korea, Rep.							...	44.3	47.5	52.3
Malaysia								...	47.3	55.4
Philippines									...	48.1
Thailand										...

Source: our calculations on WTA Statistics Canada database.

## Appendix I: Countries considered as third markets in Glick and Rose indexes

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Algeria	Laos P. Dem. Rep.
Argentina	Liberia
Australia	Malaysia
Austria	Malta
Bangladesh	Mexico
Belgium-Lux.	Morocco
Bolivia	Myanmar
Brazil	Neth. Antilles
Brunei	Netherlands
Cambodia	Nicaragua
Canada	Nigeria
Chile	Norway
China	Pakistan
Colombia	Panama
Costa Rica	Paraguay
Cuba	Peru
Denmark	Philippines
Dominican Rep.	Poland
Ecuador	Portugal
Egypt	Reunion
El Salvador	Romania
Finland	Saudi Arabia
Fm Czechoslovakia	Singapore
Fm USSR	South Africa
Fm Yugoslavia	Spain
France	St Kitts Nev.
French Guiana	Suriname
Germany	Sweden
Greece	Switzerland
Guadeloupe	Syrian Arab Rep.
Guatemala	Taiwan
Hong Kong	Thailand
Hungary	Tunisia
India	Turkey
Indonesia	UK
Iran	USA
Ireland	United Arab Emirates
Israel	Uruguay
Italy	Venezuela
Japan	Vietnam
Korea Rp	

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