Trends in Asian Trade: Implications for Transport Infrastructure and Trade Costs

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Introduction

The Asian region has long been home to some of the world's most dynamic trading economies. The last decade has proved no exception to that rule, with China and India achieving historically unparalleled trade growth. This growth brings prosperity but also a series of challenges for both private and public sectors. Chief among these challenges is building and maintaining a trade infrastructure adequate to the new trading environment.

The purpose of this chapter is to examine the evolution of merchandise trade in Asia with a focus on how this evolution affects infrastructure needs. The starting point is an analysis of rapid growth in aggregate volumes of trade, its geographic orientation and growing cargo imbalances. The extent of trade growth carries obvious implications for infrastructure demand, as more trade requires improved infrastructural development to keep pace.

However, aggregate changes are reasonably well understood and so the primary focus of this chapter is change in the composition of Asian trade. A traditional approach to thinking about composition is to disaggregate trade by product categories, for example, manufacturing versus agriculture and mining. Instead, I focus on four types of compositional change each of which affects the type and intensity of transportation services demanded. These include: changes in the weight to value ratio of trade; growth in air shipping and the demand for timeliness; growth in new flows and large versus small shipments; and growth in fragmentation / vertical specialization.

Aggregate Trade: Growth and Orientation

Aggregate trade volumes are growing rapidly in Asia. Table 1 reports values of imports and exports (in billions of 2000 US$) for 12 Asian countries in 1995 and 2005 from COMTRADE. The countries are roughly grouped by level of development, with emerging markets at the top and established developed markets at the bottom.

In this period China and India stand out prominently. Chinese exports (imports) grew at 15.4 (15.2) percent per year, while Indian exports (imports) grew at 10.4 (13.6) percent per year. The result was that in 10 years Indian trade tripled, and Chinese trade quadrupled – with China becoming the most prolific trader in Asia. The remaining countries also experienced trade growth, but at rates comparable to or less than the worldwide average in this period of 4.9 percent per year

Also noteworthy is the fact that many countries have merchandise trade imbalances that are large relative to flows: China has a merchandise surplus equal to 15.6 percent of imports; India has a merchandise deficit of 45.4 percent of exports. Typically trade balances are thought to be a subject of concern only isofar as they reflect problems with currency valuation or with domestic savings and investment rates. But they also matter for infrastructure and transport planning purposes. Transportation expenses are minimized when ships and planes run at full capacity in both directions. A country that runs a large trade surplus in dollar terms typically also runs a trade surplus in full relative to empty containers and this drives up shipping costs.

With whom are the Asian countries trading? Table 2 reports the shares in 2005 of each major geographic region (Asia, North America, Europe, Other) as an export destination or import source for each listed country. Asia is the dominant origin and destination point for all listed countries except India and the Kyrgyz Republic.

Further, within Asia trade is growing in importance for most countries. Table 2 also reports the percentage point change in shares for the Asian region. For example, the share of Indonesian exports destined for Asian market grew from 60.4 percent in 1995 to 65.2 in 2005, a growth of 4.8 percentage points. For every country but the Kyrgyz Republic, Asia as a source of imports grew in importance in this period, by an average of 6.3 percentage points. Similarly, Asia as a destination region for exports grew in pronounced fashion for most Asian traders. Again the Kyrgyz Republic is an exception, as is China. China is especially interesting as its exports shifted in dramatic fashion away from Asia, which received nearly 60 percent of China's exports in 1995 but only 44 percent in 2005.

Recalling the spectacular growth in both imports and exports for China reported in Table 1, the changing geographic composition of China's trade paints a clear picture. The rest of Asia exports inputs (parts and components, capital machinery, raw materials) to China, which combines these inputs into final goods for sale in the rest of the world.

This raises the following question: but for China, what would trade performance look like in the rest of Asia? The first column of Table 3 reports the share of China in exports for each country in 2005. China as a destination represents less than 10 percent of exports for the emerging markets, but much higher percentages for the developed economies – 13.4 percent for Japan, just under 22 percent for Korea and Taiwan, and 44 percent of Hong Kong's exports. Exports to China grew very rapidly, with rates as high as 65 percent per year for Taiwan. Even the modest 6.6 per annum growth for Hong Kong represents a very large dollar growth given that its exports to China started from a very high base in 1995.

One way to measure the China effect is to conduct a thought experiment. Suppose a particular exporter experienced no growth in exports to China but all other flows stayed the same. By how much would their aggregate export growth be reduced? To show this the last two columns of Table 3 report annualized growth in exports to the World and to the World less China. For the emerging markets (top half of the table) and Singapore, exports to China are growing fast but still represent a fairly small share of aggregate exports. The consequence is that eliminating China from the aggregate growth totals has a small effect – typically lowering export growth by less than one percentage point a year. For the remaining countries China is a major export destination, and so after netting growth in exports to China off of their overall trade growth, we see Hong Kong's and Taiwan's exports growing at anemic 1.3 and 0.4 percent per year, and Japan's export growth actually going negative.

Trade of course requires two partner countries and infrastructure problems on either end can be costly to both parties. Put another way, the importance of the Asian region as an origin/destination of trade for these countries indicates an important interdependency. As China's trade grows rapidly and suffers inevitable congestion effects it becomes a problem not just for China and Chinese firms but for all other Asian nations that have come to rely on China as a trading partner.

The weight to value ratio of trade

Transportation specialists are accustomed to thinking of transportation costs in per unit terms, the cost of transportation services necessary to move grain a ton-km or to move one TEU container from Los Angeles to Hong Kong. International trade specialists

who pay attention to shipping costs as an impediment to trade are accustomed to thinking of these costs in ad-valorem terms, the cost of transportation services necessary to move a dollar of grain or microchips between two points. The distinction is important because even if the cost of moving one TEU container remains constant over time the ad-valorem cost and the implied impediment to trade will change as the contents of the container grow more valuable.

To see this, suppose we sell one kilogram of a good at a price per kg of p, and pay shipping costs f per kg shipped. Note that the price per kilogram, p, is just the value/weight ratio, that is, the inverse of the weight/value ratio. If the shipping price per kg f is independent of the goods price per kg, the ratio of destination to origin prices is

$$(1.1) \qquad p^*/p = (p+f)q/pq = 1 + f/p = 1 + (weight/value)f$$

If the container holds scrap metal, p is low (weight/value is high), and the ratio p*/p is high. That is, shipping charges drive a large wedge between the prices at the origin and destination. If the container holds micro chips, p is very high (weight/value is very low), the ratio p*/p is close to 1, and shipping charges drive only a small wedge between prices at the origin and destination.

Of course, the shipping charge f may be increasing in the value of the container's content because higher value goods require more careful handling and a larger insurance premium. We can then write the per kg shipping charge as $f = p^{\beta} X$, where X represents other costs shifters such as distance, port quality and so on. In this case we have

(1.2) $$p^*/p = 1 + p^{1-\beta}X = 1 + X\left(\frac{weight}{value}\right)^{\beta-1}$$

Unless $\beta = 1$ the weight/value ratio of a product will be an important determinant of the transportation expenses incurred when trading that product. Hummels and Skiba (2005) and Hummels, Lugovskyy and Skiba (2007) examine the dependence of shipping costs on product weight/value. They estimate that a 10 percent increase in product weight/value leads to a 4-6 percent increase in shipping costs measured ad-valorem, i.e. relative to the value of the good shipped. Further, since there is tremendous variation across products in weight/value ratios, weight/value explains far more variation in observed transportation costs than do other observables including: the distance goods are shipped, the technology with which they are shipped, the quality of port infrastructure, or the intensity of competition between carriers on a trade route.

What has happened to the weight/value ratio for Asian trade? Systematic data on product weights are not available for trade worldwide, but by combining detailed shipment characteristics from US trade data with the worldwide coverage of the COMTRADE data we can calculate the weight of the trade bundle for each country. To do this, we calculate the median weight/value ratio for each HS 6 digit product k in US imports between 1990 and 2005, ω_k.[1] We then multiply the weight/value ratio by the share of product k in the trade bundle of country c at time t, s_{ckt}. Summing over products yields the aggregate weight/value ratio for each country's imports and exports at a point in time.

[1] Weight variables in the data are subject to significant measurement error, in particular, extreme outliers that make simple or trade weighted averages a misleading measure of central tendency. Medians do not suffer this problem and moreover, exhibit a very high degree of over time correlation for a given product.

$$\omega_{ct} = \sum_k s_{ckt} \omega_k$$

This of course assumes that a dollar of some particular product, say, wooden furniture, weighs the same when shipped to the US as when shipped to other destinations, so that variation across countries and over time is driven by differences in the trade shares of heavy and light products.

We report time series on weight/value measured in kg per constant year (2000) US dollars for each country's imports (solid line) and exports (dashed line) in Figure 1. Several patterns are notable. One, a dollar of exports weighs far less for the developed market economies (Japan, Korea, Taiwan, Hong Kong, Singapore) than for the emerging market economies. Indonesia is a notable outlier in the weight of its exports, which are almost 40 times heavier per dollar than those of Singapore or Japan. Two, most of these Asian economies (with the exception of Malaysia and Indonesia) are net importers of weight, that is, their import bundles weigh far more than do their export bundles. Three, the picture of China's trade that emerged in the aggregate flows is reinforced here. China's imports are getting heavier and exports are getting lighter as China imports raw materials, transforms them, and shifts increasingly to high value exports.

Two final points about weight/value are worth emphasizing. First, the falling weight/value ratio for Chinese exports may play an important role in its export expansion. Equation (1.2) indicates that shipping costs are a function of weight/value and other factors X such as port quality and geography. China faces cost disadvantages due to geography when shipping into the US and European markets. However, by upgrading product quality and producing goods with lower weight/value China has been able to minimize the impact of these other disadvantages.

Second, changes in the weight/value ratio of trade have implications for how goods are shipped and for changes in competitive advantage in world trade markets. Reductions in weight/value make it easier to shift from ocean to air shipping because it reduces the ad-valorem price differential between the two modes. Consider this example. I want to import a $16 bottle of wine from France. Air shipping costs of $8 are twice ocean shipping costs of $4. Going from ocean to air increases the delivered cost by $4 or 25 percent. Now suppose my tastes improve and I want to import a $160 bottle of wine from France so that the weight/value ratio of the product has dropped sharply. The shipping costs are the same, but now the $4 cost to upgrade to air shipping represents just a 2.5 percent increase in the delivered price. The consumer is much more likely to use the more expensive shipping option when the effect on delivered price is smaller.

The broad point for transportation planning is that final consumers are sensitive to changes in the delivered price, not to changes in the transportation price. If the cost of transportation substantially affects the delivered price, as in the first example, modal choice will be driven by cost considerations. But if the transportation price is but a small fraction of the delivered price, it will likely be trumped by other factors such as timeliness or reliability. It should be noted that the same lesson is true of all cost differentials related to transportation Port A may charge handling fees per container that are twice the handling fees for Port B, but unless these differences substantially impact delivered prices of products they will have minimal impacts on the derived demand for transportation.

Air Shipping and the Demands for Timeliness

As Hummels (2007) shows, air shipping worldwide has grown at a rate of 8.3 percent per year since 1975, much faster than ocean shipping or trade growth as a whole. How important is air shipping for the Asian economies? Figure 2 reports data from the IATA World Air Transportation Statistics on the growth in air cargo between Asian and other major regions between 1980 and 2004, with cargo measured in terms of freight tones carried. Air cargo involving Asian nations has grown much faster than in the world as a whole, with especially rapid growth involving intra-Asian international flights.

Despite this very rapid growth in air cargo measured in terms of cargo weight shipped, the vast majority of trade by weight takes place via ocean cargo. To measure the importance of air cargos in value terms we must rely on US imports data.

Table 4 reports on the share of air transport in export value to the US from each Asian exporter in 1995 and 2005. Air shipping constitutes a small share of trade for Indonesia (14 percent) and the Kyrgyz Republic (12.9 percent) at the low end up to a remarkably high share of trade for Malaysia (71.6 percent) and Singapore (79 percent). These differences closely reflect differences in the weight/value of the export bundles for each exporter, as well as the importance of electronics. Air shipping has slightly declined in importance since 1995 for the developed market economies, but has significantly increased for both China and Malaysia.

What is driving the rapid growth in Asian air cargo? As argued above, declining weight/value ratios play a large role, as do the steep declines in the price of air cargo documented in Hummels (2007). In addition, four factors seem especially important:

rising incomes, vertical specialization/fragmentation, testing new markets, and trade between geographically remote locations.

High income households buy higher quality goods and higher income countries import higher quality goods.[2]. Rising incomes affect demand for air transport in three ways. One, higher quality goods have higher prices and therefore a lower ad-valorem transportation cost for reasons just discussed. Two, as consumers grow richer, so does their willingness to pay for precise product characteristics.[3] That in turn puts pressure on manufactures to produce to those specifications, and be rapidly adaptable. Three, delivery speed is itself an important characteristic of product quality, and will be in greater demand as income grows.

Two, a hallmark of recent trade growth is the importance of the fragmentation of international production processes, also known as vertical specialization.[4] Multi-stage production may be especially sensitive to lags and variability in timely delivery, and both are reduced by using airplanes. Of course, airplanes move people in addition to cargo. Multinational firms with foreign production plants rely heavily on the ability to fly executive and engineers for consultations with their foreign counterparts. For all the wonder of information technology, there is not yet a good substitute for face to face communication, especially when new products and production processes are being introduced. Below, I provide evidence that growth in vertical specialization / fragmentation has been especially important in East Asia.

Three, airplanes are ideal to use in testing new markets and so are especially important for firms who are expanding trade by selling new goods for the first time. The

[2] Hallak (2005), Choi et al (2007).
[3] Hummels and Lugovskyy (2005).
[4] See Yi (2003) and Hummels, Ishii, and Yi (2001).

use of air shipping is about a trade off: speed and flexibility versus unit costs. Speed and flexibility are more important when markets are a long distance away, and when there is uncertainty in quantity demanded, product quality, or desired product characteristics. Unit cost advantages for ocean shipping are greatest when the goods have low value/weight ratios, when market demand is certain and when the scale of trade is large.

In the next section I show that much of the growth in Asian trade is along the extensive margin, meaning that nations are growing their exports by shipping new goods to new markets, not by increasing the quantities sold of existing exports. What are the characteristics of these new markets? Most firms begin producing only for a local market, slowly expand sales within their own country, and some small fraction of these gradually expand sales abroad. Of these who go abroad, they initially look to neighboring countries. Because of this process, new and unexploited markets tend to be further away. When serving these distant markets, firms face tremendous uncertainty about demand, quantities sold are likely to be very low initially, and most trading relationships fail in a few years. All of these characteristics, initially small quantities of uncertain demand in distant markets, are precisely the characteristics that make air shipping particularly attractive. This suggests that airplanes may be an especially effective tool for firms wishing to test new markets.[5]

Four, geographic remoteness of two kinds can be overcome by using airplanes. Ocean port cities act as entrepots for interior regions of their own countries. These entrepot cities can be a bottleneck choking off trade, especially for geographically large countries with economically important interior regions. This becomes more pronounced

[5] Aizenman (2003) and Schaur (2006) examine the use of airplanes in hedging demand volatility. Evans and Harrigan (2005) and Harrigan and Venables (2004) discuss the importance of demand volatility in determining comparative advantage and industrial agglomerations.

in cases where ports vie for land and coastal access that retains significant value for housing and public amenities. Trucks arriving at and departing these facilities also compete with other users of roadways, leading to major highway congestion and significant pollution effects. Air cargo that overflies congested ports can be an effective way to reach remote interior regions. This can be seen clearly in US data, where the share of coastal facilities is shrinking in favor of direct transport into the US interior.[6]

Airplanes are also relatively more useful at reaching distant foreign markets. Suppose I am trying to decide between air and ocean shipping in reach two foreign markets, the first proximate to and the second distant from my exporter. How does the distance affect my calculation of the appropriate mode to use? Exporters consider two costs, both rising in distance. The first is the direct cost of transport, and the second is the time cost.

Time costs are unimportant for some goods, and in these cases exporters can focus more narrowly on direct transport cost considerations. In most instances, direct cost considerations will favor ocean transport whether the foreign destination is distant or proximate. For some goods time costs are important, and more subtle calculation is required. For the nearby export destination, direct costs favor ocean shipment, and the time difference between ocean and air is small enough that time costs can be ignored in the calculation. For the distant export destination, however, the time difference between ocean and air can loom large indeed. In short, the further away the market, the greater the time advantages provided by air shipping.

More generally we can calculate the importance of timeliness by combining estimates of the time value of trade by product with data on trade shares. Hummels and

[6] Haveman and Hummels (2004)

Schaur (2007) estimate the value of time saving using US imports data that report the price and quantity of air shipping relative to ocean shipping as well as time delays associated with ocean shipping. The idea is that a firms' willingness to pay for more expensive air shipping is increasing in the number of days saved with airplanes, and decreasing in the premium paid to air ship. The sensitivity of air shipment to these factors can then be used to calculate a per day valuation for time savings that is product specific. Call this per day valuation for an HS 4 product k, τ_k. As with the weight / value ratio we can then calculate the aggregate time sensitivity of a country's trade bundle by multiplying the product specific time cost by the share of that product k in the trade bundle.

$\tau_{ct} = \sum_k s_{ckt}\tau_k$.

The last two columns of Table 4 report the time sensitivity of the import and export bundle for each country. The values are written in ad-valorem equivalents per day. A value of 0.77 for Chinese exports means that each day of delay in transit is equivalent to a tariff of 0.77 percent, so that a 4 day delay is equivalent to a tariff of just over 3 percent ad-valorem. Two things are notable about these figures. First, time sensitivity is much more important for the developed compared to the emerging market economies. Second, the time sensitivity of the import and export bundles are considerably different – developed markets export goods that are more time sensitive than the import, while the emerging market do the reverse. Note that the import bundles of India and Indonesia are twice as time sensitive as their exports. Of course, the numbers on time sensitivity in the last two columns of Table 4 are intended to capture aggregate tendencies, and do not reflect the sensitivity of particular sectors. Malaysia, for

example, ships extremely time sensitive products to the US as demonstrated by the very high share of air shipping shown in the first two columns of Table 4.

New flows and large/small flows

Recent theoretical and empirical research in international trade has begun to emphasize the importance of extensive and intensive margins of trade expansion. A country can expand exports by trading larger quantities of a given set of goods (the intensive margin), or by expanding set of goods that are traded (the extensive margin). Higher trade costs can affect both margins.[7]

Suppose that exporting firms must pay a fixed cost of trade (for example, the cost of collecting information about foreign markets or setting up distribution networks) and marginal costs of trade (proportional to quantities traded). In this case, firms must sell a sufficiently high volume of exports to justify paying the fixed costs. A fall in marginal costs of trade lowers delivered prices and expands quantities demanded abroad. This has two effects: existing exporters can sell larger quantities (an increase in the intensive margin), and more firms can now cover their fixed costs of trade and begin exporting for the first time (an increase in the extensive margin). In contrast, a drop in fixed costs of trade leads to trade expansion only along the extensive margin.

Which of these are most important? In order to decompose trade growth in this manner, write the aggregate value of a country c's exports at time t as

(1.3) $$X_t^c = N_{jkt}^c \overline{X}_{jkt}^c$$

[7] See Hummels and Klenow (2005) on extensive and intensive margin expansion and Hillberry and Hummels (2007) and Eaton, Kortum, and Kramarz (2004) on the role of geographic frictions.

N^c_{jkt} is the number of unique shipments of products k (measured at the 6 digit level of the Harmonized System) to destinations j from exporter c at time t, and $\bar{X}^c_{jkt}$ is the average value per unique shipment. If c ships 10 distinct products apiece to each of 5 destination markets the number of unique shipments is 50.[8] Exports could increase over time because country c ships more goods, has more export destinations per good or higher average value per shipment. (Note that it is also possible to separate N into the number of products and number of destinations per product. However, at this 6 digit HS level of aggregation we see very little growth in number of products traded in this period. As a result, changes in the number of unique shipments for these countries and this time period are driven almost entirely by expansions in the number of markets with which trade occurs.)

We can then express the log percentage change in total exports over time as the sum of the log changes in the components, that is

$$\ln \frac{X^c_{t+1}}{X^c_t} = \ln \frac{N^c_{jkt+1}}{N^c_{jkt}} + \ln \frac{\bar{X}^c_{jkt+1}}{\bar{X}^c_{jkt}}$$

This is useful because we can then assess the percentage contribution of each component to the total change. Table 5 provides such a decomposition separately for imports and exports of each country. For simplicity we report only the log change in each variable. For example, using the values from Table 1, the log change in Chinese exports between 1995 and 2005 is ln(675/161)=1.43. Of this 1.43, 0.80 came from an increase in the number of unique shipments, and 0.63 came from an increase in average value per shipment. Contrast this mixed growth with Thailand and Malaysia where almost all

[8] One could further decompose this into the number of products multiplied by the average number of destinations per product.

growth came via an increase in the number of shipments rather than an increase in the average shipment. Conversely, almost all the growth for Hong Kong and Japan came through an increase in average shipment size rather than an increase in the number of unique shipments.

The calculation of the changes in average shipment size can be misleading – the average can rise because all existing shipments get larger, or it could be that shipment size grows differentially at different points in the size distribution. To show this distinction Table 5 also reports growth in the size of the median and 90th percentile shipment. By comparing these to growth in the mean shipment we can understand where trade growth is occurring.

Consider Chinese exports, where the number of shipments and mean shipment size are growing rapidly, as are 90th percentile shipments, but median shipment sizes are falling. This indicates that China has experienced a tremendous growth in new shipments but these tend to be very small, pushing down the median shipment size. At the same time, established flows that were already large (90th percentile) in 1995 have grown larger still, and this increased the mean shipment size. The pattern across all reported countries is similar – median shipment sizes are falling while mean shipment sizes are rising (or in some cases, both are falling but medians are falling faster).

What do we learn from this exercise? For most of these countries we have export expansion occurring in two very different ways – there are large and existing flows that are the principal drivers of aggregate trade growth, but there are also a very large number of new entrants that, to date, do not yet represent a large fraction of overall trade. This distinction matters for several reasons. One, the infrastructure needs of small and

medium size firms may be considerably different than those of large firms. They typically lack the internal capacity for facilitating trade and must work through trade intermediaries to gather information about foreign market opportunities, and to handle trade finance, transportation and distribution functions. Two, small firms face higher shipment costs because they are unable to negotiate bulk discounts. Three, if we take the fixed v. marginal cost view of trade costs, these new flows associated with small and medium size firms are highly tenuous. Small increases in trade costs could kill off many exporting firms quickly. Now, one could view this as a minor concern – these flows are small and their loss could be absorbed with little impact on aggregate numbers – but this ignores the dynamic nature of new flows. Besedes and Prusa (2003,2004) use survival analysis to show that new trade flows suffer high failure rates, but those that do survive go on to ever-larger trade shares. That is, today's success story was yesterday's fragile newborn.

Fragmentation and vertical specialization

Rather than producing final goods in their entirety, countries are increasingly specializing in stages of production. This is true to a much greater degree in Asia than in any other region of the world and is largely responsible for the large fraction of intra-Asian flows shown above. Fragmentation puts a much larger strain on transport and trade infrastructure than other types of production arrangements. Because products engage in "round tripping" the impact of higher transportation expenditures are multiplied by the number of times a component in shipped. Further, timeliness in

delivery and information tracking matters to a greater extent as entire factories can be shuttered by the absence of key components.

How important is this phenomenon in Asian trade? One way to measure the fragmentation process is to look at the share of trade that occurs in goods labeled "parts and components". This approach has been widely employed and is useful, but it also leaves out intermediate goods (e.g. chemicals) that do not contain the "parts and components" label. An alternative approach introduced in Hummels, Ishii and Yi (2001) is to employ input-output tables that track use of imported intermediate inputs. One can measure the contribution of imported inputs into gross output and the portion of gross output that is exported. This provides us with the value of goods that are traded twice – once as an imported input, and again embodied in an exported final good.

Uchida (2007) employs this technique in conjunction with Asian Input-Output data produced by JETRO-IDE to measure vertical specialization in Asia. Summary results are reported in Table 6. Consider China, for example. Roughly 9.5 percent of China's exports in 2000 consisted of imported inputs, up from 2.2 in 1980. The importance of vertical specialization is greatest for Malaysia, Philippines, Singapore, Taiwan and Thailand, whose exports include from 26 to 37 percent foreign content. The numbers are smaller for Japan, Indonesia, and the US because these countries engage in one but not both sides of vertical specialization. Indonesia provides inputs in large quantities but engages in less processing. Japan and the US import inputs in large quantities, but do not combine these with domestic value added to export goods.

Conclusion

It is well known that Asian trade has grown very rapidly in the past decade and this growth has put infrastructure under considerable strain. The point of this paper has been to highlight the particular nature of that trade growth, its changing composition, and the particular demands compositional change places on infrastructure. The key points are these: trade is growing and growing lighter; exports are expanding primarily by reaching new markets with smaller flows; and fragmented production networks are becoming the norm. All of these changes put a premium on speed, on flexibility, and on information. Infrastructure improvements targeted on these points will be more likely to pay off in the form of increasingly efficient integration into the global economy.

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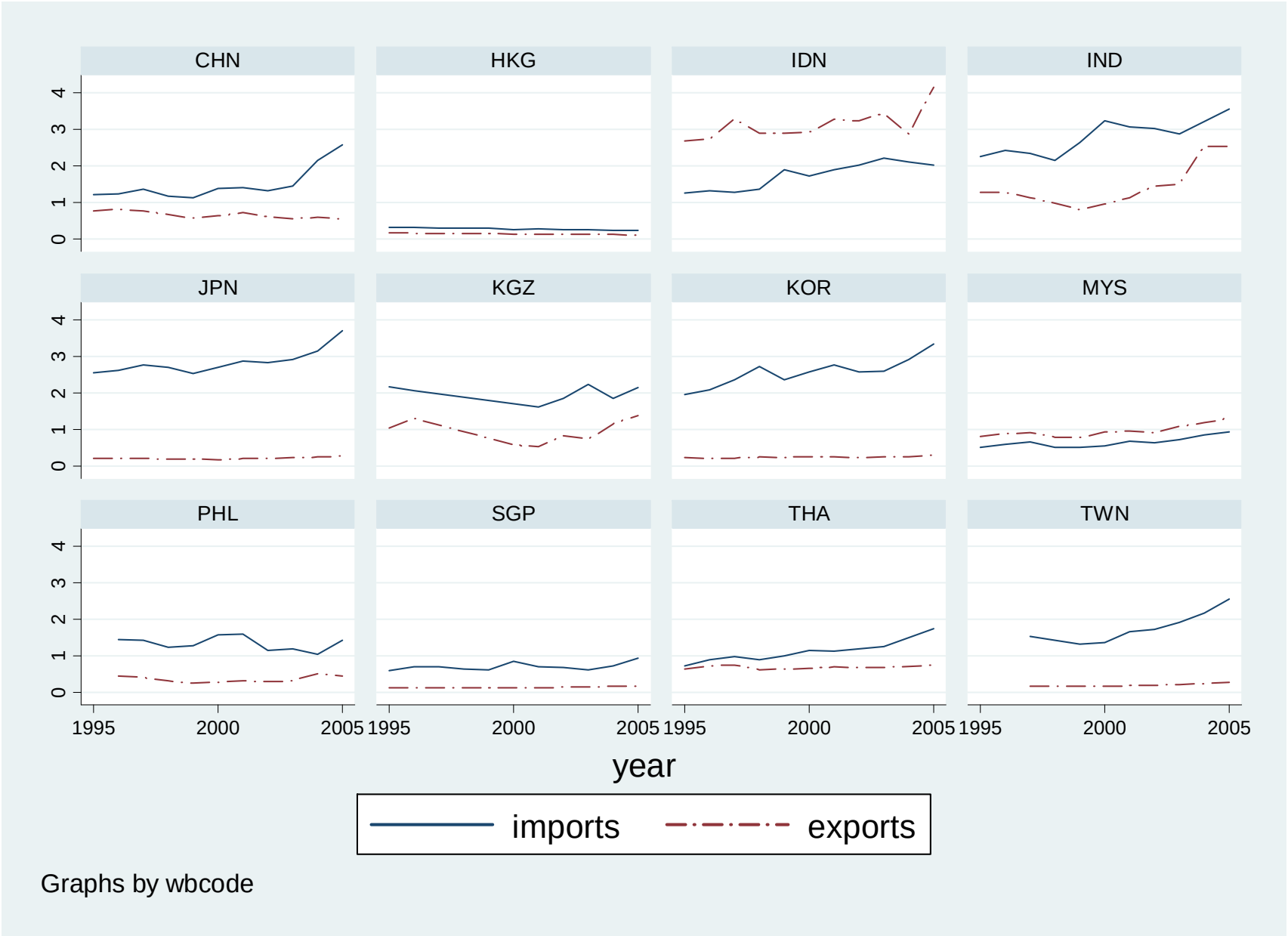
Figure 1 – Weight/Value of Trade 1995-2005



Graphs by wbcode

Figure 2 Air Cargo in Asian Trade (Thousands Freight Tonnes)

	Region				Domestic
	N America	Europe	Within Asia	Other	Asia
2004		3343	5386	1689	2490
2000	2259	2530	2104	825	2402
1995	1030	1290	1545	501	1404
1985	346	305	232	242	
1980	190	216	114	96	
Annual Growth	13.2	12.1	17.4	12.7	6.6

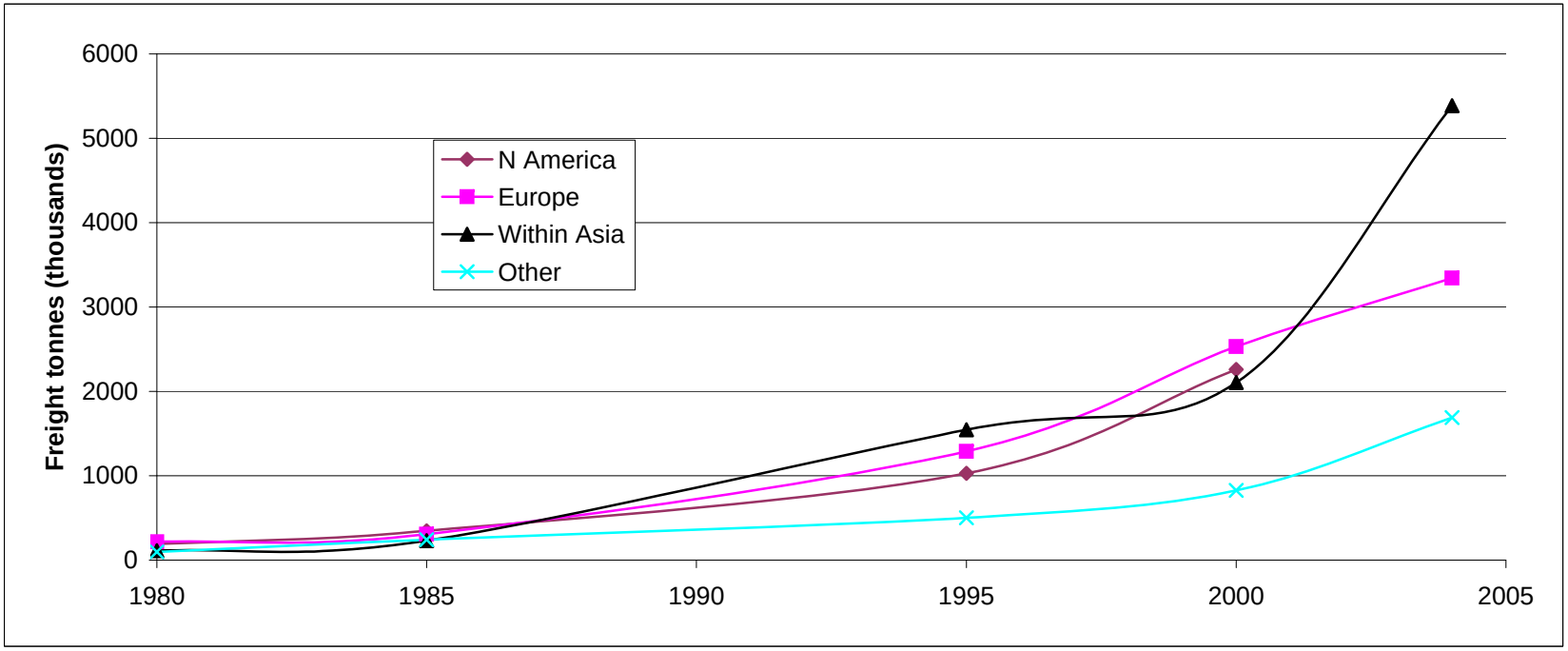


Table 1 -- Trade Growth 1995-2005

	Exports (Billion 2000$)			Imports (Billion 2000$)		
Country	1995	2005	Annualized growth rate	1995	2005	Annualized growth rate
China	161.0	674.0	15.4	142.0	583.0	15.2
Indonesia	47.9	75.9	4.7	42.5	51.2	1.9
India	33.9	90.8	10.4	37.0	132.0	13.6
Kyrgyz Republic	0.4	0.6	2.7	0.6	1.0	5.6
Malaysia	78.1	123.0	4.6	80.1	99.8	2.2
Phillipines	21.6	36.6	6.0	36.7	41.6	1.4
Thailand	60.5	96.3	4.8	74.1	104.0	3.4
Hong Kong	186.0	259.0	3.4	209.0	266.0	2.4
Japan	469.0	505.0	0.7	354.0	450.0	2.4
Korea	136.0	252.0	6.4	147.0	232.0	4.7
Singapore	126.0	196.0	4.5	134.0	176.0	2.8
Taiwan	128.0	167.0	3.4	114.0	160.0	4.3

Notes:

1. Source: COMTRADE database, authors calculations
2. First year of Phillipines data is 1996. First year of Taiwan data is 1997.

Table 2 -- Geographic Orientation of Trade, 2005

	Export Destination Region (Shares)					Import Source Region (Shares)				
	Asia	North America	Europe	Other	1995-2005 Change in Asia Share	Asia	North America	Europe	Other	1995-2005 Change in Asia Share
China	44.6	23.0	21.7	10.7	**-15.0**	62.2	8.5	14.6	14.7	4.8
Indonesia	65.2	12.1	12.8	9.9	4.8	62.0	7.9	12.2	17.9	12.3
India	31.6	17.9	24.3	26.2	0.6	34.0	9.7	33.9	22.4	10.1
Kyrgyz Republic	31.5	3.4	35.0	30.1	**-23.6**	37.3	7.4	50.0	5.2	**-11.8**
Malaysia	58.0	20.4	12.4	9.2	1.9	65.6	13.4	13.2	7.7	6.7
Phillipines	61.1	18.7	17.2	3.0	18.3	60.7	18.1	9.5	11.7	9.4
Thailand	56.7	16.4	14.6	12.3	3.8	60.9	7.7	11.9	19.5	3.4
Hong Kong	62.3	17.1	15.7	4.9	10.1	82.3	5.6	9.0	3.1	7.3
Japan	48.1	24.4	16.1	11.4	4.7	44.1	14.4	13.9	27.6	7.6
Korea	51.7	16.1	17.3	14.9	2.3	48.3	12.8	12.8	26.1	7.3
Singapore	67.4	10.9	12.4	9.4	8.0	61.5	12.1	13.3	13.2	1.8
Taiwan	64.8	16.1	12.4	6.7	14.0	57.9	12.1	12.2	17.8	7.9

Notes:
1. Data Source: COMTRADE data, authors calculations

Table 3 Export Growth to China

	Export Share to China, 2005	Annual growth in exports to… China	World	World less China
Indonesia	7.8	12.2	4.7	4.3
India	6.6	32.5	10.4	9.7
Kyrgyz Republic	4.1	-10.9	2.7	4.1
Malaysia	6.6	14.5	4.7	4.2
Phillipines	9.9	31.6	6.0	5.0
Thailand	8.4	16.3	4.8	4.2
Hong Kong	44.7	6.6	3.4	1.3
Japan	13.4	11.3	0.7	-0.2
Korea	21.8	18.7	6.4	4.6
Singapore	8.8	19.7	4.6	3.8
Taiwan	21.7	64.9	3.4	0.4

Table 4 -- Time Sensitivity of Trade

	Air Share in Exports to US		Per Day Time Sensitivity	
	1995	2005	Imports	Exports
China	10.6	23.3	0.69	0.77
Indonesia	8.3	14.0	1.00	0.56
India	47.1	41.4	1.50	0.76
Kyrgyz Republic	1.6	12.9	1.22	5.92
Malaysia	48.2	71.6	0.87	0.62
Phillipines	44.8	48.0	0.65	0.51
Thailand	29.4	41.3	0.87	0.84
Hong Kong	41.4	38.5	0.74	0.81
Japan	27.8	25.6	0.57	1.14
Korea	48.2	34.2	0.58	1.03
Singapore	78.2	79.0	0.75	0.82
Taiwan	31.1	37.1	0.69	0.91

Source:
1. COMTRADE, US Imports of Merchandise, author's calculations
2. Per day time costs based on Hummels 2007 "Time as a Trade Barrier"

Table 5 -- Decomposing Trade Growth 1995-2005

	Log Change in Export				
			Shipment Value		
	Value	Number of shipments	Mean	Median	90th pctile
China	1.43	0.80	0.63	-0.09	0.38
Indonesia	0.46	0.65	-0.19	-0.91	-0.47
India	0.99	0.80	0.19	-0.32	-0.02
Kyrgyz Republic	0.26	0.61	-0.35	-1.84	-1.25
Malaysia	0.46	0.42	0.03	-0.12	-0.04
Phillipines	0.53	0.35	0.18	-0.65	-0.43
Thailand	0.46	0.51	-0.04	-0.85	-0.24
Hong Kong	0.33	0.04	0.29	-0.61	-0.14
Japan	0.07	-0.06	0.13	-0.18	0.01
Korea	0.62	0.29	0.33	-0.33	-0.05
Singapore	0.45	0.10	0.35	-0.29	0.07
Taiwan	0.27	0.10	0.17	-0.37	-0.12

	Log Change in Import				
			Shipment Value		
	Value	Number of shipments	Mean	Median	90th pctile
China	1.42	0.39	1.03	-0.27	0.44
Indonesia	0.19	0.19	-0.01	-0.57	-0.38
India	1.27	0.64	0.63	-0.45	0.09
Kyrgyz Republic	0.55	1.81	-1.26	-2.35	-1.66
Malaysia	0.22	0.12	0.10	-0.29	-0.07
Phillipines	0.12	0.09	0.03	-0.56	-0.49
Thailand	0.34	0.34	0.00	-0.85	-0.38
Hong Kong	0.24	0.11	0.13	-0.63	-0.35
Japan	0.24	0.12	0.12	-0.37	-0.13
Korea	0.46	0.30	0.16	-0.70	-0.23
Singapore	0.27	0.11	0.16	-0.58	-0.22
Taiwan	0.34	0.13	0.20	-0.62	-0.19

Notes:

1. Source: COMTRADE database, authors calculations
2. First year of Phillipines data is 1996. First year of Taiwan data is 1997.

Table 6 Vertical Specialization in Asia

	Millions of 2000$			Percentage of Total Exports				
	1990	1995	2000	1975	1985	1990	1995	2000
CHN	966	5,373	13,932		2.2	4.3	7.2	9.5
IND	584	1,583	2,873	1.4	1.9	3.0	4.9	6.9
JPN	5,742	11,451	14,939	3.8	4.1	3.6	4.1	5.1
KOR	5,710	11,819	19,673	20.6	18.5	16.1	17.6	19.8
MYS	2,906	11,303	25,606	7.2	12.7	15.1	23.5	37.2
TWN	7,938	14,420	24,368		15.5	19.7	25.0	26.4
PHI	990	2,623	7,687	4.3	10.4	15.7	18.8	30.6
SIN	8,281	19,354	17,811	20.9	36.1	35.8	42.6	35.5
THA	2,326	7,690	10,815	3.0	8.2	19.0	24.4	26.5
USA	2,107	6,431	7,438	0.9	1.7	2.1	3.8	4.3

Vertical specialization (VS). The dollar (or %) content of exports comprised of imported inputs

Equals (Share of Imported Inputs in Gross Output) * Value of Exports

Source: Yoko Uchida, "Trade Growth and Vertical Specialization in East Asia"