THE AUSTRALIAN NATIONAL UNIVERSITY

Working Papers in Trade and Development

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April 2008

Working Paper No. 2008/04

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Abstract: This paper examines the implications of China's rapid integration into global production networks for export performance of countries in Southeast Asia. In a clear departure from the conventional practice, the trade flow analysis of the paper is based on a careful disaggregation of reported trade data into components and final goods, with a view to delineating supply-side complementarities arising from cross-border production fragmentation. There is clear evidence that network-related trade in components has strengthened Southeast Asia's trade links with China, opening up new opportunities for the expansion of component production/assembly writhing vertically integrated global industries. However, these trade links with China have not lessoned the dependence of growth dynamism of these countries on the global economy; the dynamism of regional cross-border production networks depends inexorably on China's trade in final goods with North America and the European Union.

Keywords: China, Southeast Asia, production fragmentation, global production networks

JEL Codes: F14, F23, O53,

Forthcoming in Linda Yeuh (ed), ***The Future of Asian Trade and Growth with the Emergence of China***, London: Routledge.

China's integration into global production networks and its implications for export-led growth strategy in other countries in the region

Ever since the Peoples' Republic of China (henceforth China) began to emerge as a major trading nation in late 1980s, there has been a growing concern in policy circles in other countries in East Asia that competition from China could crowd-out their export opportunities. This concern has figured much more prominently in economic policy debated in countries in Southeast Asia than elsewhere in the region, because of the apparent similarities in export compositions of these countries and that of China. Initially, the 'China fear' in the region was mainly related to export competition in the standard light manufactured good (clothing, footwear, sport goods etc.), but soon it turned out to be pervasive as China begun to rapidly integrate into global production networks in electrical and electronics products through an unprecedented increase in foreign direct investment in these industries. Rapid increase in China's share in world exports markets in these product lines, coupled with some anecdotal evidence of MNEs operating ASEAN countries relocating to China, have led to serious concern about possible erosion of the role of ASEAN countries in global production networks. [1] These concerns have gained added impetus from China's recent accession to the WTO, which only provided China with most-favoured nation (MFN) status in major markets but also enhanced China's attractiveness to export-oriented investment by reducing the country risk of investment.

Various policy reports and scholarly works, which provide the empirical basis of this debate, are based on the traditional notion of horizontal specialisation in which countries trade goods that are produced from start to finish in just one country. So far, little attention has been paid to possible complementarity of production processes across countries in the region arising from the on-going process of international production fragmentation (cross-border dispersion of component production/assembly within vertically integrated manufacturing industries). Production fragmentation opens up opportunities for countries to specialise in different slices (different tasks) of the production process depending on their relative cost advantage and other

[1] See for instance Freeman and Bartels (2004), Chapter 1 and the work cited therein.

relevant economic fundamentals (Feenstra 1998, Jones 2000, Jones and Kierzkowski 2001). Therefore, China's integration into global production networks based on her comparative advantage in the assembly of final goods could well provide opportunities for the expansion of parts and component exports to China from Southeast Asia other countries in the region, which, over many years, have been favoured locations for parts and component production/assembly within global production networks.

The purpose of this paper is to examine China's emerging trade patterns and their implications for export performance of countries is Southeast Asia while paying particular attention to possible complementarities arising from China's rapid integration into global production networks. In order to assess the magnitude and nature of trade within global production networks, it is necessary to separate parts and components (henceforth referred to as 'components' for brevity) from final (assembled) products in reported trade data. We do this through a careful disaggregation of 5-digit level data based on the Revision 3 of the Standard International Trade Classification (SITC, Rev 3) of the United Nation trade data reporting system (See Appendix). The data are for the period from 1993, when almost all countries reporting to the UN trade system had adopted the revised reporting system, to 2004, the most recent year for which data are available for all reporting countries. Among the Southeast Asian nations, only the six largest economies―Indonesia, Malaysia, the Philippines, Thailand, Singapore and Vietnam―are covered; Brunei, Cambodia, Laos and Myanmar are ignored because of lack of data.[2] To gain perspective, the Southeast Asian experience is examined in the broader context of East Asia. For this purpose, East Asia is defined to include Japan, and developing East Asia which covers the newly industrialised economies (NIEs) in Northeast Asia (South Korea, Taiwan and Hong Kong), China and Southeast Asia.

The paper is organised as follows. The next two sections survey the evolution of fragmentation-based production networks in ASEAN and emerging patterns of manufacturing trade in China. Against this backdrop, the following section examines the

[2] All Southeast Asian countries are now members of the Association of Southeast Asian Nations (ASEAN) and the ASEAN Free Trade Area (AFTA). Therefore the terms, Southeast Asia, ASSEAN and AFTA are used interchangeably in the ensuing discussion.

emerging role of China in cross-border production networks and its implications for the ASEAN's role in the new regional division of labour. The final Section presents the key policy inferences. The procedure followed in extracting data from the UN trade data tapes, data quality, and methodological issues related to estimating the impact of production fragmentation on trade patterns are discussed in the Appendix.

Network Trade in Southeast Asia

International production fragmentation has been an important feature of the international division of labour since about the mid-1960s. The electronics MNEs based in the USA started the process in response to increasing pressures of domestic real-wage increases and rising import competition from low cost sources. The US government facilitated the process by introducing an outward processing tariff (OPT) scheme under which companies were allowed to export material for processing overseas and to re-import the finished products, paying tariff only on the value added abroad (not the exported intermediates). Geography, costs and history all combined to persuade US MNEs to first explore opportunities for outsourcing in neighbouring countries in Latin America. However, unfavourable investment climate in these countries—macroeconomic instability, political tensions, trade union upheavals and uncertainty—led American producers to switch to sub-suppliers located in East Asia (Helleiner, 1973; Grunwald and Flamm, 1985; Feenstra, 1998).

Linking of Southeast Asia to the global electronics production networks began in 1968 with the arrival of two US companies, National Semiconductors and Texas Instruments, to set up plants to assemble semiconductor devices. By the beginning of the 1970s Singapore had the lion's share of offshore assembly activities of the US and European semiconductor industries. Virtually every international electronics producer was present in Singapore by the mid-1980s, when the hard disk drive assemblers entered the country further boosting its role as a global assembly centre. During the next five years semiconductor production declined in relative importance, and computer peripherals, especially hard disk drives and computers became the more important part of the islands electronic industry. By the late 1980s, Singapore was the world's largest exporter of hard disk drives, accounting for almost half of world production (McKendrick *et al*., 2000).

As early as 1972, the MNEs with production facilities in Singapore began to relocate some low-end assembly activities in neighbouring countries (particularly in Malaysia, Thailand and the Philippines) in response to rapid growth of wages and land prices. Many newcomer MNEs to the region also set up production bases in these countries bypassing Singapore. By the late 1980s, this process had created a new regional division of labour, based on skill differences involved in different stages of the production process and relative wages, and improved communication and transport infrastructure. At the time, there was a widespread concern in policy circles in Singapore that the regional spread of MNE operations in electronics industry could be at the expense of Singapore. However, the subsequent developments vividly demonstrated that 'the larger the scale and scope of electronic industry [which produces a wide range of heterogenous end-products, each of which needs a large number of equally heterogenous components in its manufacture] in Southeast Asia, the greater the economies of scale and more the opportunities for specialisation for all participating countries. More recently, regional production networks have begun to expand to Vietnam (Athukorala, 2007, 230-31,).[3] Despite obvious advantageous in terms of location and relative wages, Indonesia has so far failed to benefit from this new form of international specialisation because of the unfavourable domestic investment climate (Athukorala, 2006a).

A number of factors underpinned the continued attraction of the region as a location of assembly activities. First, despite rapid growth, manufacturing wages in all ASEAN countries except Singapore still remain lower than or comparable to those in countries in the European periphery and Mexico (Table 1). Moreover, significant

[3] Until recently, the fledgling electronics industry in Vietnam was largely dominated by small companies from newly industrialized countries in East Asia, with the sole exception of Fujitsu which operated a medium-size assembly plat in Ho Chi Ming City. On 28 February 2006, Intel Corporation, the world's largest semiconductor producer, announced that it will invest $300 million to build a semiconductor testing and assembly plant (with an initial workforce of 1200) in Ho Chi Ming City as part of its worldwide expansion of production capacity.

differences in wages among the countries within the East Asia region have provided the basis for rapid expansion of intra-regional product sharing systems, giving rise to increased cross-border trade in parts and components. Second, the relative factor cost advantage has been supplemented by relatively more favourable trade and investment policy regimes, and better ports and communication systems that facilitate trade by reducing the cost of maintaining 'services links'.

Table 1 about here

Third, as first-comers in this area of international specialisation, ASEAN countries (in particular Malaysia, Singapore and Thailand) seem to offer considerable agglomeration advantages for companies that are already located there. Site selection decisions of MNEs operating in assembly activities are strongly influenced by the presence of other key market players in a given country or neighbouring countries. Against the backdrop of a long period of successful operation in the region, many MNEs (particularly US-based MNEs) have significantly upgraded technical activities of their regional production networks in ASEAN and assigned global production responsibilities to affiliates located in Singapore and more recently also to those located in Malaysia and Thailand (Borrus *et al.*, 2000; McKendrick *et al*., 2000). Overall, the ASEAN experience seems to support the view that MNE affiliates have a tendency to become increasingly embedded in host countries the longer they are present there and the more conducive the overall investment climate of the host country becomes over time (Rangan and Lawrence, 1999; Athukorala and Yamashita, 2006).

Over the years Singapore's role in regional production networks has gradually shifted from low-skill component assembly and testing to component design and fabrication and providing headquarter services for production units located in the neighbouring countries. Singapore's attractiveness as the regional centre of cross-border production networks has been continuously enhanced by the policy emphasis of the government on infrastructure development, expanding the human capital base, maintaining labour relations in a manner highly conducive for international production, and sound macroeconomic management (McKendrick *et al*., 2000; Brown and Linden, 2005).

The data summarises in Table 2 help understand the growing importance of trade in parts and components in world trade in machinery and transport equipment and the pivotal role played by Southeast Asian countries in this trade. World trade in parts and components increased from about $527 billion (20.9% of total manufacturing exports) in 1992/93 to over $1500 billion in 2004/05 (24.2%).[4] Components accounted for nearly a third of the total increment in world manufacturing exports between these two years. In developing East Asia, all countries covered in our data tabulation have recorded increases in world market shares, with the six Southeast Asian countries exhibiting faster increases compared to the regional average. Within East Asia, ASEAN countries, in particular Malaysia, Philippine, Singapore and Thailand, stand out for their heavy dependence on product fragmentation for export dynamism. In 2004?/5, components accounted for 58.4% of total exports of the Southeast Asian countries, up from 46.7% in 1992/3.

Table 2 about here

A comparison of export and import data points to an interesting development in Southeast Asia's participation in world machinery trade; the increase in relative position of these countries on the export side has been accompanied by a mild decline in the region's share on the import side. These counterstaining patterns in export and import trade suggest that the region has become increasingly specialised in the production of components in world machinery trade. As we will see in the next section, this development has been underpinned by a sharp increase in the region's component exports to China.

A striking feature of component trade in ASEAN is the heavy concentration in electrical machinery, semiconductor devices in particular (Table 3). Components of

[4] Throughout the paper inter-temporal comparison calculations are made for the two-year averages relating to the end points of the period under study so as to reduce the impact of year to year fluctuations of trade flows.

electrical machinery account for 70% of total component export from the six ASEAN countries, compared to a world trade share of this product category of 38%. For semiconductor devices, the comparable figures are 59% and 32% respectively. Among the individual countries, the degree of concentration in electrical machinery was particularly higher for Malaysia and the Philippine. The six ASEAN countries together accounted for nearly a fifth of world trade in electrical machinery (18% in semiconductors). Overall, the data clearly point to the competitive edge of Southeast Asia in component specialisation in electrical and electronic industries.

Table 3 about here

China's Trade Expansion

China's dramatic trade expansion since the late 1970s has been the largest shock experienced by the world trading system in the post-war era. Total merchandise exports from China increased from US$ 8 billion (around 1% of world exports) in 1978/9 when the process of liberalization reforms started to US$1442 billion (13.4% of world exports) in 2004/5.[5] In 2006, China was the second largest exporting nation in the world after Germany, and assuming the current growth rates continue, will become the largest in about ten years.

This phenomenal export expansion has been accompanied by a dramatic shift in the commodity composition of exports away from primary products and towards manufacturing (Table 4). The share of manufactures in China's total merchandise exports increased from less than 40% in the late 1970s to nearly 80% in the early 1990s and to 91% in 2004/5. For more than a decade during the post-reform era, conventional labour-intensive manufactures, particularly apparel, footwear, toys and sport goods were the prime movers of export expansion. By the mid-1990s, miscellaneous manufacturing (SITC 8), a catch-all commodity group encompassing most of these products, accounted for almost half of total merchandise exports and nearly two-thirds of total manufacturing exports. Since then there has been a notable shift in the composition of manufacturing exports away from conventional labour-intensive product lines and towards

[5] The data reported in the paper, unless otherwise stated, come from UN Comtrade database. Throughout the paper inter-temporal comparison calculations are made for the two-year averages relating to the end points of the period under study so as to reduce the impact of year to year fluctuations of trade flows. I think that this latter point has been made in the previous note.

seemingly more sophisticated product lines, in particular those within the broader category of machinery and transport equipment (SITC 7) (machinery for short). Between 1992/3 and 2004/5 the share of miscellaneous manufactures in total exports declined from 49% to 31% and the share of machinery and transport equipment increased from 17% to 44%. The expansion of machinery exports has been brought about by China's highly publicised export success in a wide range of 'information and communication technology' (ICT) products (falling under SITC categories 75, 76 and 77). China's world market share in office machines increased from less than 2% in 1992/93 to over 28% in 2004/5. Today China is the world's largest global producer as well as the single largest exporter of personal computers falling under this commodity group. The world market share of telecommunication and sound recording equipment (dominated by mobile phones, DVD players, and optical disc (CD) players) increased from 8% in 1992/3 to 26% between these time points.

Table 4 about here

Table 5 about here

The data summarised in Table 5 demonstrate the pivotal role played by assembly operations within global production networks in the expansion of machinery exports from China. The share of components in total machinery imports of China increased from 32.5% in 1992/3 to 63.4% in 2004/5, with the import shared of the three ICT products (SITC 75, 76 and 77) recording a much faster growth.[6] By contrast final goods (total exports minus components) have continued to dominate the export composition. Over the past decade, the share of final goods in total machinery exports has remained around 75%, with only minor year-to-year changes. Given the fact that the production of parts and component is generally more capital- and technology- intensive than final assembly, these figures clearly show that China's export success has so far been underpinned largely by its comparative advantage in international production

[6] Semiconductors and microprocessors best exemplify China's dependence on imported components. China has surpassed the US and Japan to become the world's largest market for semiconductors largely because they are assembled in the electronic and information technology products exported in such large volumes. In 2004, China's imports accounted for one-third of global semiconductor output of $213 billion (SIA 2005).

arising from labour abundance. When components are netted out, more than 80% of total Chinese manufacturing exports from China can still be treated as labour-intensive products.[7]

In sum, the mere fact of rapid growth of assembled final goods exports in highly fragmented high-tech industries does not necessarily imply that China is rapidly gaining maturity as a sophisticated high-tech exporting country. In a context where international fragmentation of production is becoming a symbol of economic globalization, the classification of final commodities by factor intensity is not the same as the classification of the production process occurring in these countries by factor intensity. The ongoing process of production fragmentation and China's increased integration into global production networks as an assembly centre has opened up opportunities for other countries in the region to benefit from China's rapid export expansion as participants in these networks. With this background, let us turn to China's relative performance in world machinery trade and trends and patterns of China's bilateral trade in this product category.

China-Southeast Asia Network Trade

Table 6 provides data on the growing importance of East Asia in China's machinery trade, focussing separately on trade in components and final products. The data clearly reflect the evolving role of China as an assembly centre within the East Asian region.

The share of East Asia in total parts and component imports to China has increased sharply. By 2004/5, over two thirds of total components imports to China originated in the region. By contrast, only 47.8% of Chinese final products found markets in these countries. The share of Japan in component imports to China declined from 26.8% in 1992/3 to 22.6% in 2004/5, but all other East Asian countries have gained market shares. The combined share of imports from Southeast Asian countries recorded

[7] The massive structural shift in Chinese exports away from traditional labour intensive products and toward machinery and transport equipment (and information technology products within that commodity group) has been interpreted by some observers to imply that China is rapidly becoming an advanced technology superpower (Albaladejo and Lall (2004), Rodrik 2006, Yusuf *et al*. 2007,). Our analysis based on a careful separation of parts and components from reported trade, however, suggests that such an inference (which is based on an identification of product sophistication simply on the basis of the stated product nomenclature) is fundamentally flawed.

the sharpest increase, from a mere 1 % in 1992/3 to 16.0% in 2004/5. Among these countries, import shares of Malaysia and the Philippines have increased at a faster rate compared to that of Singapore. The increase in market of the countries in the region has been reflected in a sharp decline in China's extra-regional imports of components. For instance, import shares of the US and EU declined from 10.5% to 7.0%, and from 19.4% to 10.7% between these two time points.

Table 6 about here

Compared to the increased intra-regional dependence in component imports of China, geographic composition of its final goods exports (that is, total reported exports – component exports) is characterised by a clear extra-regional bias. In 2004/5, 62% of total final product exports found market outside the East Asian region, up from 45% in 1992/3. The share of exports to East Asia and Southeast Asia declined from 49.5% to 26.5% between 1992/3 and 2004/5. Exports to Southeast Asia accounted for around 5%. These differences in the geographic patterns of imports and exports reflects the increasingly important role played by China as a final product assembler for advanced-country markets using parts and components procured from countries in the region, with Southeast Asian countries among them playing an increasingly important role. The data also point to an increase in two-way trade in components between China and Southeast Asia. For instance the share of Southeast Asia in total component exports of China increased from 5.8% to 13.0% accompanied by to 16% an increase in the region's share of Chinese exports from 1% between 19992/3 and 2004/5. This pattern reflects the occurrence of multiple border crossing of components at different stages in the production process, a well documented feature of international production fragmentation (Brown and Linden 2006).

Complementarity in network trade: An Econometric test

We observed in the previous section that emerging trade patterns are not consistent with the widely held view that China's rapid world market penetration is at the expense of export opportunities of the other countries in East Asia (and other developing countries) is not consistent with the actual trade data. On the contrary, China's emergence as a major final good assembler has opened up new market opportunities for the other countries in the region to engage in component production/assembly. I now turn to a more formal examination of the implications of this new division of labour for the export performance of Southeast Asian countries from a comparative regional and global perspective.

The analytical tool used for this purpose is the gravity equation, which has established itself as the dominant empirical framework for analysing bilateral trade flows.[8] The major novelty of the present application lies in the specific emphasis placed on delineating the implications for export performance of other countries of China's rapid integration into regional production networks. For the purpose of this analysis, I first augment the basis gravity equation by incorporating a number of explanatory variables suggested by recent theoretical and empirical advances in the emerging literature on international production fragmentation to obtain benchmark model of the analysis econometric exercise. The modified model is then estimated separately for China's total machinery imports, components, and final goods, while interacting China income variable with dummy variables specified for countries in Southeast Asia as a group as well as for individual countries therein. The estimated coefficients of the interaction term provide a test of whether China's import intensity from the countries in the regional is significantly different from imports from the other countries covered in the analysis.

The benchmark model is,

$$
\begin{aligned}
lnIMP_{i,j} = {} & \alpha + \beta_1 lnGDP_i + \beta_2\, lnGDP_j + \beta_3\, lnPGDP_i + \beta_4\, lnPGDP_j \\
& + \beta_5 lnDST_{i,j} + \beta_6 ADJ_{i,j} + \beta_8 lnRULC_{i,j} + \beta_9\, lnRER_{i,j} \\
& + \gamma T + \varepsilon_{ij} \qquad (1)
\end{aligned}
$$

where subscripts *i* and *j* respectively refer to China (importing country) and the partner (exporting) country and the variables are listed and defined below, with the postulated sign of the regression coefficient for the explanatory variables in brackets.

EXP	Bilateral imports between *i* and *j*
GDP	Real gross domestic product (GDP) (+)

[8] On the theoretical foundation of the gravity equation see Anderson (1979), Deardorf (1998) and Bergstrand (1985). For recent applications of gravity equation for trade for analysis and extensive listing of the related literature see Anderson and Marcouiller (2002), Rose (2003), and Eichengreen *et al*. (2007).

PGDP	Real GDP per capita (+)
DST	The distance between the economic centres of *i* and *j* (-)
ADJ	A binary variable assuming the value 1 if *i* and *j* share a common land border and 0 otherwise (+)
RULC	Relative unit labour cost in manufacturing between *j* and *i* (+)
RER	An index of bilateral real exchange rate which measure the international competitiveness of country *i* against country *j* **(+)**
T	A set of time dummy variables to capture year-specific 'fixed' effects
α	A constant term
ε	An stochastic error term, representing the omitted other influences on bilateral trade

The first four explanatory variables (*GDP*, *GDPP*, *DST* and *ADJ*) are the standard gravity-model arguments, which do not require further discussion. Among the remaining variables, relative unit labour cost (*RULC*, relative manufacturing wage adjusted for labour productivity) is presumably a major factor impacting on the global spread of fragmentation-based specialisation (Jones 2000, Jones and Kierzkowski 2001). In a context where both capital and components have become increasingly mobile, relative cost of production naturally becomes an important consideration in cost-border production. The inclusion of real exchange rate, *RER*, which captures international competitiveness of traded-goods production, is based on similar reasoning. Another important determinant of trade flows suggested by the theory of production fragmentation is the cost of 'service links' connecting 'production blocks' in different countries (Jones and Kierzkowski 2001). There is no unique measure of the cost of service links. However, in our model, distance (*DST*) and adjacency (*ADJ*), and per capital income (*PGDP*) capture certain aspects such costs. The importance of distance as a determinant of transport cost has greatly diminished during the post-war era thanks to technological advances. However, there is evidence that the geographical 'distance' is still a key factor in determining international transport cost, in particular shipping cost, and delivery time (Evans and Harrigan 2003). Timely delivery can in fact be a more important influence on vertical trade compared to final trade because of multiple border-crossing involved in the value added chain. The common border dummy (*BRD*) captures possible additional advantages of proximity that are not captured by the standard distance measure (the greater cycle distance between capital cities). Inclusion of *PGDP* as an explanatory variable allows for the fact that more developed countries have better ports and communication systems and other trade-related infrastructure as well as better institutional arrangements for contract enforcement that facilitate trade by reducing the cost of maintaining 'services links'. Finally, the time-specific fixed effects (T) are included to control for general technological change and other time-varying factors.[9]

The model was estimated using annual data relating to China's manufacturing imports over the period 1992-2004 from all countries each of which accounted for 0.1% or more of world manufacturing trade in 2000/1. Forty-two countries satisfied this criterion. Of these countries, Hong Kong was deleted from the country coverage because of its peculiar trade links with China. It was not possible to cover Taiwan because of the unavailability data on bilateral trade flows. As exports from China form the key explanatory variable in the model, our data set relates to 39 countries. Data on bilateral exports are compiled from the importers' records (CIF) of the UN Comtrade database. The trade data were disaggregated into components and final products as detailed in Appendix 1. The data source for other variables and methods of variable construction are explained Appendix 2.

The regression estimates are reported in Table 7. In the preliminary regression, estimates of China's GDP and per capita GDP variables were found to be highly correlated. So the final estimates reported here contain only the GDP variable and the related country/country group slope interaction dummies. Note that the key issues of interest here are (a) the degree to which import flows are related to China's economic expansion measured by GDP, and (b) how the magnitude of the measured relationship varies among commodity categories and trading partners once we control for the other relevant variables. The coefficient of GDP in the model captures the average degree of import elasticity of China's economic expansion. The estimated coefficient of a given regional/country interaction dummy variable indicates the degree to which the degree of elasticity of imports from the particular country group/country deviates from that average level. Note that in specifying interaction dummy variables the based dummy used is the developed countries (excluding Japan). Under the three product category, the first equation help examining

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[9] To be consistent with recent gravity equation applications to trade flow modeling, in experimental runs we also included binary dummy variables to represent common language, common colonial relationship, landlockness , and island status of countries. These were subsequently omitted because statistical insignificance and erratic sign changes among alternative specifications. We also tested two variables, telephone mainlines per 1,000 people (TELE) and per capital electricity production in kilo-watts (kwh) (ELET), to represent infra-structure related trade cost, and an institutional quality variable (the index of institutional quality recently constructed by Kaufmann *et al* 2006) to capture transaction costs associated contract enforcement. These variables were found to be highly correlated with PGDP. A binary dummy variable included to capture the possible trade effects of membership in regional trading agreements also fount to be statistically insignificant throughout. Exclusion of these variables (jointly and individually) was supported by the standard variable deletion (*F*) test.

whether China has a greater propensity to import from South East Asia compared to developed countries and the other three sub regions (Japan and Korea (JK), Latin America (LATM) and Central and Eastern Europe (CEEU).

Table 7 about here

The results suggest that China's economic expansion has been associated with an increase in total machinery imports at a rate twice of average GDP growth (18% as compared with 9%) in the country during the period under study. A comparison of the equations for components and final imports shows that, the rate of explain in the former category was much sharper compared to that in the latter. Imports of this commodity category grew at a rate of more than twice of the GDP growth rate. The result for the GDP interaction dummy for Southeast Asia suggests that the rate of growth of imports from Southeast Asia associated with one percentage point increase in GDP in China was about 3.8 percentage points higher compared to imports from developed countries (base dummy), after controlling for other relevant determinants. A comparison of the coefficients for the four regional interaction dummies strongly support hypothesis China's propensity to imports components from Southeast Asian is significantly higher. The results also show a greater propensity for importing from Latin American countries, but as already noted this probably reflects the rather low initial base of imports from these countries. In terms of the results for individual country dummies, Malaysia, Philippines and Singapore stand out for the very high degree of China's propensity to import components from these countries. Interestingly, the coefficient for Japan and Korea (combined) on the component equation is positive but statistically insignificant, suggesting that within the East Asian region, China's component imports are heavily concentrated in South East Asia.

Concluding Remarks

There is clear evidence that the fragmentation-based specialisation has become an integral part of the economic landscape of Southeast Asia and in the wider East Asian region. Trade in components has been expanding more rapidly than conventional final-good trade. The degree of dependence on this new form of international specialisation is proportionately larger in East Asia, in particular in Southeast Asia, compared to North America and Europe. A notable recent development in international fragmentation of production in the region has been the rapid integration of China into the regional production networks. This development is an important counterpoint to the popular belief that China's global integration would crowd out other countries' opportunities for international specialization. China's imports of components from countries in Southeast Asia and other developing East Asia countries have grown rapidly, in line with rapid expansion of manufacturing exports from China to extra-regional markets, mostly to North America and the European Union.

Booming component exports from Southeast Asia to China, however, does not mean that the process has contributed to lessening the regions dependence on the global economy. On the contrary, the region's growth dynamism based on vertical specialisation depends inexorably on China's extra-regional trade in final good, and this dependence has in fact *increased* over the years.

Appendix A

Data Source and Method of Data Compilation

There are two approaches to quantifying the magnitude and patterns of manufacturing trade that can be directly attributed to production fragmentation. The first approach, which was commonly used by early studies in this area, is to use the records maintained by OECD countries (in particular the US and countries in the European Union) in connection with the use of special tariff provisions that provide for preferential access for the re-entry of domestically produced components assembled abroad ('outward processing trade (OPT) statistics'). The OPT schemes have covered only a selected list of products and the actual product coverage has varied significantly among countries and within a given country over time. Moreover, and perhaps more importantly, the importance of these tariff concessions as a factor in promoting global sourcing (and therefore the actual utilization of these schemes), has significantly been diminished over the years by the process of investment and trade liberalisation in ICs and regional economic integration agreements. The second approach, which provides a much more comprehensive and consistent coverage of fragmentation trade, is to delineate trade in parts and component from the related final (assembled) goods using individual-country trade statistics recorded on the basis of the Standard International Trade Classification (SITC) of the United Nations (Yeats, 2001). This is the method used in this paper.

In its original form (SITC, Rev 1), the UN trade data reporting system did not provide for separating parts and components from final manufactured goods. The SITC Revision 2 introduced in the late 1970s (and implemented by most countries only in the early 1980s) adopted a more detailed commodity classification, which provided for separation of parts and components within the machinery and transport sector (SITC 7). There were, however, considerable overlap between some advanced-stage assembly activities and related final goods within the sector in the Revision 2, which made it difficult to separate fragmentation trade from total trade (Ng and Yeats, 2001). For instance 'television tubes' were not separable from 'TVs' and ' computer processors' were lumped together with 'computers'. Revision 3 introduced in the mid-1980s marked a significant improvement over Revision 2 in providing a comprehensive coverage of parts and components in SITC 7. Revision 3 has also identifies some parts and components of products belonging to belonging to SITC 8 ('miscellaneous manufactures'), but the coverage is far from complete. For instance, for some products which belong to this commodity category such as clothing, furniture, and leather products in which outsourcing is prevalent, some of the related components (e.g., pieces of textile, parts of furniture, parts of leather soles) are presumably recorded under other SITC categories. Given the separation of components from final goods is incomplete for SITC 8, in this study focus solely on SITC 7 with a view to minimise any bias in analysing trends in fragmentation trade arising from the incomplete commodity coverage of the original data.

It is important to note that international production fragmentation has been spreading in recent years beyond SITC 7 and 8 to other product categories such computer software (included as part of 'special transactions' under SITC 9), pharmaceutical and chemical products (falling under SITC 5) and machine tools and various metal products (SITC 6). The UN data system does not permit us to identify these new facets of fragmentation-based international exchange. So the tabulations presented here of the magnitude of fragmentation trade are downward biased. However, the magnitude of the bias is unlikely to be substantial because fragmentation-based international specialisation is predominantly concentrated in machinery and transport equipment category (SITC 7) (Yeats, 2001; Feenstra, 1998).

The data for this paper are compiled over the period from 1993 to 2004 based on a comprehensive list of parts and components prepared at the 5-digit level. The list was prepared by carefully linking the parts and accessaries identified in the United Nations Statistical Division: Classification Registry (http:/unstats.un.org/unsd/cr/registry) with the 5-digit SITC products. (The list is available from the author on request).

The data are tabulated using importer records, which are considered more appropriate compared to the corresponding exporter records for analysing trade patterns for a number of reasons (Ng and Yeats, 2003, Appendix 1, Feenstra *et al.*, 2005). Importer records are admittedly less susceptible to double counting and erroneous identification of the source/destination country in the presence of entrepot trade compared to data based on reporting country records (e.g., China's trade through Hong Kong and Indonesia's through Singapore). Also, some countries fail to properly report goods shipped from their own export processing zones. These exports are simply lump these exports into one highly aggregated category of 'special transactions' under SITC 9. While no fully satisfactory solutions exist for these problems, it is generally believed that data compiled from importer records are less susceptible to recording errors and reveal the origins and composition of trade more accurately since there normally are important legal penalties for incorrectly specifying this information on customs declarations. Among the countries covered in this study, Taiwan is not covered in the UN data system and Vietnam has not yet begun to make data available according to the standard UN format. Singapore was not reporting data on its bilateral trade with Indonesia because of political reasons.[10] In these cases, the data gaps were filled using the corresponding trading partner records.

[10] In 2005 Singapore started releasing data on trade with Indonesia, after being pressured for decades by the Indonesian government.

APPENDIX 2: Definition of Variables and Data Source

Label	*Definition*	*Data Source/variable construction*
EXP	Value of bilateral exports in US$ measured at constant (2000) price.	Exports (at CIF price, US$): compiled from importer records of UN-COMTRADE, online database (http://www.bls.gov/ppi/home.htm). Exports value series was deflated by the machinery and transport equipment sub-index of the US producer price index.
GDP,GDPP	Real GDP, and real per capita GDP (at 1995 price)	World Development Indicator, The World Bank
DIST	Distance. The Great Circle distance from capital city to capital city	Rose (2002) dataset, http://faculty.haas.berkely.edu/arose/RecRes.htm
ADJ	A binary dummy variables which take value 1 for countries which share a common land border and 0 otherwise	Rose (2002) dataset, http://faculty.haas.berkely.edu/arose/RecRes.htm
INSTQ	Institutional quality. An index which measures the extent to which agents have confidence in and abided by the rule of society, based on perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the credibility of contracts. The index ranks from 0 to 2.5, with a higher number indicating better rules of law enforcement.	Kaufmann, Kraay and Mastruzzi (2006).
RULC	The ratio of unit labour cost in country j and country i. Unit labour cost is measured as the ratio of the average manufacturing wage to manufacturing value added per worker. By construct, an increase (a decrease) in *RULC* indicates an improvement (a deterioration) in i's cost competitiveness relative to j.	Annual manufacturing wages data for USA: 'Interactive database of National Income and Product Accounts Tables' at http://www.bea.gov/bea/dn/nipaweb/SelectTable.asp?Selected=N#S6 under Section 6 - Income and Employment by Industry All other countries: US Bureau of Economic Analysis (BEA) online database, 'Survey of U.S. Direct Investment Abroad' http://www.bea.doc.gov/bea/uguide.htm#_1_23
RER	Real exchange rate: $RER_{ij} = NER * \frac{P^{W}{}_{i}}{P^{D}{}_{j}}$ where, *NER* is the nominal bilateral exchange rate index., P^W in price level of country j measured by the producer price index and P^D is the domestic price index of country I measured by the GDP deflator. By construct, an increase (decrease) in RER_{ij} indicates a an improvement (deterioration) in *i*'s competitiveness in traded-goods production vis a vis *j*	Constructed using data obtained from World bank, World development Indicators database. Following Soloaga and Winters (2001), mean-adjusted RER is used in the model. This variable specification assumes that countries are in exchange rate equilibrium at the mean.

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Table 1: Average annual compensation per worker
in selected countries, circa 2000

Country	Year	Average annual compensation (US$)[1]
China[2]	2001	1835
Indonesia	2000	880
Philippines	2000	2965
Thailand	1999	3345
Malaysia	2000	4380
Vietnam	2000	650
Taiwan	1997	14420
Korea, Republic of	2000	15780
Singapore	2000	20440
Poland	2000	2502
Hungary	2000	2898
Czech Republic	1998	4150
Mexico	2000	8050

Source:
China: China Statistical Press (2003) and Guangdon); Vietnam: Vietnam GSO (2000); other countries: Nicita and Olarreage (2006).

Notes:
1 Salary/wage plus other remuneration.
2 Average manufacturing wage of Beijing, Tianjin, Shanhai, Zhejiang, Liaoning and Guangdon

Table 2: Parts and components in world machinery trade, 1992/93 and 2004/05 (%)

	Exports				Imports			
	Country composition of parts and components exports		Share of parts and components in manufacturing exports		Country composition of parts and components exports		Share of parts and components in manufacturing exports	
	1992/93	2004/05	1992/93	2004/05	1992/93	2004/05	1992/93	2004/05
East Asia	30.7	42.6	21.9	30.0	22.4	34.8	22.9	38.0
Japan	16.6	11.1	26.9	32.9	3.4	4.2	16.5	25.9
Developing East Asia	14.1	31.5	18.0	29.1	18.9	30.6	24.7	40.6
China	1.2	10.0	5.3	19.5	2.6	10.8	17.7	38.8
Hong Kong	1.7	0.9	18.8	27.7	3.6	5.9	16.4	37.3
Rep. of Korea	2.1	4.5	19.5	31.0	2.9	2.9	28.8	32.4
Taiwan	3.3	5.6	21.2	43.5	2.4	2.8	29.6	34.4
Southeast Asia	5.9	10.4	27.5	40.3	9.9	10.9	32.6	48.5
Indonesia	0.1	0.6	3.1	20.0	0.9	0.4	23.4	20.9
Malaysia	2.0	3.7	33.6	48.3	2.7	2.9	39.8	54.3
Philippines	0.5	2.0	34.1	64.9	0.5	1.4	26.6	66.1
Singapore	2.5	2.6	33.8	43.2	4.1	4.7	35.2	54.1
Thailand	0.8	1.4	20.9	27.8	1.8	1.5	28.1	33.1
Vietnam	0.0	0.1	1.6	9.8	0.0	0.0	0.0	0.0
South Asia	0.1	0.3	3.6	6.4	0.1	0.3	3.6	6.4
Oceania[4]	0.3	0.3	15.7	15.9	1.4	0.9	17.3	13.8
NAFTA[5]	24.8	18.8	29.7	29.8	27.8	21.8	24.7	22.5
USA	18.8	13.5	30.4	32.2	19.3	14.2	23.0	19.8
Canada	3.6	2.5	23.2	21.0	6.5	4.0	32.8	27.9
Mexico	2.4	2.8	38.4	30.2	2.0	3.6	23.0	34.1
Mercosur[6]	0.7	0.6	14.6	14.4	0.7	0.6	14.6	14.4
ANCOM[6]	0.0	0.0	5.0	4.7	0.0	0.0	5.0	4.7
Europe	41.5	35.6	18.3	19.6	43.2	36.6	18.7	19.9
EU15[8]	38.5	30.4	18.8	19.6	40.1	30.6	19.1	20.3

Eastern Europe	0.6	3.2	11.3	26.3	0.6	3.3	11.3	26.3
Rest of Europe	0.3	0.4	15.6	22.5	0.3	0.4	15.6	22.5
World	100.0	100.0	20.9	24.2	100.0	100.0	20.9	24.1
Memo items:								
Developed countries	79.9	58.4	22.2	23.9	79.9	58.4	22.2	23.9
Developing countries	18.6	39.9	17.2	25.7	18.6	39.9	17.2	25.7

Source: Compiled from UN Comtrade database.

Notes:

--- Data not available.
1 Two-year average
2 Japan + Developing East Asia.
3 Southeast Asia + China + Hong Kong SAR, Taiwan, South Korea.
4 Australia and New Zealand
5 North American Free Trade Area: USA, Canada and Mexico.
6 Southern American Common Market: Argentina, Brazil, Paraguay and Uruguay.
7 Andean Common Market: Chile, Ecuador, Peru and Bolivia.
8 Member countries (15) of the European Union prior to its enlargement to cover some countries in Eastern Europe: Austria, Belgium, Luxemburg, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, and United Kingdom

Table 3: Southeast Asia's Parts and Components Trade: Composition and World Market Share by Major Category, 2003/5 (%)

		Indonesia	Malaysia	Pipelines	Singapore	Thailand	Vietnam	S.E. Asia	World
	EXPORT: composition (%)								
71	Power generating machines	4.6	0.4	0.4	1.9	2.7	3.1	1.3	10.6
72	Special industrial machinery	2.7	0.5	0.1	1.4	0.6	3.7	0.8	3.8
73	Metalworking machinery	0.1	0.1	0.0	0.3	0.2	0.5	0.1	1.0
74	General industrial machines	5.0	1.1	0.6	2.6	5.7	9.2	2.2	9.7
75	Office machines	9.9	21.2	10.5	23.3	21.0	3.1	19.1	11.8
76	Telecomm. And sound equipments	21.3	7.6	3.9	3.5	15.4	6.1	7.3	7.3
77	Electrical machines	46.7	68.0	82.5	65.4	48.5	69.4	66.9	38.3
	Semiconductor devices (SITC 776)	21.9	63.2	75.9	58.7	36.9	5.4	59.2	32.3
78	Road vehicles	9.5	1.0	1.8	0.8	5.8	4.9	2.1	14.7
79	Other transport equipment	0.2	0.1	0.2	0.7	0.1	0.1	0.3	2.8
7	Total	100	100	100	100	100	100	100	100
	E**XPORT: World market share**								
71	Power generating machines	0.1	0.1	0.1	0.5	0.3	0.0	1.2	100
72	Special industrial machinery	0.2	0.5	0.1	0.9	0.2	0.1	2.1	100
73	Metalworking machinery	0.0	0.2	0.1	0.9	0.3	0.0	1.6	100
74	General industrial machines	0.2	0.4	0.1	0.7	0.8	0.1	2.3	100
75	Office machines	0.3	6.7	1.8	5.3	2.5	0.0	16.6	100
76	Telecomm. And sound equipments	1.0	3.9	1.1	1.3	2.9	0.1	10.3	100
77	Electrical machines	0.4	6.7	4.4	4.6	1.8	0.2	17.9	100
	Semiconductor devices (SITC 776)	0.2	7.3	4.8	4.8	1.6	0.0	18.8	100
78	Road vehicles	0.2	0.3	0.2	0.1	0.5	0.0	1.4	100
79	Other transport equipment	0.0	0.1	0.1	0.7	0.1	0.0	1.0	100
7	Total	0.3	3.8	2.0	2.7	1.4	0.1	10.3	100
	IMPORTS: Composition								
	Imports								
71	Power generating machines	17.0	2.5	1.0	3.8	5.8	15.6	3.9	10.6
72	Special industrial machinery	11.0	1.5	1.5	4.3	1.5	9.6	3.0	3.8
73	Metalworking machinery	1.2	0.4	0.3	0.6	0.5	2.9	0.5	1.0

74	General industrial machines	20.5	2.8	1.1	4.3	7.2	12.2	4.5	9.7
75	Office machines	1.1	13.3	16.9	16.4	13.6	7.9	14.6	11.8
76	Telecomm. And sound equipments	2.8	4.5	3.9	4.0	3.9	9.4	4.2	7.3
77	Electrical machines	16.4	72.7	72.6	61.8	54.0	28.0	63.2	38.3
	Semiconductor devices (SITC 776)	3.1	61.9	67.5	54.0	39.6	8.0	53.6	32.3
78	Road vehicles	28.3	1.5	2.1	2.1	11.5	13.0	4.2	14.7
79	Other transport equipment	1.8	0.8	0.6	2.8	1.9	1.5	1.7	2.8
	IMPORTS: World market share								
71	Power generating machines	0.5	0.7	0.1	1.5	0.8	0.3	4.1	100
72	Special industrial machinery	1.0	1.2	0.6	4.8	0.6	0.5	8.7	100
73	Metalworking machinery	0.4	1.3	0.5	2.5	0.8	0.6	6.1	100
74	General industrial machines	0.7	0.9	0.2	1.9	1.1	0.3	5.1	100
75	Office machines	0.0	3.4	2.2	6.0	1.8	0.1	13.5	100
76	Telecomm. And sound equipments	0.1	1.9	0.8	2.4	0.8	0.3	6.3	100
77	Electrical machines	0.1	5.7	2.9	6.9	2.1	0.2	18.0	100
	Semiconductor devices (SITC 776)	0.0	5.8	3.2	7.2	1.9	0.1	18.1	100
78	Road vehicles	0.6	0.3	0.2	0.6	1.2	0.2	3.1	100
79	Other transport equipment	0.2	0.9	0.3	4.3	1.0	0.1	6.9	100
7	Total	0.3	3.0	1.5	4.3	1.5	0.2	10.9	100

Source: Compiled from UN Comtrade database

Table 4: China's Merchandise Exports: Composition, Growth and World Market Share, 1992/3 – 2004/5

	Composition (%)			Growth (%)			World market share (%)		
	1992/3	2000/1	2004/5	1992-00	2000-05	1992-05	1992/3	2000/1	2004/5
Primary products	13.6	7.9	6.0	3.3	7.9	4.2	0.7	0.7	0.8
Manufacturing (5 to 8 – 68)	82.1	89.7	90.7	7.5	12.4	8.1	4.5	8.0	12.0
Chemicals and related products (5)	3.2	3.2	3.3	6.8	12.9	7.8	1.4	2.2	2.9
Resourced based manufacturing (6-68) [1]	12.7	11.8	11.8	6.4	12.2	7.4	3.6	6.6	9.5
Machinery and transport equipment (7)	17.1	32.9	44.6	11.3	17.3	11.8	1.9	5.5	11.4
Power generating machines (71)	0.7	1.1	0.9	9.3	9.5	8.5	1.3	2.7	3.7
Special industrial machinery (72)	0.5	0.6	0.8	7.2	18.1	9.4	0.7	1.5	3.1
Metalworking machinery (73)	0.2	0.2	0.2	5.6	13.1	7.1	1.1	1.7	2.8
General industrial machinery (74)	1.4	2.0	2.8	9.4	17.7	10.7	1.4	3.7	7.4
Office machines (75)	1.9	8.9	14.5	17.6	20.5	16.7	1.7	10.1	28.2
Telecommunication and sound equipment (76)	6.6	9.1	12.7	9.1	17.7	10.5	7.9	13.1	26.2
Electrical machinery, apparatus and parts (77)	4.7	9.8	11.3	11.8	14.6	11.4	2.8	6.9	12.4
Road vehicles (78)	0.8	1.1	1.2	8.8	13.9	9.3	0.4	0.8	1.3
Other transport equipment (79)	0.2	0.2	0.2	7.0	15.3	8.6	0.3	0.6	1.4
Miscellaneous manufactured articles (8)	49.1	41.8	31.0	5.8	7.5	5.7	13.9	21.6	24.8
Clothing and accessories (84)	18.9	13.3	9.6	4.6	7.0	4.8	19.1	26.3	31.8
Footwear (85)	7.4	5.2	3.3	4.6	4.9	4.3	27.6	42.0	44.2
Baby carriages toys and games (894)	8.6	7.9	5.2	6.4	5.7	5.6	32.5	54.9	61.5
Total merchandise exports	100.0	100.0	100.0	6.9	12.2	7.7	4.0	6.7	9.6
US$ billion	136	403	897						

Source: Compiled from UN Comrade database.

Table 5: Share of parts and components in China's Machinery and Transport Equipment Trade

		Exports			Imports		
		1992/3	1999/0	2004/5	1992/3	1999/0	2004/5
71	Power generating machines	16.5	18.4	22.7	60.0	63.7	55.5
72	Special industrial machinery	17.9	27.9	33.0	11.5	14.1	13.5
73	Metalworking machinery	21.8	27.5	28.5	13.1	16.6	16.8
74	General industrial machinery	12.6	29.2	38.5	23.8	31.5	36.8
75	Office machines	25.2	35.5	36.7	51.5	54.7	47.9
76	Telecommunication and sound equipment	40.9	42.6	35.1	48.5	61.4	74.0
77	Electrical machinery, apparatus and parts	15.0	23.9	24.4	70.3	80.8	87.5
78	Road vehicles	27.3	38.3	52.5	26.3	64.8	57.9
79	Other transport equipment	16.5	18.4	22.7	16.9	23.1	14.5
7	Total	22.3	34.7	36.7	32.5	56.6	63.4

Source: Compiled from UN Comrade database.

Table 6: Direction of China's Trade in Machinery and Transport Equipment: Destination/Source Country Composition and Growth (%)

6A: Exports

Designation country/region	Geographic composition (%) Total exports		Parts and components		Final goods		P&C share in total exports/imports (%)		Contribution of P&C to total export/import increment
	1992/3	2004/5	1992/3	2004/5	1992/3	2004/5	1992/3	2004/5	1992/3-2004/5
East Asia	58.4	47.2	66.2	64.3	55	38	34.3	47.7	48.5
Japan	7.8	12	13	12.9	5.5	11.5	50.5	37.6	37.3
Developing East Asia	50.6	35.2	53.2	51.3	49.5	26.5	31.8	51.0	52.3
Hong Kong	42.0	21.0	42.4	29.9	41.8	16.2	30.6	49.9	51.7
Korea	1.1	3.5	2.1	4.6	0.6	2.8	57.8	46.0	45.9
Taiwan	1.8	2.6	2.8	3.7	1.4	2	47.1	49.8	49.9
Southeast Asia	5.7	8.1	5.8	13.1	5.7	5.4	30.8	56.6	57.5
Indonesia	1.2	0.9	1.1	0.9	1.2	0.9	27.8	35.0	35.5
Malaysia	1.0	2.3	1.2	4.9	0.9	0.9	36.3	74.6	75.4
Philippines	0.3	0.6	0.3	0.8	0.4	0.5	30.3	46.7	47.1
Singapore	2.1	3.0	2.6	4.7	1.8	2.1	37.5	54.9	55.4
Thailand	1.2	1.3	0.7	1.8	1.4	1.0	17.7	48.5	49.8
Vietnam	0.2	0.5	0.2	0.4	0.2	0.5	30.3	28.0	28.0
Other	41.6	52.8	33.8	52.7	46.0	62.0	49.0	50.6	50.9
World	100	100	100	100	100	100	30.3	35.0	35.2
US$ bln.	14.2	325.8	4.3	114.1	9.9	211.6			

6B: Imports

Source country/region	1992/3	2004/5	1992/3	2004/5	1992/3	2004/5	1992/3	2004/5	1992/3-2004/5
East Asia	55.1	60.3	64.8	67.7	50.4	47.8	38.1	70.8	75.1
Japan	27.4	22.9	26.8	22.6	27.7	23.4	31.7	62.2	67.8
Developing East Asia	27.6	37.4	37.9	45.1	22.6	24.4	44.4	76.0	79.3
Hong Kong,	13.6	3.7	24.2	4.9	8.5	1.7	57.6	83.5	106.8
Korea	2.1	9.1	3.0	9.4	1.6	8.7	46.2	65.1	65.7
Taiwan	10.8	13.1	9.1	14.9	11.6	9.9	27.3	71.7	77.0
Southeast Asia	1.1	11.6	1.6	16.0	0.8	4.5	47.1	87.0	87.4
Indonesia	---	0.6	---	0.6	---	0.6	---	63.0	63.0
Malaysia	0.2	4.3	0.2	6.8	0.1	0.2	32.4	97.2	98.3
Philippines	---	2.3	0	3.4	---	0.4	---	93.2	93.2
Singapore	0.7	2.7	1.2	2.9	0.5	2.4	55.5	67.7	68.1
Thailand	0.1	1.9	0.1	2.3	0.1	1.2	32.4	76.3	76.6
Vietnam	---	---	0.1	---	---	0.1	---	---	---
OECD	37.4	27.9	30.6	19.5	40.7	42.2	26.5	44.1	47.7
Other	7.5	11.8	4.6	12.8	8.9	10	19.8	68.4	72.7
World	100	100	100	100	100	100	32.4	63.0	67.6
US$ bln.	37.7	292.2	12.2	184.2	25.4	108.4			

Source: Compiled from UN Comtrade database.

Notes: --- Zero or negligible.

Table 7: Regression estimates of determinants of China's imports of machinery and transport equipment, 1992-2004 (Dependent variable China's imports)

Explanatory variables	Parts and components		Final goods		Total	
	1(a)	1(b)	2(a)	2(b)	3(a)	3(b)
Log GDP, exporter	0.97	1.24	1.02	1.26	0.94	1.18
	(16.17)**	(20.67)**	(20.40)**	(25.20)**	(18.80)**	(23.60)**
Log per capita GDP, exporter	0.89	1.28	0.88	1.41	0.90	1.38
	(9.89)***	(12.80)**	(8.80)**	(12.82)**	(10.00)**	(12.55)**
Log GDP China (GDPCH)	2.08	2.20	1.00	1.18	1.47	1.64
	(7.17)**	(8.46)**	(4.00)**	(5.13)**	(5.44)**	(6.83)**
Log distance (DST)	-2.42	-3.20	-2.00	-2.83	-2.14	-2.98
	(-8.64)**	(-9.14)**	(-7.69)**	(-8.09)**	(-8.23)**	(-8.51)**
Log real exchange rate (RER)	0.65	0.55	0.40	0.34	0.66	0.58
	(2.83)**	(2.89)**	(1.82)	(2.27)*	(2.64)*	(2.64)*
Log unit labour cost (ULC)	0.10	0.31	0.05	0.29	0.18	0.44
	(0.38)	1.29	0.23	(1.53)	(0.75)	(2.00)*
Asian crisis dummy	0.92	0.27	0.43	-0.22	0.70	0.02
	(2.79)**	(2.25)*	(1.54)	(-2.44)*	(2.33)*	(0.18)
JK*Log GDPCH	0.27		1.39		1.28	
	(1.16)		(3.78)**		(2.64)**	
SEA* Log GDPCH	3.83**		1.56		3.23	
	(9.12)		(4.59)**		(6.21)**	
Japan* Log GDPCH		-0.06		-0.21		0.03
		(-0.23)		(-0.64)		(0.10)
Korea* Log GDPCH		0.21		0.10		0.31
		(0.72)		(0.30)		(0.97)
Singapore* Log GDPCH		-0.03		0.41		0.36
		(-0.08)		(1.28)		(0.97)*
Indonesia* Log GDPCH		3.64		2.48		2.59
		(5.78)**		(5.28)**		(4.63)**
Thailand* Log GDPCH		2.67		2.35		2.68
		(6.07)**		(7.83)**		(7.66)**
Malaysia* Log GDPCH		2.61		1.66		2.57
		(7.68)**		(5.03)**		(7.34)**
Philippines* Log GDPCH		5.33		4.04		4.89
		(11.34)**		(13.47)**		(15.28)**
LATM* Log GDPCH	3.71	3.95	2.59	2.76	3.39	3.57
	(3.44)**	(3.53)**	(3.60)**	(3.68)**	(3.73)**	(3.76)**
CEEU* Log GDPCH	-0.35	-0.47	-0.37	-0.64	-0.84	-1.05
	(-0.51)	-0.75	-0.60	-1.07	-1.38	(-1.84)*
Constant	-57.70	-65.30	-31.80	-41.10	-41.10	-49.70
	(-7.50)**	(-8.84)**	(-4.58)**	(-6.02)**	(-5.73)**	(-7.22)**
R^2	0.75	0.82	0.75	0.81	0.76	0.82
RMSE	1.39	1.19	1.29	1.12	1.28	1.09
Number of Obs.	486	486	483	483	486	486

Note: 1 Estimated by OLS (with heteroskedasticity correction). Results for time dummies are not reported. T ratios are given in parentheses, with the statical significance marked as * 5% and ** 10%.

JK Japan and Korea
SEA Southeast Asia (Singapore, Indonesia, Malaysia, Philippines, Thailand)
LATM Latin America
CEEU Central and Eastern Europe
DCS Developed countries defined as OECD countries excluding Japan and Korea (base dummy)

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