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Malaysia-China Network Trade: A Note on Product Upgrading

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ABSTRACT

The paper addresses the importance of network trade between Malaysia and China and assesses the extent of product upgrading in components traded. The study brings to the fore the following. First, China is emerging as an important market for component imports relative to component exports. As such the increase in two-way flows of parts and components for further processing and development, implying a shift away from assembly-end operations, remains insignificant. Second, network trade appears to have improved the quality of exports (reflecting the 'moving up of the value chain') destined to China, but the gaps between the unit values of export and imports have narrowed in the recent past, implying less product development.

Keywords: *network trade, two-way trade, unit values, relative unit values, product upgrading*

Introduction

China has emerged as the fourth largest trading partner of Malaysia since 2001. Malaysia's trade with China has grown tremendously to account for 8.8 per cent of total trade in 2005. Malaysia's trade ties with China have grown faster than that with the rest of the world, particularly since the aftermath of the financial crisis in 1998 (Kwek and Tham 2005; Li 2006). The spectacular expansion in trade with China is largely attributed to China's success in integrating into the regional and global production networks. Based on Srholec's (2006) clustering of countries into the core and periphery of network trade, China shifted from the first periphery to the core of network trade between 1995 and 2004. Malaysia however remained firmly at the "core" of trade in intermediate inputs and capital goods over the same period. It is therefore not surprising that international production systems dominate in merchandise trade between both countries.

China's rise at the center of global production systems (Gill and Kharas 2007) has resulted in some reconfiguration of the networks. In the context of Malaysia, there are two key concerns. First, there are mounting fears that China in particular would eventually compete with Malaysia to become a more favourable location for developed countries, particularly in outsourcing activities (Kwek and Tham 2005). These fears have already been manifested in mid-2003, when the electrical and electronic firms in Malaysia (particularly Penang) had employed 17 per cent fewer workers than in 2000 (Woo 2004, see also Kit *et al.,* 2005) due to the reallocation of the production base towards China[1]. Second, that China may outperform Malaysia in terms of product quality given that the export structure of China (reflected in the import share

from the Malaysian perspective) has rapidly shifted into complex high technology products (Lall and Albaladejo 2003; Rumbaugh and Blancher 2004; Rodrik 2006; Engardio 2007).

There are however those who claim that the above fears are baseless. For example, Li (2006) states that the Malaysia-China trade reflects comparative advantage (see also Kit *et al*., 2005) in different technology intensive manufactured goods, which are complementarities (instead of substitutes) in heterogeneous intermediate products. Wong (2003) does not deny that product competition exists between Malaysia and China as the index of commodity overlap has increased from 41 per cent to 50 per cent between 1997 and 2001. However since the index of geographic overlap is higher at 72 per cent between Malaysia and China, both countries may be able to expand their market shares simultaneously in third markets, mainly developed markets. No such threat exists as there are enough differences in products of Malaysia and China.

Despite the mixed arguments on the 'China effect' or rather the 'China fear' on Malaysia, trade ties with China remains relevant for Malaysia. China has become a regional production base, importing intermediate goods for further processing and exports to developed countries. It is also poised to become the world's biggest export base. Further, China is amongst the world's most important consumer market (one which is not monolithic but diverse). Networks with China are thus important for Malaysia to tap directly into the domestic market and to indirectly maintain market access in advanced markets outside the region. The paper first examines the extent and shifts in network trade (referring only to trade in parts and components) between both

countries; and second the relative position and strengths of Malaysia's component exports in the quality ladder with China. The paper draws evidence from the analysis of trade flows for the period 1990 to 2005.

Internationalization of Production

Economic globalization does not merely entail greater trade levels, but the international exchange of some factors and inputs into the production process (Gereffi 2001). Trade developments in the East Asian region in particular point to a rapid expansion in international network production[2] (Ng and Yeats 2001; Jones *et al*., 2005, Gaulier *et al.,* 2004, Athukorala and Yamashita 2006) throughout the 1990s (Ando and Kimura 2003), which translates into the rising importance of trade in ***parts and components***. In fact, component trade ('middle products,' 'intra-product,' 'intermediates' or 'fragments of final products') has grown at a faster pace than trade in final manufactured goods (Athukorala and Yamashita 2006; Jones *et al*., 2005).

The disintegration of production across borders can arise due to large factor price differentials or factor productivity differences between countries, which allow for some of the production segments to be produced more cheaply in another country (Findlay and Jones 2001; Jones and Manjit 2001). Findlay and Jones (2001) state that such outsourcing is a natural concomitant of scale, in addition to reduction in service links (transportation, communication and coordination) brought about by technical progress.

Put simply, industries across the globe are now characterized by segments with varying skill requirements. The structure and composition of trade thus changes with the unskilled abundant country abandoning the production of the

final good, and instead assembling the imported skilled segment with domestic production (This reasoning follows the Hecksher-Ohlin lines for the basis for trade, see Jones *et al.,* 2005) or even manufacturing certain components (segments) of the product. The vertical integration of production across borders does not merely allow unskilled labour intensive countries to gain a comparative advantage in low-end industries but also provides opportunities for them to be involved in low-end production stages of high-end industries (Arndt 2004).

The structure of the networks has important implications industrial[3] upgrading. It shapes the capacity to upgrade production activities as the export role shifts. Networks have contributed to the development of new comparative advantages ("recycling comparative advantages"), which is said to be at the core of East Asian industrialization (Gaulier *et al.,* 2004). This may involve either product shifts, changes in economic functions, intrasectoral progression or intersectoral shifts. Industrial upgrading is a thorny issue as it involves a complex interaction with a host of other factors in the domestic economy and as such, upgrading product capabilities takes time.

Extent of Production Networks

Component Trade

Since industries based on the Standard International Trade Classification (SITC) scheme do not separate component trade from final goods, the study adopts Athukorala's (2003) classification of intermediate goods[4] inferred from trade statistics (of the SITC, Revision 3) for the industries in sections SITC 7 and 8[5]. For the study, only items termed as "parts and accessories" at the 5

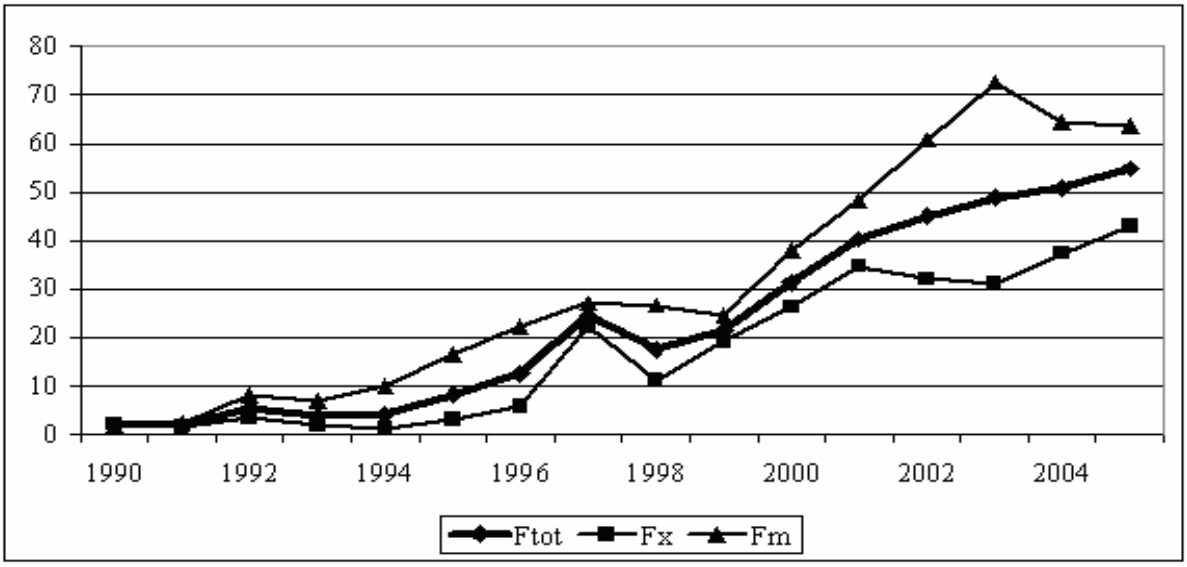
digit level SITC[6] are counted as components while others are treated as finished goods. The data is sourced from the United Nations (UN) COMTRADE database.

Data on trade in parts and components is compiled for 212 components in six industries (electrical and electronics, machinery manufacturing, transport equipment and scientific and measuring equipment, furniture and fixtures and miscellaneous items)[7]. The electrical and electronics, machinery manufacturing, transport equipment industries are highly structured. In the electrical industry, components refer to wires, conductors, power cables, telecommunication cables and fibre optic cables, whilst electronic components comprise semiconductor components, passive components and other components (printed circuit board, metal stamped parts and precision plastic parts). As for machinery manufacturing, the parts and components form and integral part of the industry since it include moulds and dies, jigs and fixtures, actuators, motors, gear boxes and control systems for the four main categories of machinery (power generating machinery and equipment; specialized machinery and equipment for specific industries; metalworking machinery and equipment; and general industrial machinery and equipment). Components for the transport equipment industry include parts and components for motor vehicles (passenger and commercial vehicles) and aircraft.

Figure 1 compares the development of network trade between Malaysia and China over the period 1990 to 2005 for six manufacturing industries in Malaysia. Based on Figure 1, there was hardly any production sharing between both countries in 1990. Component trade only represented 2 per cent of total trade with China in 1990. However in 2005, trade shares in parts and

components for the six industries had increased to 55 per cent recording an annual average rate of 34 per cent.

Figure 1: Extent of Malaysia-China Network Trade (in per cent)



Note: 1. Ftot – Share of trade in parts and components in total trade.
2. Fx - Share of exports of parts and components in total exports.
3. Fm - Share of imports of parts and components in total imports.

Source: Computed from the UN COMTRADE.

The increase in networks between Malaysia and China is much larger from the import relative to the export side. The share of components in total imports had also increased remarkably from 2 per cent in 1990 to 64 per cent in 2005[8]. By industry, Malaysia is a net importer of components in electrical and electronics and machinery manufacturing, whilst she remains a net exporter of components for the remaining four industries. In 2005, China remained as Malaysia's fourth major source of imports, which mainly comprised parts and accessories for office machines, transistors and valves and automatic data

processing equipment (Ministry of Finance 2005). Similar to the upward trend in component imports, the share of components in total exports had increased from 2 per cent to 43 per cent for the period of review. In fact, trade in components recorded a higher annual average growth rate than that of total trade with China.

The trends above do not only signify the importance of networks in trade in manufactures with China, but also indicate that networks with China are no longer driven just by cost considerations. The increase in component exports (though lagging behind component imports) to China clearly indicate that market expansion strategies are also important. The findings concur with the belief that China complements Asian exports in intermediates, thus any exogenous increase in its exports will result in an associated increase in the partner countries exports of the same product (Eichengreen and Hui 2005[9]). This is particularly true given that China's foreign trade heavily relies on processing operations; imports of goods into China are assembled or transformed and re-exported within international assembly and subcontracting operations.

Network trade with China is of very different importance for the six selected industries. Overall, component trade with China is highest in the electrical and electronics industry, followed by machinery manufacturing. From the export perspective, network trade is found to be highest in the transport equipment, followed by the electrical and electronics and machinery manufacturing (see also Lemoine and Unal-Kesenci 2002). Exports shares of components in transport equipment increased substantially in the late 1990s. The high shares of component exports in electrical, electronics and transport equipment is

hardly surprising since China is the world's third largest car market and on pace to become the biggest market for PCs, broadband telecommunication services and digital TVs. At present, China is already the world's biggest consumer of wireless phones, with 350 million cellular subscribers (Engardio 2007).

In contrast to the above industries, importance of component trade remains relatively low in scientific and measuring equipment, furniture and fixtures and miscellaneous products. The small component trade shares with China in furniture and fixtures are expected given that China has already established its own large furniture makers such as Lacquer Craft, Fine Furniture and Starcorp. These companies import most of their components including wood from the US. Nevertheless production sharing with China has increased in most industries, with the exception for miscellaneous items. The decline in production sharing for miscellaneous items plausibly reflect that China records a comparative advantage in such items (Lemoine and Unal-Kesenci 2002) and the recent decline in export shares of these items in China's trade (See Rumbaugh and Blancher 2004).

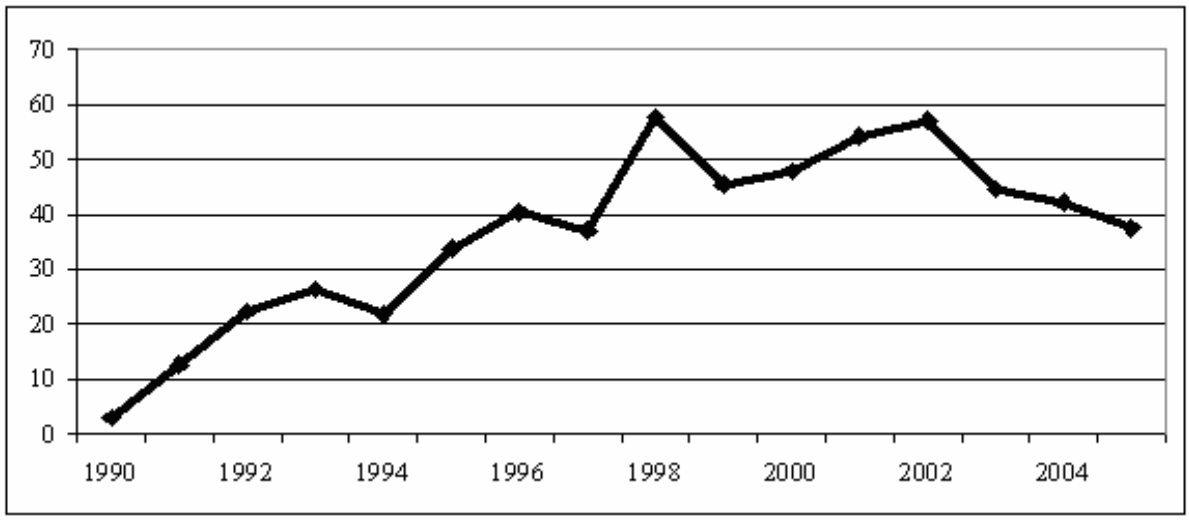
The above discussion highlights a key point. Malaysia is essentially a net importer of components from China (clearly stands as an assembly country similar to that of China, see Lemoine and Unal Kesenci 2002; Gaulier *et al.,* 2004; Huang 2007), which are then assembled into finished products for the domestic and export markets. The growing networks with China from the import perspective clearly indicate that Malaysian industries have become increasingly reliant on suppliers in China for essential manufacturing inputs. Conversely, China's appetite for Malaysia's component exports seems to have

slowed down as China is becoming increasingly dependent on developed markets for component supplies. (Lemoine and Unal-Kesenci 2002, note that China has no strong bias in favour of Asian sourcing particularly in machinery) Further, the shift by multinationals to manufacture in China has resulted in China becoming more self-sufficient in key materials and components (Engardio 2007; see also Gill and Kharas 2007). Many Taiwanese companies have relocated to China. This poses a challenge for Malaysia step up into a higher level of integration with China by strengthening its network ties from the export perspective, particularly in electrical and electronics, machinery manufacturing and transport equipment.

Two-Way Trade in Components

Figure 2 presents the extent of trade overlap (two-way trade) in parts and components, as measured by the aggregate Grubel-Lloyd (AGL) index (see Grubel and Lloyd 1975). The extent of overlap in network trade has increased from 3 per cent to 38 per cent of total trade between 1990 and 2005. The numbers do not suggest that two-way trade in components between the two countries is significant. Trade overlap with China only surpassed the 50 per cent benchmark in 1998, soon after the financial crisis, and in 2002, just after the downturn in the global electronics industry. However, two-way trade in component has been on the decline since then.

Figure 2: AGL Index for Malaysia-China Component Trade (in per cent)



Note: The aggregate Grubel-Lloyd (AGL) index is calculated based on the 5-digit level of aggregation.

Source: Computed from the UN COMTRADE.

The decline in two-way trade in components in the recent past is noted across all six industries. Though the global slowdown in electronics has exposed the downside of network trade with China in this industry, sales in semiconductors are said to have picked up in the second-half of 2005 (Ministry of Finance 2005; Bank Negara Malaysia 2006). Similarly exports of automotive parts and components such as oil filters, wipers, absorbers and suspension systems had also reached newer heights in 2005. In fact, the increase in two-way trade in parts and components after 2001 may be attributed to the phasing out of protection in the automobile sector[10] with China's accession to the WTO and the abolishment of the local content programme in the automotive sector by the Malaysian government in 2002.

By industry, two-way trade in components has generally increased with time, except for furniture and fixtures and miscellaneous items. However, in the

electrical and electronics industry, the extent of trade overlap remains below 50 per cent. A possible reason for this is that massive foreign and domestic investments in China have resulted in some milestones in science and technology. Of significance is the increase in semiconductor plants producing chips, putting China on track to be the world's second largest chip producer (Engardio 2007). China has also developed competency in heavy machineries.

Overall, the upward trend in overlap in network trade again implies that Malaysia is just not a receiver but also a sender of network links in trade with China. Prior to 2000, the trends in two-way trade depict a gradual change, albeit small, in Malaysia's role from "sinks" (receive links in the network) to a "transmitter" (send and receive links) of intermediate inputs into the production network with China. This gradual shift towards component supply subcontracting (production of component parts or subassemblies for exports) to China however seems to be diminishing in the recent past.

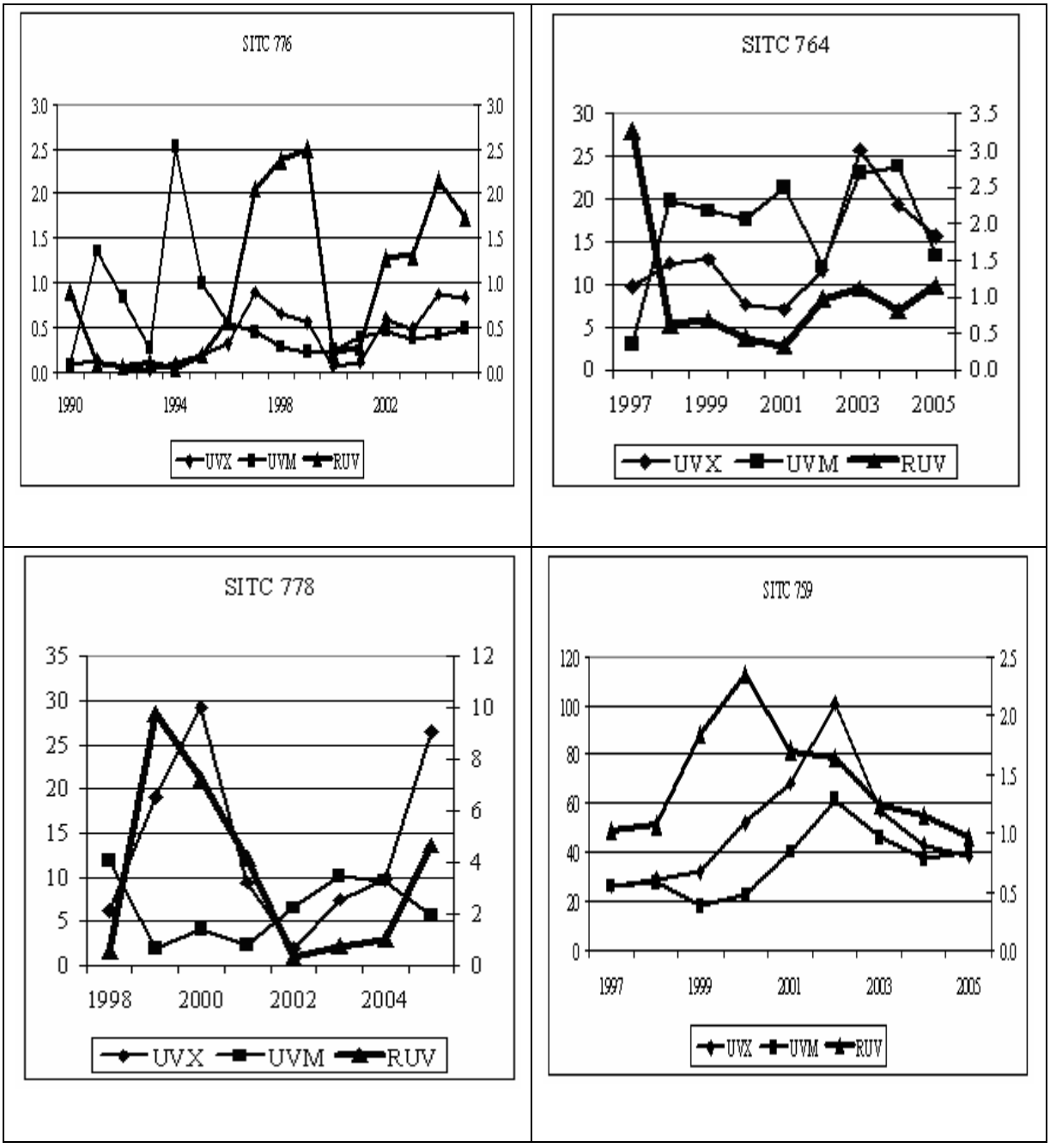
Product Development for Selected Components

The quality of components traded becomes a key issue as products belonging to the same category may be characterized by different qualities. Rodrik (2006) notes that in the case of China, the export unit values for most of its electronic products in 2003 were lower than those of Malaysia (see also Azhar *et al.,* 2006). He claims therefore that there is some truth to the argument that Chinese exports of electronic products tend to be low cost without much technological sophistication. As such, there is scope for greater network trade with China if Malaysia specializes in higher quality components.

To capture the shifts from a low quality (cheap) to a high quality (expensive) product of the same type (one aspect of industrial upgrading from the production side), the unit values[11] of exports (UVX) and imports (UVM) are calculated at the 5-digit SITC to reflect the respective prices. The quality of exports is assessed *via* the relative prices of exports to imports (RUV = UVX/UVM) of the same product. There are three limitations in the data that are worth mentioning. First, there are a large proportion of bilateral export-import pairs with zero trade. Thus the pairs with zero-trade are not considered for quality comparison. Second, the quantity data is missing for numerous products prior to 1998, thus limiting the time series. Third, the measurement units for quantity differ, shifting from number of items to kilogramme. The choice of measurement unit is based on that which represents the component that is most heavily traded.

Figure 3 plots the unit values of exports and imports and the relative unit values for components[12] of four SITC categories, SITC 776 (thermionic valves, tubes, photocells and etc.), SITC 764 (telecommunications equipment), SITC 778 (electrical machinery and apparatus) and SITC 759 (office machines and automomatic data processing machines and units thereof). Based on Kit *et al.* (2005) study, China has outperformed Malaysia in categories 764, 778 and 759, which are considered as low and mid-end electrical and electronics. Thus it is interesting to identify if the same holds in the case of components within those categories.

Figure 3: Unit Values and Relative Unit Values for Selected Parts and Components



Note: 1. UVX - unit value of exports; UVM – unit value of imports.
2. RUV - relative unit value of exports to unit value of imports.
3. UVX and UVM are on the left axis whilst RUV is on the right axis.
4. UVX and UVM for SITC 776 are measured as price per item whilst that for SITC 764, 778 and 759 are in price per kilogramme.
5. For SITC 764, and 759, quantity data is not available for the years prior to 1997 whilst for SITC 778 quantity data is not available for the years prior to 1998 respectively.

Source: Computed from the UN COMTRADE.

For all four categories in Figure 3, the RUVs are above unity in most years. This is a positive indication that products exported to China have a higher value-added content than their corresponding imports. This is not surprising as the electrical and electronics industry has remained the key sector in Malaysian manufacturing, and if improvements in product quality were to take place, this sector is the most highly candidate given its high levels of export orientation dominated by multinationals. (See also Ministry of International Trade and Industry 2006, for discussion on the high value and higher technology content of electrical and electronic parts and components exported by Malaysia to the rest of the world). The findings of Norlela and Figueiredo (2004) also indicate a steady progression in the electronics industry of Malaysia, involving the production of complex and higher value products since 2000. There is even a move from assembly of electronic and semiconductor devices to sub-assembly and component assembly of more complex devices.

However, the critical question is: Are there significant amounts of domestic value- added in component trade with China? The answer is a no. Malaysia can no longer rest on its laurels given that the gap between UVM and UVX is narrowing in the recent past. Best (2007) emphasizes that the success of the Malaysian electronics industry in the past lies in the growth of output but not value-added. Conversely, the value-added realised in China has increased as it now includes more stages of production which used to be made abroad. The increased integration of production in the mainland reflects the rapid escalation of parts transactions among foreign affiliates (Lemoine and Unal-Kesenci 2002).

Thus, China's emerging capabilities in high volume production will intensify the tendency of mass production manufacturing to be commodified. According to McKibbin and Woo (2003), much needs to be done given that China ranks almost as high as Malaysia in the indigenous innovation index. Furthermore, Lemoine and Unal-Kesenci (2001, 2002) note that the specialization pattern of China is becoming almost similar to that of Malaysia, given the rapid rate of imitation in the latter which has shortened the product cycle tremendously (Tham 2005).

China is also fast gaining strength in producing sophisticated products at competitive prices. China's accession to the WTO has brought about reductions in its export prices and thereby enhanced her appeal as an efficient supplier of intermediate inputs. Prices of Chinese produced goods are generally 30 to 50 per cent below that of the US (Engardio 2007). Product development is undeniably an important issue for Malaysia or it may fact the reality of being squeezed out by China (see Best, 2007).

Concluding remarks

The study suggests the following. First, Malaysia's participation in production networks with China has increased but Malaysia remains a net importer of components. Second, though there is an increase in two-way flows of parts and components for further processing and development, implying a shift away from assembly-end operations, the numbers remain insignificant. Third, network trade appears to have improved the quality of exports (reflecting the 'moving up of the value chain') destined to China, but the trends remain indeterminate in the recent past.

It is thus crucial for Malaysia to capitalize on China's booming demand for high-end parts and components that feed into its assembly plants, to maintain China as its big customer. The intensity of competition for market share in China will be based on goods exported on the quality ladder. Engardio (2007) argues that China has the capacity to accelerate industrial upgrading and forming horizontal differentiated products at a more advanced technology level. In this context, Woo (2004) adds that technological versatility becomes necessary for countries like Malaysia to capitalize on the lengthened production chains (see Rajan 2005) in manufacturing activities, or face the dismal possibility of de-industrialization (see also Lall and Albaladejo 2003) or a hollowing-out of the sector (Tham 2005).To reap benefits from mutual trade dependence, Malaysia needs to enhance its technological capacity (see also Tham 2001, 2005), which is to innovate indigenously, particularly to upgrade exports.

In short, given that Malaysia's competitiveness will be based on product quality, moving up the value chain becomes and inevitable option. Malaysia needs to ensure constant product upgrading to remain an important cog in network trade with China, particularly through component supply subcontracting, lest it loses out to the newly industrializing economies such as Taiwan, South Korea and Singapore. The network links with China are also important given that if China competes away Malaysia's place in the advanced markets for a particular product, the net welfare effect experienced by Malaysia will depend on the extent to which China resorts to sourcing components for that product from Malaysia (see Arndt 2004, for similar reasoning).

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Notes

[1] The leading export product category to China from the rest of the world is electrical and electronic products, particularly key components (electronic integrated circuits and micro assemblies) used in the assembly of electronic products (Li, 2006)

[2] Alternative terms have been given to reflect the same concept, such as segmentation, integrated production, outward processing (see Lall *et al*., 2004), intra-product specialization,

super-specialization (see Helg and Tajoli, 2004), multi-stage production (Hummels *et al*., 2001), de-localization, disintegration (see Hijzen *et al.,* 2003), production sharing, vertical specialization, slicing the value chain and outsourcing (see Feenstra and Hanson, 1996; Athukorala and Yamashita, 2006), kaleidoscope comparative advantage and intra-mediate trade (Rajan, 2005).

[3] Gereffi (1999a, 1999b) states that industrial upgrading includes: (a) within factories - a movement from cheap to expensive items and simple to more complex goods (product characteristics); (b) within inter firm enterprise networks - a movement from low-value labour intensive industries to capital and technology intensive industries or mass production of standardized goods to flexible production of differentiated goods (intersectoral shifts); (c) within local or national economies - a movement from simple assembly of imported inputs to higher value-added goods and services involving forward and backward linkages along the supply chain (intrasectoral progression); and (d) within regions – a movement towards phases of the production chain that involves raw material supply, production, marketing and design (economic activities).

[4] Athukorala's (2003) classification of 'parts and components' are found to be more comprehensive than that of Ng and Yeats (1999) given that the latter does not include semiconductor products in their classification. Therefore the Ng and Yeats (1999) classification will understate the true importance of this exchange. However it is acknowledged that this classification is not an exhaustive measure of the phenomenon of international fragmentation.

[5] There is no comprehensive relevant statistics that allow for precisely measuring the role of international production and trade networks. Various ways have been adopted in the literature to identify trade in parts and components. Athukorala and Yamashita (2006) identify 225 products at the 5-digit level SITC as parts and components belonging to sections SITC 7 (machinery and transport equipment) and SITC 8 (miscellaneous goods) while Lall *et al.* (2004) concentrate on the 4-digit SITC 7.

[6] See Lall *et al.* (2004) for the limitations in capturing fragmentation (partially) by merely separating finished goods from parts and components.

[7] The six industries are fairly representative of trade flows with China as they represent a combined trade share of 68 per cent in 2005, with combined export- and import shares of 53 per cent and 78 per cent respectively.

[8] The changes in the patterns of imports reflect the growing share of intermediate goods and a declining share of consumption goods (UNDP, 2006b).

[9] The study by Eichengreen and Hui (2005) indicate overall positive effects for Malaysia due to trade with China, reflecting the specialization of Malaysia in exports of components and other capital goods that are much demanded by the latter.

[10] China is expected to gain strength in heavy industries, under the tutelage of foreign companies that have invested in China (Engardio, 2007). For example, China has become and important auto supplier to the US (Lum and Nanto, 2007).

[11] Average unit values are used as a proxy for determining the quality of goods traded (see also Appelbaum, 2004 for other measures that tap into dimensions of the production side of industrial upgrading). Unit values measured at the finest level of aggregation of which data are available minimize the incidence of composition problems (Hallak, 2006). (See Silver, 2007, for the unreliable use of unit value indices given biases arising from compositional changes in quantities and quality mix of what is exported and imported).

[12] The selected components are reflective of the network trade between Malaysia and China in terms of as they command the largest components shares in total component trade. From China's perspective, commodity composition of processing trade has also shifted towards machinery and electrical machinery (Lemoine and Unal-Kesenci, 2002).

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