

Does Intra-Industry Trade Matter During Economic Crisis? An Assessment of Malaysia-China Trade⁺

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Abstract

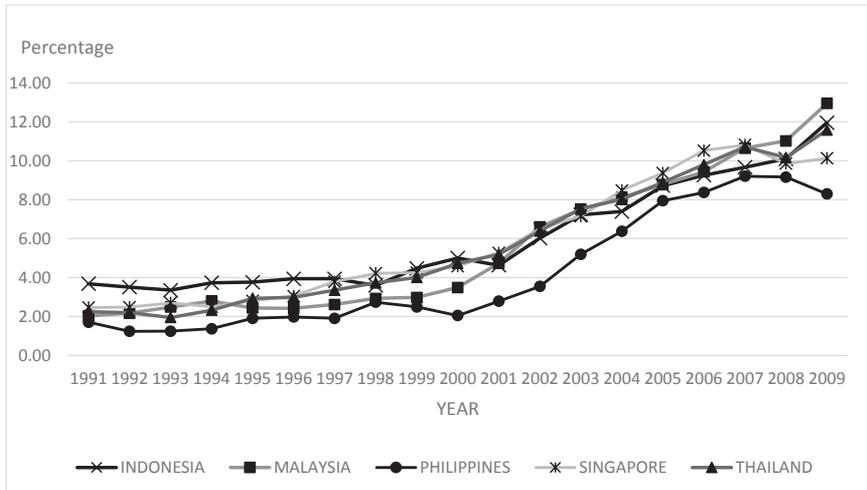
China is Malaysia's largest trading partner. A significant part of this trade is intra-industry trade (IIT), Malaysia being a major participant in global supply chains that end in China, increasingly the final processing destination. Two economic crises in a decade have raised the question of the link between IIT and economic crises – specifically whether crises impact IIT or whether participation in IIT can protect against external risks, including from crises. This study finds that IIT between Malaysia and China has not been impacted by the Asian Financial Crisis but somewhat by the Global Financial Crisis. As a corollary, IIT has offered some protection from the former crisis but not from the latter. These findings have several implications. First, the severity of a crisis matters for IIT. Second, a strategy of participation in global supply chains ultimately depends on technological and organizational capability.

Keywords: *intra-industry trade, economic crisis, Malaysia, China*

1. Introduction

The last decade of the 20th century and the first decade of the 21st are notable for three major economic developments. The first is growing intra-Asian trade that has been a driving force behind Asian economic integration. At the centre of this development is China, the world's largest exporter. Trade between China and ASEAN countries is one of two foci of integration, the other being China and Northeast Asia. Institutionally, China-ASEAN trade has been brought under the umbrella of the China-ASEAN Free Trade Area (CAFTA) which came into effect on 1 January 2010. When fully implemented, CAFTA is expected to become one of the largest trading blocs in the world.¹

Figure 1 ASEAN5 Countries' Shares of Trade with China, 1993–2009



A perspective of the growth of ASEAN-China trade is given in Figure 1 for the period 1991 to 2009. For each of the ASEAN countries shown, a rising share of trade with China can be observed, with Malaysia's share the highest in 2009.

The second development is production fragmentation of increasing complexity that is producing lengthening global supply chains. These chains began life as in-house vertical production chains for manufactured products in multinational corporations, but technological advance allowed distinct phases of the production process to be undertaken in different geographic locations to capture cost or market advantages.

China is again the elephant in the room with respect to supply chains, being the final destination of most chains as well as the market for their final output. Its importance stemmed both from an abundance of low-cost skilled labor and its growing domestic market for final products. As its domestic corporations took control with more segments of supply chains, some, like Haier and Huawei, have evolved to become multinational corporations in their own right. The advent of supply chains is altering what many perceive to be China's competitiveness in manufactures threatening to change the "North-South" character of the trade with ASEAN countries' to a situation where China export manufactures and ASEAN countries supply raw materials and/or intermediate inputs.

A trade-dependent ASEAN is also a major player as producer of intermediate goods in these supply chains, although both with respect to trade openness and supply chain participation, there is variation among member

countries. Indeed, with IIT a rising share of trade, ASEAN's greater trade dependence (126.8 per cent in 2009) compared to China (48.4 per cent) suggests that IIT plays a much more important role in ASEAN than in China.

The third development has been the onset of two economic crises a decade apart, one originating in Southeast Asia and the other global. Asia is the only part of the world to suffer both. ASEAN is at the epicentre of the Asian Financial Crisis (AFC) of 1997-1999, while also suffering damage because of its export orientation in the Global Financial Crisis (GFC) that began in 2008.

This paper speaks to these three developments through examining the bilateral trade relations between Malaysia and China. As already indicated, inclusion of China requires no justification. As for Malaysia, it has also figured prominently in each of these three developments. China has become its largest trading partner since 2009. It is deeply integrated into global supply chains with upstream supplies coming mainly from the US and downstream exports to China for final assembly (World Bank 2014). And it suffered major damage during the AFC, as well as a sharp reverse when the GFC struck. Hence, as it celebrated its 40th anniversary of full diplomatic relations with China in 2014, the theme of this paper is Malaysia-China relations from the Malaysia perspective.

The specific issue discussed is the significance of intra-industry trade (IIT) in the China-Malaysia economic relationship in the specific context of two financial crises – the Asian Financial Crisis of 1997-99 (AFC) and the Global Financial Crisis (GFC) that began in 2008. It seeks to provide answers, even if partial, to the following questions:

- (1) How important is IIT in Malaysia-China bilateral trade?
- (2) Did the onset of crises, specifically the AFC and the GFC, affect the intensity of China-ASEAN IIT?
- (3) As a corollary, did the existence of IIT mitigate the adverse impact of these crises?
- (4) What are the implications of this relationship for future Malaysia-China trade?

This discussion of the recent past has relevance for the future because intra-ASEAN trade with China and production networks will continue to strengthen, and also because, as indicated by Reinhart and Rogoff (2009), crises will continue to plague the future. Learning from the past provides valuable clues to what will inevitably occur in the 21st century.

This paper is structured as follows. Section 2 presents a brief review of literature on IIT in general and for China and Malaysia in particular. The significance of Malaysia-China trade and the growing importance of IIT is the subject of Section 3. Section 4 looks at the impact of crises on IIT intensity

during the AFC and GFC. The extent to which IIT insulates against external risk is documented in Section 5. Section 6 concludes.

2. Brief Literature Review

The principles of IIT as a departure from arms-length trade and its significance have been extensively discussed at the theoretical level since the seventies (see Greenway and Torstensson, 1997: 251-253).² This significance not only has implications for trade policy (Navaretti, Haarland and Venables, 2001) but also extends to links with technological change (Yusuf, Altaf and Nabeshima, 2004), employment relocation (Cabral and Silva, 2006) and foreign direct investment (see, for instance, Fukao, Ishido and Ito, 2003, Xing, 2007). Research has also included measurement of IIT (e.g. Azhar and Elliot, 2006; Dixon and Menon, 1995), specific industries especially in East Asia (e.g. Ernst, 2002; Gangnes and Van Assche, 2010; Turkcan, 2010) and countries or regions (Brulhart and Elliot, 2002)), in which global production networks (also referred to as production fragmentation), figure prominently.

Thanks to its growing participation in IIT, East Asia is the subject of a growing number of studies. These include Ando (2006), Ernst (2002), Fukao, Ishido and Ito (2003), Gangnes and Van Assche (2010), and Xing (2007). Also Zhang *et al.* (2005) studied the determinants of IIT for China and found that China's IIT with its trading partners is increasingly technology-intensive.³ Kimura and Obashi (2009) compared characteristics of production networks in machinery parts in China's regions and ASEAN, finding similarities and contrasts between them. Studies of specific industries in a Southeast Asian country had also been undertaken (see, for example Austria 2006).

Early studies reported increasing IIT for Malaysia (Chandran and Pandiyan, 2003; Menon, 1996), partly the result of government involvement in markets (Rasiah, 1995). This increase, however, came with adjustment costs in the form of large inter-industry payroll changes (Brulhart and Thorpe, 2000). Specific industries were also investigated, with the Malaysian electronics industry having been shown to grow rapidly driven by intra-industry trade in electronic components but labor productivity had been stagnant since the early 2000s (Parinduri and Thangavelu, 2011). For manufacturing, Abu Bakar and Normaz (2013) found manufactured goods, machinery and transport equipment dominated Malaysia's IIT but no quality improvement was observed. Finally, bilateral IIT between Malaysia, China and Japan was investigated by Arip, Lau and Satoru (2011).

With Asia impacted by two major economic crises since the mid-1990s, studies that link economic crises to IIT are beginning to emerge. For instance, Obashi (2009) examined the resilience of Asian production networks during

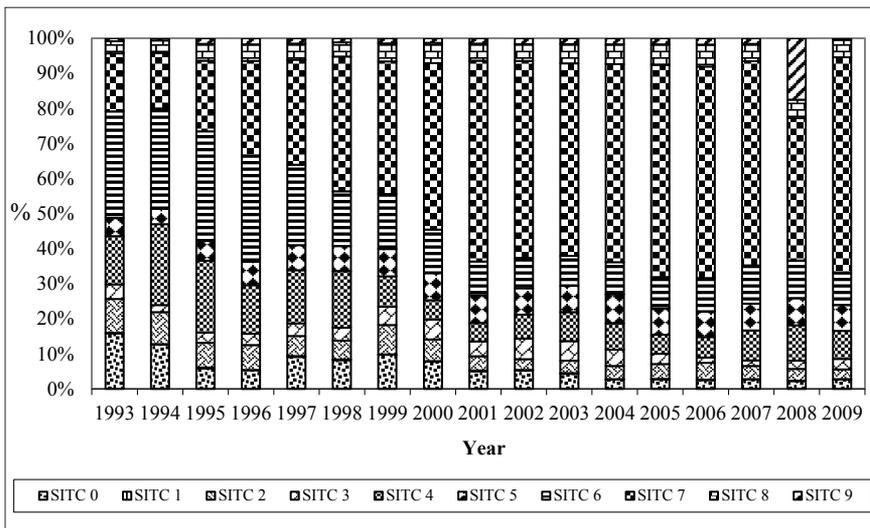
the AFC, while Escaith, Lindenberg and Miroudot (2010) investigated the role of global supply chains in explaining the collapse of trade during the GFC.

3. Malaysia – China Bilateral Trade and the Importance of IIT

Malaysia is a founding member of ASEAN.⁴ Its position as the second most trade-oriented country, measured in terms of the ratio of trade (exports plus imports to GDP) in ASEAN (after Singapore) has been lost to Vietnam because of the latter's recent rapid increase in trade, especially with China (Anwar and Nguyen, 2010; Vuving, 2006). However, it is an important player in IIT.

The importance of IIT in the Malaysia–China trade relationship is shown in Figure 2 above in which trade is classified by one-digit SITC. The category SITC7, machinery and transport equipment, has accounted for the largest trade share since 1997, this share rising from 16.5% in 1993 to 61.5% in 2009. This has occurred as Malaysia established itself as a major player in the electronics supply chain. The second largest trade share is that of SITC6, manufactured goods classified chiefly by material, this share shrinking as that of SITC7 expands. A notable feature of SITC6 is the rough balance between exports and imports, suggesting the importance of IIT. These two categories combined has accounted for an increasing share of total trade, suggesting Malaysia's undiminished reliance on the export of manufactures.

Figure 2 Composition of Malaysia-China Bilateral Trade, 1993-2009



Source: UNCTAD Handbook of International Trade and Development Statistics – various years.

In this paper, IIT intensity is measured using the Grubel–Lloyd (GL) index (Grubel and Lloyd 1975).⁵ Following Austria (2004), the level of IIT intensity is characterized as weak if the GL Index is between 0.00 and 0.249, mild if it is between 0.25 and 0.49, moderately strong if it is between 0.50 and 0.749 and strong if it is between 0.75 and 0.99.

Table 1 shows IIT intensity indices for single-digit SITC industries in Malaysia-China trade for the year 1993, 1998, 2009, and 2013. The year 1993 represents the early days of IIT, the two middle years those during which the AFC and GFC were at their peak, and 2013 the most recent year.

Several features are notable from Table 1. First, trade in mineral fuels (SITC3), a primary commodity, has weak IIT intensities throughout the period from 1993 to 2013. But trade in food and live animals (SITC0)⁶ began with weak IIT intensity until the onset of the AFC, but had mild to moderate IIT intensity after the AFC. Second, as already noted, manufactured goods and machinery (SITC6 and 7) are consistently the industries with strong IIT intensity. The high IIT indices for these two groups despite the intervening

Table 1 IIT Intensity Indices for Malaysia-China Trade, by Single-digit SITC, 1993-2013

<i>Industry</i>	<i>1993</i>	<i>1998</i>	<i>2009</i>	<i>2013</i>
SITC0 Food and live animals	0.2440	0.1863	0.3466	0.5380
SITC1 Beverages and tobacco	0.0184	0.1785	0.6506	0.3748
SITC2 Crude materials, inedible, excluding fuels	0.7379	0.4912	0.4283	0.2653
SITC3 Mineral fuels, lubricants and related materials	0.2384	0.1966	0.2057	0.1574
SITC4 Animal and vegetable oils, fats and waxes	0.7666	0.4039	0.0115	0.3536
SITC5 Chemicals and related products, n.e.s.	0.4143	0.9993	0.8701	0.3140
SITC6 Manufactured goods classified chiefly by material	0.6935	0.8872	0.8462	0.8126
SITC7 Machinery and transport equipment	0.7996	0.7299	0.9724	0.8135
SITC8 Miscellaneous manufactured articles	0.2085	0.3019	0.4695	0.4463
SITC9 Commodities and transactions not elsewhere classified	0.4394	0.1606	0.5504	0.9907

Source: Authors' calculations.

crises show the strong links of these two industries in the global supply chain, especially those that end in China. Third, a group of other industries have IIT indices that fluctuate from year to year. Examples are beverages and tobacco (SITC1), animals and vegetable oils (SITC4), and chemicals (SITC5).

4. The Impact of Crises on China-Malaysia Intra-industry Trade

To analyze the link between IIT and crises, IIT intensity of industries is measured for 2-digit SITC exports and imports using data from UNCTAD. To permit focus on the AFC and GFC, the periods under consideration are 1993-1997 (pre-AFC), 1998-2003 (post AFC), 2001-2006 (pre-GFC) and 2007-2009 (GFC and after). A country that bears comparison with Malaysia is Vietnam. The latter has, as indicated earlier, displaced Malaysia as the second most globalized economy in ASEAN. Its electronics and electrical equipment (E&E) exports are, like Malaysia's, relatively low in value-added and technology but IIT intensity has been growing.

Table 2 summarizes changes in IIT intensity for bilateral trade between Malaysia and China for the sub-periods defined above. The proportion of industries with moderate and strong integration rose in the post AFC period 1998 to 2003, reaching a peak in 2001-2006 but fell almost to the pre-AFC period in the GFC and post-GFC period. It appears therefore that the AFC was associated with strengthening IIT while the GFC was associated with the opposite. The latter is also associated with Malaysia's eroding competitiveness in high-tech exports (World Bank 2014). China's rising technological intensity in its IIT is also likely to give it a bigger role, i.e. by lengthening the segments of the supply chains it controls at the expense of Malaysia.

Table 2 Changes in IIT Intensity in Malaysia-China and Vietnam-China Trade, 1993-2009

Country	Period	1993-97	1998-2003	2001-06	2007-09
	<i>Malaysia</i>				
% of industries with $0.00 < \text{IIT} \leq 0.249$		49.15	36.51	36.51	42.86
% of industries with $0.25 \leq \text{IIT} \leq 0.499$		22.03	25.40	22.22	25.40
% of industries with $0.500 \leq \text{IIT} \leq 0.749$		22.03	22.22	30.16	19.05
% of industries with $0.750 \leq \text{IIT} \leq 0.999$		6.78	15.87	11.11	12.70
Total % of industries with $0.00 < \text{IIT} \leq 0.49$		71.18	61.91	58.73	68.26
Total % of industries with $0.50 \leq \text{IIT} \leq 0.99$		28.81	38.09	41.27	31.75

Source: Authors' calculations.

Table 3 reveals what happened to IIT intensity during the years of the two crises. With respect to the AFC, there was little change either way. Generally fewer than 10% of industries with different degrees of IIT intensity increased or decreased their IIT intensity in both years of the crisis (1997-1998 and 1998-1999). For almost every group of industries in the table, more industries increased their IIT intensity than decreased it.

The AFC appears therefore to have had little impact on IIT, which continued to intensify all the way through the mid-2000s. Although posing a major challenge to Southeast Asia, the AFC was primarily regional with the US and European economies continuing to boom. Global production networks of multinational corporations (MNCs) continued to supply products for these thriving economies from China as the main final assembly platform, while China itself was little affected by the AFC.⁷ Malaysian industries that were part of these networks were beneficiaries of this boom,⁸ and, indeed, exports brought Malaysia out of the AFC.

A somewhat different picture emerges from the figures for the GFC. First, the impact on IIT intensity in the first year of the Crisis was muted, probably because the GFC arrived very late in 2008. However 15% the group of industries with medium IIT intensity (index between 0.5 and 0.75) saw their IIT index fell to the low IIT intensity group (index between 0.25 and 0.5). Second, the second year of the crisis saw a strong impact on industries in the highest IIT intensity group, 24% of which fell into lower IIT intensity groups. Thus the GFC had a major impact on industries with high IIT.

Table 3 Malaysia: Changes in IIT Intensity by Industry during the AFC and GFC

<i>% of Industries in which IIT changed</i>	<i>AFC</i>		<i>GFC</i>	
	<i>1997-98</i>	<i>1998-99</i>	<i>2008-09</i>	<i>2009-10</i>
<i>IIT Index fell from:</i>				
0.75 and above to below 0.75	9.93	11.43	6.29	23.65
0.5-0.75 to below 0.5	6.24	7.03	15.03	4.37
0.25-0.5 to below 0.25	4.62	5.27	6.92	4.68
<i>IIT Index rose from:</i>				
0.5-0.75 to above 0.75	5.31	4.62	4.56	3.28
0.25-0.5 to above 0.5	8.08	6.81	6.13	4.06
0.0-0.25 to above 0.25	14.09	14.73	8.02	7.64

Source: Authors' calculations.

5. IIT as a Hedge against Risk During Crises

Just as the question of whether economic crises have an impact on IIT intensity can be asked, so can the question of whether participation in IIT offers a degree of protection from economic crises. To the extent that process trade has significant import content, fluctuations in exports will be balanced by movements in imports in the same direction. The result is fairly stable net exports. This was the case with China's overall trade in the GFC –when exports fell, so did imports, with the result that even during the Crisis, China maintained a current account surplus. Does this logic apply to bilateral trade between Malaysia and China?

Table 4 shows changes in exports and imports during the years of the AFC and GFC for SITC6 and SITC7 as well as for total trade between Malaysia and China. Insulation from shocks can take the form of either maintaining growth in the face of collapse or at least of muting its impact. For the AFC this was indeed the case for SITC6, with the category's exports expanding faster than total exports to China. But it was not the case for SITC7 because Malaysia was and is much more an importer of transport equipment, and the AFC would severely impact such imports. When the GFC arrived, IIT proved to be of little avail – SITC6 exports to China fell much more than total bilateral exports, with the SITC7 exports telling the same story. In the case of imports during the AFC, those for SITC6 did track changes in exports, as predicted by IIT, but SITC7 imports tracked total imports. The link between imports and exports is even looser during the GFC. Overall, then, these figures

Table 4 Malaysia-China Trade: Percentage Change in Exports and Imports during the AFC and GFC

	<i>AFC</i>		<i>GFC</i>	
	<i>1997-98</i>	<i>1998-99</i>	<i>2008-09</i>	<i>2009-10</i>
<i>Exports:</i>				
SITC6	+95.2	+65.8	-15.2	-80.9
SITC7	+24.5	-52.5	-16.0	-30.0
Total exports	+5.9	+15.3	+0.5	+31.2
<i>Imports:</i>				
SITC6	+37.5	+94.2	-6.3	+5.5
SITC7	-21.0	+33.3	+21.1	+41.3
Total imports	-17.4	+15.3	-14.0	+20.0

Source: Authors' calculation.

show that while IIT offers a degree of protection during regional crises, it is of little avail for global crises. Further, the nature of the industry – whether it is an exporter or an importer, the type of products – matters as much as the degree of IIT. Finally, in terms of bilateral trade, the country context is important in that it determines the composition of that trade

6. Conclusions

Trade plays a major role in Malaysia's relations with China. With Malaysia locked into global supply chains organized by multinational corporations, IIT is a significant part of this trade. This form of trade has the advantage of being less susceptible to the factors that affect arms-length trade but the disadvantage of being dependent on the health and organization of supply chains. These advantages and disadvantages can be material during times of economic crisis, from which Asia, including Malaysia and China, have suffered twice in the space of a decade. Understanding the IIT linking the two countries' bilateral economic relations is important for the 21st century because such crises will still occur, albeit not necessarily under the same circumstances as those of the recent past.

In seeking to answer the questions posed in section I, this paper found, first, that IIT intensity is high for the trade in manufactures (including E&E goods) and equipment, but low for primary commodities involving little processing. Second, while the AFC had no impact on IIT, with a rising trend in this intensity continuing through the crisis, the GFC led to some reversal in IIT intensity. The latter can be explained by the argument that a global crisis can damage global supply chains. Third, the paper also found that whether participation in global supply chains and increasing IIT intensity can reduce risk exposure to external shocks also depends on the magnitude of these shocks. An important question that arises is that although the GFC, through its negative impact on global chains may have increased exposure to external shocks, would the gradual shift towards intra-Asian trade be able to moderate that impact on Malaysia's IIT? In other words, is “decoupling” in trade likely to have the same benefits on trade vulnerability to shocks as IIT intensification is alleged to have?

Fourth, an implication of these findings is that even if effective only for regional crises, IIT intensification can be beneficial and a basis for future strengthening of Malaysia-China trade. However, this is likely to be a challenge for several reasons. First, although IIT had been the major source of trade growth, Malaysia's prospects for IIT intensification are limited, its technology industries losing competitiveness from human capital constraints even as supply chains are lengthening. Second, with China upgrading its technology, giving it the capacity to take over larger parts of supply chains,

Malaysia will face a changing comparative advantage landscape not to its advantage. The loss of competitiveness in technology-intensive industries will lead to Malaysia ending up more as a supplier of raw materials all of which have low IIT intensity. This will in turn increase the vulnerability of the country's exports to external economic crises.

Notes

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1. It will have a population larger than that of the EU and NAFTA combined. See Greenwald (2006).
 2. OECD (2002) and Ruffin (1999) also provide clear expositions on the principles involved.
 3. Research shows greater technology intensity to be associated with more IIT; e.g. “higher value chain of production where higher quality of goods have been produced in order to maintain competitiveness” by Azhar *et al.*, 1998; Zhang *et al.*, 2005), “... coupled with technology spillover” by Fukao *et al.*, 2003, Xing, 2007; Buckley *et al.*, 2007, Liu & Buck, 2007, Chuang and Hsu, 2004; Lemoine and Ünal-Kesenci, 2004; Montobbio, 2005); and “... innovative capability” by Guan and Ma, 2003 and Liu and Zou, 2008.
 4. The other five member countries joined two decades or more later – Brunei

Darussalam joined on 8 January 1984, Vietnam on 28 July 1995, Lao PDR and Myanmar on 23 July 1997, and Cambodia on 30 April 1999.

5. The GL index is $IIT_i = 1 - \frac{\sum |X_i - M_i|}{\sum (x_i + m_i)}$ where X and M refer to exports and imports between two countries respectively, i refers to the particular industry, and $0 \leq IIT \leq 1$. Since the primary purpose of this paper is to measure the overall relationship between IIT and exposure to crises, no attempt had been made to distinguish between horizontal and vertical IIT.
6. This group consists both of unprocessed food like cereals, vegetables and fruits but also processed food like milk products like cheese and yogurt, as well as beverages like coffee and tea. Increased food processing would have led to higher IIT intensity.
7. China's exports to the US totaled \$75.24 bil. in 1997 and \$85.41 bil. in 1998, representing percentage increases over the previous year of 18.8% and 13.5% respectively.
8. Obashi (2009) confirmed the resilience of Asian production networks during the AFC, with intermediate products enjoying more stability than finished products.

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