Economic Recovery of the Manufacturing sector in Malaysia

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Abstract

This paper seeks to understand why the manufacturing sector in Malaysia has not been severely affected by the global economic crisis as many had predicted given its trade dependence. The structure of the manufacturing sector is analysed using firm level data. In addition the paper analyses export spillovers and the transmission channels. The paper finds that the economic recovery was driven shift in Malaysia's trading partners with China assuming a greater role as well as increased domestic demand. Domestic firms have assumed a greater role over the years compared to foreign firms in the manufacturing sector both in the export and domestic market, but concentrated mainly in the traditional industries. There is evidence of export spillovers from multinationals through imitation, competition and information channels. Lastly domestic firms have more vertical backward linkages than the foreign firms.

Key words: Economic recovery, global economic recession, manufacturing sector, Malaysia.

1.   Introduction

Following the global crisis it has been a turbulent time for Asia. The intensity of the downturn took everybody by surprise and was much larger than what could have been anticipated based on historic correlations of growth between the Asian and the advanced western economies (Kato, 2009). There was a free fall in world trade, industrial production, asset prices and global credit availability which threatened to push the global economy into the abyss of a new great depression in early 2009 (UN 2010:1). Most countries in the Asian region were hit by a sharp drop in demand in the developed countries and elsewhere. Most of the regions did show double digit declines in exports. Taipei, China saw the biggest fall, over 40 percent year on year in December 2008 and January 2009, while large declines were seen in Japan, Korea, Singapore, Indonesia, Malaysia and Hong Kong. In many cases, the declines were greater than those seen during the bursting of the information technology bubble in 2000-2001. Along with the drop in exports was a fall in the industrial production in these countries. In addition there was a fall in domestic demand and private capital deteriorated fast. As a result there was a major drop in the economic growth in most of these countries (Kawai, 2009).

Against this backdrop, the rebound in Asian economic activity has again taken many observers by surprise. Indeed, Asia is leading the global recovery. Several dynamic economies in the region are generating growth outcomes that register on a global scale and are helping pull the world economy out of recession. China and India are leading the way, but the phenomenon is by no means limited to these two countries. Asia's economic importance is unmistakable and palpable (Singh, 2010). UN (2010:2) notes that in most countries, the economic rebound has been built on three pillars. Initially there was a massive and to some extent concerted, policy actions by the major economies which arrested a further erosion of confidence world wide. In addition there was a control of panic driven shedding of inventories accompanied by cut backs in industrial production through stabilization of financial markets and restoration of consumers' confidence. Finally were the international repercussions of the first two. Consistent with this pattern,

the strongest declines in export volumes and industrial production indices were seen among major manufacturing exporters, especially those in Asia. Following the turn in the inventory cycle, Japan and developing Asia are also leading the rebound in trade and production. The recovery in industrial production, in turn, has allowed for renewed growth in the demand for primary commodities and a rebound in world commodity prices. Industrial production in export-dependent Asia has regained most of the ground lost since September 2008, even returning to pre-crisis levels in a few countries. This rebound seems to have been driven by an equally sharp rebound in export volumes as well as the domestic demand.

This paper focuses on Malaysia in South East Asia which has suffered from the crisis although not as severe as many had predicted given its trade dependence. The impact of the crises has been felt most strongly in two sectors of the Malaysian economy which are the manufacturing sector and the construction sector leading to declines in output resulting in labor market shocks which have led to retrenchments (Malaysian economic report 2008-2010). Since 1970 until 2005 the manufacturing sector in Malaysia has been the main engine for growth (MITI, 2006). The collapse of exports mainly dominated by manufactured goods as well as slowdown in foreign direct investment has been a key concern to policy makers. However the Malaysian economy is back on a recovery path much faster than many had expected. Given the significance of the manufacturing sector in Malaysia and the limited studies existing based on firm level data, this study seeks to analyse the structure of the manufacturing sector as well as estimate the export spillovers and their transmission channels for period 2000-2006.This analysis is hoped will shed light in understanding why the Malaysia's manufacturing sector has shown signs of economic recovery following the global economic crisis.

The rest of the paper is structured as follows. In the next section is overview of the manufacturing sector in Malaysia in relation to recent global economic crisis. Literature review on possible reasons for Malaysia's resilience as well as export spillovers follows in section three. The analytical framework is presented in section four. A discussion of the data and the empirical findings follows in section five. The last section contains the conclusion.

2.   Overview of the manufacturing sector in Malaysia

In the early year of independence, Malaysia's economy was largely focused on the production of primary commodities. These commodities continued to be the main revenue generators until the late 1970s after which the primary sector's relative importance diminished. By the mid 1980s manufacturing become the engine of Malaysia's economic growth. Malaysia's move from an economy dependent on primary commodities to an industrializing one was accelerated with the inflow of foreign direct investment (FDI) in the late 1960s and early 1970s. The government saw the important role of FDI in developing and shaping the country's industrial base via the technology (embodied in machinery and production processes) and technical expertise that it brought in. As a result, by 1990 the Malaysian economy has been one of the best performers in the developing world over the past 25 years. Malaysian GDP grew at an annual rate of 6.7 percent during the 1971-1990, led by a manufacturing sector that expanded at 10.3 percent. Performance was even stronger in the early part of the of the 1990s, when the economy grew at 8.1 percent per annum and the manufacturing sector at 12.3 percent, the

highest rate of industrial growth in Asia with the exception of China (Lall, 1995). From graph 1 below, it can be observed that manufacturing sector has had the highest contribution to GDP growth compared to other sectors until 2006 when it was over taken by the services sector.

**Graph 1: Malaysia's growth rates of key sectors (1971-2010)**

Source: World Development Indicators (2010) and Malaysia's Economic Report 2009/2010
* 2009 figures are estimates while 2010 figures are forecasts

Malaysia's manufacturing sector has been very vulnerable to external shocks as shown by the downturn swings in graph 1. For example the sharp downward swing in the 1973-1976 can be attributed to oil shock while the swing in 1985-1987 was due to the world economic recession. The Asian economic crisis in 1997 severely affected the manufacturing sector compared to the recent global economic crisis. The decline in manufacturing growth during the period 2001 to 2003 was attributed to the decline in the global demand for manufactured goods mainly electronics which is a major component of manufactured exports in Malaysia. In addition Malaysia was facing greater competition from low cost producers like China and India (Malaysia's Economic Report 2001/2002).

The recent global economic crisis although not as severe compared to the Asian crisis of 1997 has affected the Malaysian overall economy as well as its manufacturing sector. The Malaysian economy went officially into a recession in mid 2009 although the decline in growth begun in the second quarter of 2008 (Graph 2). It was worst hit in the first quarter of 2009 but progressively worked its way out of the recession before year end. In the first quarter of 2010, Malaysia registered higher economic growth than it had enjoyed prior to the recession in the last and first quarter of 2007 and 2008 respectively.

Graph 2: Malaysia's quarterly economic growth (2007-2010)
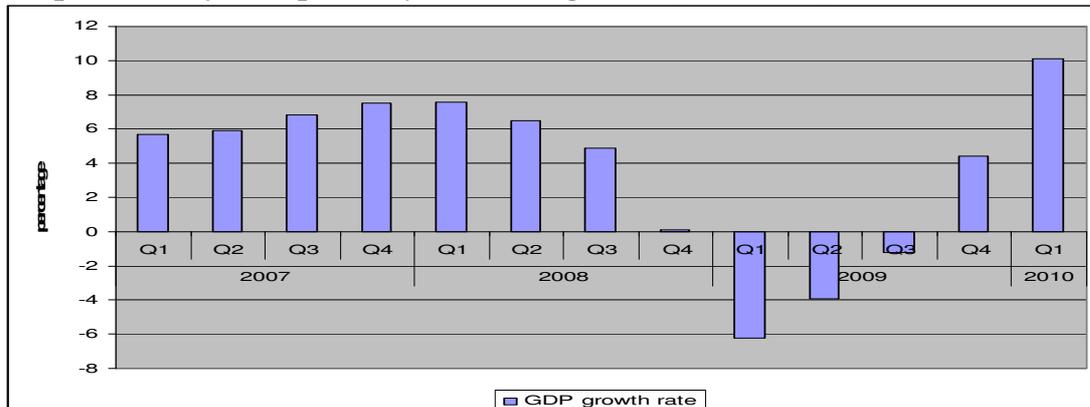
A similar trend is observed within the manufacturing sector (Graph 3). There was an overall decline in output sales from the second half of 2008 to the first quarter of 2009. This was followed by a slow but progressive increase in sales which by the end of the first quarter in 2010 was yet to reach the earlier peak in mid 2008. The employment and salaries and wages figures although reflecting similar trends do not seem to have been affected significantly[1].

Graph 3: Monthly Output, employment and salaries and wages of the manufacturing sector in Malaysia (2008-first quarter 2010)
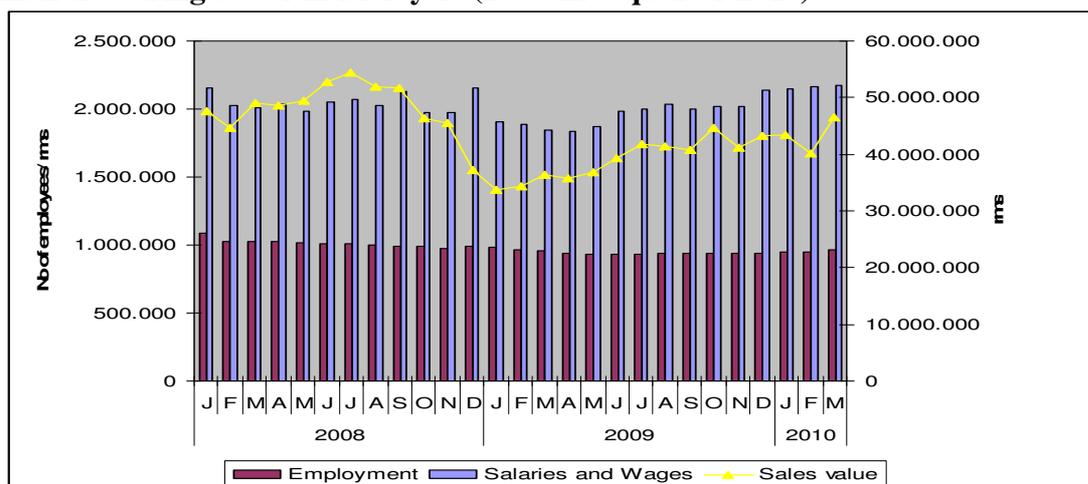
Source: Department of statistics in Malaysia

The impact of the economic recession in Malaysia was greater in the exports sector. Manufactured exports accounted for more than 80 percent of the gross exports in 2005 and 2006 (table 1) up from 12 percent in 1970 (Lall, 1995). This share fell to 79.7, 74.7 and eventually 76.7 percent in 2007, 2008 and 2009 respectively. Gross exports fell by 20 percent in 2009 (table 1).

Table 1: Malaysia's exports

Gross exports(RM millions and percentages)										
	2005		**2006**		**2007**		**2008**		**2009**	
Manufacture goods	435,742	81,6	479,674	81,4	482,424	79,7	495,337	74,7	406,971	76,7
Agricultural goods	33,181	6,2	39,091	6,6	46,882	7,7	64,651	9,7	46,824	8,8
Mining goods	51,085	9,6	55,824	17,1	59,801	9,9	85,469	12,9	65,157	12,3
Others	13,78	2,6	14,377	2,4	16,047	2,7	18,037	2,7	11,674	2,2
Gross exports	533,788		588,966		605,153		663,494		530,626	

Source: Department of statistics in Malaysia

In the manufacturing sector, overall production fell by 10 percent in 2009 (Table 2). The sector begun to decline in the second quarter of 2008 bottoming out in the first quarter of 2009 and slowly progressing out of the recession. By the first quarter 2010 the growth in this sector has surpassed not only the record set before the crisis but since 2000 (Table 2

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[1] Although reported retrenchments from government sources are small, it is believed that both underemployment (and with it the consequent fall in incomes) and unemployment figures are much higher than those officially reported (UNDP 2010:7).

and Malaysia Economy first quarter 2010). The export oriented industries followed a similar trend and were the most affected having reached their lowest drop by 21.5 percent in the first quarter of 2009 (Table 2). On average the sector dropped by 13.9 percent in 2009 and the sectors most affected were electrical and electronic products, machinery and equipment, textiles, apparels and footwear and the wood and wood products which dropped by 22,9, 21.3, 19.8 and 16.3 percent respectively (Table 2). This reduction was mainly attributed to a weak demand for manufactured products and lower commodity prices. It's interesting however to note that the medical, optical and scientific instruments sector was affected the least and although affected in 2008 grew steadily through out 2009. Most of the export oriented sectors performed well towards the end of 2009 and in the first quarter of 2010. It is only in the textile, apparels and footwear and petroleum products export industries that impressive growth was not registered.

Table 2: Manufacturing production index (2005=100) (% annual change)

	2008	2008				2009	2009				2010
		Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q1
Overall Manufacturing	0,6	8,7	4,2	1,7	-11,1	-10	-18,8	-14,9	-9,1	4,4	15,2
Export Oriented Industries	-0,7	9	3,5	-0,3	-13,3	-13,9	-21,5	-20,8	-12,1	-0,2	11,9
Electrical and Electronic Products	-4	6,6	4,6	-1,4	-23,1	-22,9	-35,8	-31,4	-22,6	1,9	38,5
Petroleum Products	5,9	17,2	4	1	2	-0,8	2,9	-5,4	6,5	-6,9	-22,1
Textiles, Apparels and footwear	0	2,8	2,1	3,1	-7,6	-19,8	-25,2	-19,2	-18,7	-16	2,7
Wood and Wood products	-4,7	-2,1	-2,8	-1,1	-8,4	-16,6	-26,4	-23,5	-16,1	-3,6	30
Rubber Products	4,7	6,2	7,8	2	2,1	-3	-21,2	-7,5	2,4	16,2	36,1
Machinery and Equipment	2,5	9,8	4.5	7.9	-13,1	-21,3	-31,4	-25,9	-22,7	0,5	21,8
Medical, Optical and scientific instruments	-7,9	9,8	-14,9	-8	-15,3	27	10,1	18,1	31	50,1	16,6
Domestic Oriented Industries	3,4	9,8	6,4	4,9	-7	-5	-15,3	-7,4	-5,2	9,3	19,1
Chemical and Chemical Products	-4,9	2,4	-2,8	-2,5	-17,4	-0,6	-16,6	-4,9	0,8	23,9	27,4
Non Metallic minerals	9,1	21,1	4,1	7,1	5,3	-13,6	-21	-12,6	-12,4	-8,3	22
Plastic Products	1,3	9,2	-0,5	4,5	-7,3	-5,1	-21,3	4,5	-9,7	7,2	11,5
Food Products	9,9	14,7	15,8	10	-0,3	3,2	-2,4	-0,9	4,3	12,3	0,2
Transport Equipment	23,4	22,9	21,9	30,3	18,4	-12,4	-10,7	-13,5	-16,2	-8,3	22
Off estate processing	9,4	22,1	18	3	-0,2	-2,1	-8	-4,5	-5,1	8,5	4,3
Fabricated metal products	6,1	5,3	15,3	8,2	-4,4	-1,1	-7,6	-6,8	1	10,1	13,8
Basic Metals	-2,9	10,4	9,5	-2,6	-27,6	-23,3	-38,7	-33,1	-18,4	6,4	35
Paper and Paper products	-3,4	2,7	-2,4	-0,1	-13,3	-17,9	-34,1	-21,2	-12,5	-2,5	31,6
Printing and services activities related to printing	7,5	7,6	20,3	3,7	-1,1	-2,7	-3,5	-8,1	-1,8	3,1	8
Beverages	2,6	8,3	2,9	6,7	-6,8	-2,3	-10,1	-1,4	-9,7	13,3	8,6
Tobacco Products	-5,6	12,1	-19,7	-4,3	-10,7	-6,4	-15,1	14,8	-19,6	0,8	-1,6

Source: Department of Statistics, Malaysia

The domestic oriented industries also suffered a great deal. The most affected industries were basic metals, paper and paper products, transport equipment and non metallic minerals. However by the end of the first quarter 2010, most of the industries had recovered well except for the tobacco products industries. In addition the recovery of the domestic oriented industries appears to have been faster than for the export oriented industries[2]. During the economic crisis period the Government introduced two rescue

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[2] This seems to support Singh (2010) recent observation about Asia. At least two notable features mark the ongoing global recovery from Asia's perspective. First, unlike in previous global recessions, Asia is making a stronger contribution to the global recovery than any other region. Second, also in contrast to previous episodes, recovery in many Asian countries is being driven by two engines—exports and strong domestic demand. Strong domestic demand reflects in part policy stimulus, but resilient private demand is also a factor. All this adds up to an impression that Asia is changing in key ways and that these changes have implications for the rest of the world.

packages with attractive fiscal stimuli totalling RM67 billion (US$18.1 billion). The purpose of these packages was to absorb retrenchment and the destabilization shocks faced by the people and to accelerate development expenditure to offset a fall in aggregate demand because of significantly reduced exports(UNDP 2010: 6).

Malaysia's trading partners have also changed during this period. Prior to the crisis in 2007, the major trading partners were the North East Asia, US, Singapore, European Union (EU), ASEAN countries and Japan accounting for about 84 percent of the trade. This compares well with Malaysia's traditional trade partners, the US, South East Asia, North East Asia and the European Union. In 2008 and 2009 however, Malaysia traded more with North East Asia (including China and Japan who were the main trade partners) and the ASEAN countries (including Singapore the most important trading partner), the US and the EU. Thus the economic recession seem to have resulted in Malaysian economy targeting more the Asian market than the US as the tradition has been (Malaysia's economic report, 2008-2009, 2009-2010). This phenomenon has been referred to decoupling (Kose et al 2008b).

Based on the above statistics, one observes that the global economic crisis did not have a serious effect on the Malaysian economy in comparison to the Asian economic crisis. The major impact of the economic crisis was experienced during the first quarter of 2009. This however did not last and the economy is back on track again. There was a notable change in Malaysian trading partners with China appearing to have assumed a much bigger role than the US as well as other Asian countries. The government stimulus package seems to have assisted the economy to withstand the effects of the crisis. A further understanding of the nature of the manufacturing sector is imperative in order to explain the observed phenomenon.

3.   Literature review

In this section literature relating to international trade as a transmission channel for economic crisis or business cycles is reviewed. In addition the role of sectoral specialization in business cycles is considered. The section concludes by reviewing literature on export spillovers which serve as a point of entry into understanding the nature of the manufacturing sector in Malaysia.

3.1   Trade, specialization and business cycles

Since the mid 1980s there has been a dramatic shift in the global economic landscape. This has been mainly attributed to the rapid increase in trade and financial linkages across countries. In addition the emerging market economies have increasingly become major players and they now account for about a quarter of the world output and a major share global growth (Kose et al 2008a). These developments along with the recent global economic crisis as well as the unexpected dramatic recovery in Asia have generated vigorous debates about the changes in the patterns of international business cycle movements. These changes have on one hand been attributed to the forces of globalization which in the recent decade have increased cross border economic interdependent and led to the convergence of business cycle fluctuations. Thus greater openness to trade and financial flows should make economies more sensitive to external shocks and increase co movement in response to global shocks by widening the channels of these shocks to spill over across countries. On the other hand, the impressive growth

rates in Asia mainly led by China and India, seems to be unaffected by the growth slowdowns in a number of industrialised countries. This has led to the question about the potency of the international trade channels of business cycle transmission. Some observes have conjectured that these emerging markets have 'decoupled' from industrial economies, in the sense that their business cycle dynamics are no longer tightly linked to industrial countries business cycles(Kose et al 2008b).

According to Kim et al (2002) the trade channel has two components, the direct and the indirect. The direct channel occurs when two countries are heavily trade with each other. If the crisis in one country is accompanied by a devaluation of its currency, the trade balance of the other country deteriorates. This is due to two reasons first, an increase in the price competitiveness of the country initially hit by the crisis, and if the two countries have a high volume of bilateral trade, the direct channel can explain the contagion of the crisis. The indirect channel works when a country devalues its currency causing other countries to devalue soon afterwards in order to maintain their competitiveness. Thus this channel will be a function of export similarities which are in turn a reflection of relative factor endowment and other economic characteristics. In addition, trade in the Ricardian sense occurs as a result of specialization and tends to be sector specific. If the primary disturbances are sectoral specific, then specialization should lead to business cycle correlation. On the other hand trade may act as a conduit for the transmission of shocks that affect all industries. In this case increased trade would lead to increased business cycle correlation (Baxter and Kouparitsas, 2005).

The empirical relationship between trade and business cycles has been studies by many authors. Canova and Dellas (1993) find that the significance of trade in the transmission of economic disturbances across countries is not robust to the choice of the detrending method. Lee and Azali (2009) find a weak positive link between trade and business cycles in East Asia compared with other studies that have focused on the developed countries. Frank and Rose (1998) find that countries with closer trade links tend to have more tightly correlated business cycles. Baxter and Kouparitsas (2005) find that bilateral trade is a robust determinant of business cycles comovements between countries. UNCTAD (2009:5) observe that recent financial and economic crisis was rapidly transmitted to many developing countries through a contraction in trade finance and a slow down in the demand affecting bilateral trade flows. Thus most of these studies reiterate the importance of trade as a transmission channel for business cycles. From graph 2 and 3 one observes a comovement between economic growth and the manufactured exports which comprise a significant portion of the gross exports suggesting that trade indeed was an important of not the most important transmission channel in Malaysia.

Another explanation by literature closely to business cycles and related to trade is the industrial structure. If the primary business cycle shocks are sector specific, then countries with greater similarities in sectoral structure would tend to have more correlated business cycle, other things being equal (Baxter and Kouparitsas 2005). Stockman (1998) shows that substantial changes in national aggregate industrial production growth rates can be attributed to industrial specific disturbances across the nations. These may result from disturbances to technology or to preferences for different type of products. In addition a substantial fraction of changes in national output can also be attributed to nation specific disturbances that are common to industries. Imbs (2004) further observes that trade has both a direct and indirect effect on business cycles. In addition specialization patterns have a sizeable effect on business cycles above and beyond their

reflection of intra industry trade and of openness to goods and assets trade. Bem et al (2009) highlight the importance of vertical linkages and specific sectoral shocks in accounting for the sudden, severe, and synchronised collapse of global trade. Yi (2009) suggested that vertical specialization provides a real transmission mechanism that may help explain the widespread decline in trade. Tanaka (2009) observes that vertical specialization accounts for the amplification of Japan's drop in trade and predicts this to be the avenue for recovery as well.

Bem et al (2009) further observe that vertical specialization transmission mechanism is subtle, with several ways in which it could help generate a large and widespread collapse in trade. First, there could be re-nationalisation of international production chains (triggered perhaps by an increase in protectionism). Second, growing vertical specialization implies that more cross-border transactions occur between separate stages of the production process. If the elasticity of substitution across stages is very low, then shocks to production in one country could be transmitted forcefully to other stages undertaken elsewhere. Third, if demand shocks are concentrated on goods that are vertically specialized, then trade is highly sensitive to changes in demand. This avenue seems relevant to the Malaysian case. Malaysia's outward looking strategy especially within the manufacturing sector has been an important driver for growth. In addition export specialization patterns are in line with the world trade of dynamic products (Chandran and Pandiyan 2003).

3.2 Export spillovers

Further insights on the nature of industrial linkages in understanding economic crisis and recovery can be provided by examining literature on spillovers. According to the neo classical economists spillovers effects from multinationals can accrue to host economies through technology transfers, accessibility to new markets, skill upgrading among others benefits (Borensztein et al., 1998; de Mello, 1997). This very important in Malaysia where several studies have attributed its successes to partly its ability to attract foreign direct investment (FDI) (Lall, 1995, Drabble 2000:240, Wong et al 2009). The spillovers from foreign firms may influence both the industrial structure of the host country as well as the performance of domestic firms. Export oriented foreign firms can play a significant role in raising export values in host countries. These firms have been behind the successful development of the manufacturing sectors and exporting activities in the newly industrialised countries Malaysia included (Lipsey, 1999).

The importance of export enhancing role of FDI in host countries has been recognised by various scholars. Domestic firms also stand to benefit from multinationals since they may have insight on markets due to the fact that they have a multi market presence. This information could easily spillover to the domestic firms. Studies that find presence of export spillovers from foreign firms include Aitken et al. 1997; Kokko et al.1997; Greenway et al.2004; Kneller and Pisu, 2007; among others. Other studies find that export spillover effects are dependent on human capital, stock market, domestic investment (Schneider et al.2010; Mengistu 2009), international experience and network structure (Mariotti and Piscitello, 2009) nature and type of FDI (Girma et al. 2008), agglomeration effects (Greenaway and Kneller 2008) and firm size (Aw 2002; Greenaway and Kneller, 2007). Some studies prefer other avenues for spillovers e.g Du and Girma (2007) who suggest that the elimination of financial discrimination against private firms is likely to be a more effective policy tool than the reliance on spillovers

from multinational firms while others find no evidence of export spillovers (Chudnovsky and Lopez 2007).

Several studies suggest various transmission mechanisms through which foreign firms affect domestic firms. Burke et al 2008; Greenaway et al. 2004; and Chung et al. 2003; find evidence of displacement/competition effects. Wen (2007) and Portal et al (2002) find evidence of demonstration effects. Liu and Buck (2007) find evidence of that learning by exporting (and importing). Brambilla et al (2009) find evidence of imitation. Eichengreen and Tong 2006 and Jabbour and Mucchielli 2007 find evidence of vertical linkages while Bietzer et al. 2008 find evidence of both horizontal and vertical linkages. Aitken, Hanson and Harrison (1997) find information externalities as a channel through which export spillovers are experienced. Markusen and Trofimenko(2009), show that experts have substantial and persistent positive effects (though not always immediate) on the wages of domestic workers and on the value added per worker. Gorg and Strobl(2005) suggest that firms which are run by owners who worked for multinationals in the same industry immediately prior to opening up their own firm are more productive than other domestic firms. Cheung and Lin (2004) identify several spillover channels to include reverse engineering, skill labour turnover, demonstration effects and supplier-customer relationships. Giroud and Scott-Kennel (2009) present a framework which identifies three underlying constructs that determine the efficacy of linkages. They argued that potential for firm capability and resource development via foreign-local interaction depends on the scope, quantity and quality of linkages formed.

In Malaysia the impact of FDI in boosting exports has also been positive. The export structure of Malaysia has evolved from heavy reliance on a limited range of primary commodities at independence to one of the developing world's largest exporter of manufactured goods (Athukorala and Menon 2004). However the export of manufactured goods has been limited to a narrow range of products and there was minimum development in the manufacturing sector (Lall 1995). Few studies exist on export spillovers and observe limited export spillovers from foreign firms to domestic firms (Athukorala and Menon 1996; Rasiah 2004 and World Bank 1997). Some studies find evidence of few linkages between foreign firms and domestic firms (Ismail, 1999, Capannelli, 1999, Lim and Pang, 1991: 107; Anuwar, 1992; O'Brien, 1993; Noor 1999; Giroud 2003) Rasiah (2002) and Iguchi (2008) find evidence of linkages and in some sectors attributing this to better with support institutions and higher local industrial cluster. Thus backward linkages seem to have been the main transmission mechanism of FDI spillovers to Malaysia. Giroud (2007) observe that Malaysia has reached the second stage in the investment development path which is characterised by both strong vertical and backward linkages.

4.   Analytical framework

In this study the analysis of export spillovers and their transmission mechanism follows after Aitken et al (1997) and Greenaway et al (2002). The study begins with the choice facing a representative domestically-owned firm between serving the domestic market, exporting, or both, to maximize its profit:

$$\max_{qd,qf} \; P_d q_d + P_f q_f - h(q_d + q_f) - m_d(q_d) - m_f(q_f) \tag{1}$$

$$\text{Such that } q_d, q_f \geq 0$$

where subscripts d and f refer to the foreign and domestic markets respectively.

This is a basic profit function dependent on prices, quantities sold in each market and costs. q refers to quantity of output and P to price. $h(\bullet)$ refers to production costs, $m_d(\bullet)$ and $m_f(\bullet)$ refer to distribution costs for domestic and foreign markets, respectively and $m_f \succ m_d$. These costs are assumed to be increasing and convex in their arguments. The distribution costs are assumed to be market specific and are in exports a decreasing function of the domestic concentration of export activity.

For empirical purposes firm's costs are assumed to be consisting of two parts, production and distribution have simple functional forms as follows:

$$h(q_d + q_f) = \frac{a}{2}(q_d + q_f)^2 + g(q_d + q_f), \quad m_i(q_i) = \frac{b_i}{2}q_i^2 + c_i q_i \qquad (2)$$

where $i = f, d$. a, g, b_i, and c_i are scalar parameters.

g and c are functions of cost variables the firm takes as given in making its output decision:

$$g = g(X, \phi, \delta), \quad c_d = c_d(X, Z_d) \text{ and } c_f = c_f(X, Z_f, \omega_E, \omega_{EF}) \qquad (3)$$

where X represents cost variables that are common to production in both markets and Z_i represent those that are specific to the production for market i. ω_E and ω_{EF} are respectively, total export activity and total foreign firms export activity. ϕ and δ represent the relative importance of foreign firms in the domestic market and the total innovation activities carried out by the foreign firms. Information spillovers imply that for the representative firm,

$$\frac{\partial m_f(q_f)}{\partial \omega_E} \leq 0 \qquad\qquad \frac{\partial m_f(q_f)}{\partial \omega_{EF}} \leq 0 \qquad (4)$$

Thus the higher the concentration of total export activity and total foreign firm activity, the more the domestic firms can benefit in terms of information externalities which in turn reduce the distribution costs of selling abroad. Competition effect and imitation/demonstration effect are also introduced and captured by ϕ and δ respectively obtained as follows:

$$\frac{\partial g(q_f + q_d)}{\partial \phi} \leq 0 \qquad\qquad \frac{\partial g(q_f + q_d)}{\partial \delta} \leq 0 \qquad (5)$$

The greater the importance of foreign firms in the domestic market the stronger the competition pressure causing the domestic firms to reduce production costs. Also the more technologically-intensive the foreign firms activities in the host country, the larger the imitation potential for domestic firms to increase their efficiency in production.

In theory, the optimal choice of output may be zero in either market. In practice some firms produce zero exports but all firms produce positive quantities for the domestic market. Accordingly the study then consider the possibility of corner solutions for the variable q_f. To do so we define the latent variable q_f^* such that:

$$\begin{cases} q_f^* = q_f & if \quad q_{fi} > 0 \\ q_f^* = 0 & otherwise \end{cases}$$

The first order conditions for profit maximization using equation (1) above for a representative domestic firm are derived as follows:

$$q_d = \frac{1}{a+b_d}\left[P_d - aq_f^* - g(X,\phi,\delta) - c_d(X,Z_d)\right] \qquad (6)$$

$$q_f^* = \frac{1}{a+b_f}\left[P_f - aq_d - g(X,\phi,\delta) - c_f(X,Z_f,\omega_E,\omega_{EF})\right] \qquad (7)$$

For estimation purposes we rewrite these equations as:

$$q_{dj} = \alpha_1 P_d + \alpha_2 q_{fj}^* + \alpha_3'Z_{dj} + \alpha_4'X_j + \alpha_5\phi + \alpha_6\delta + \varepsilon_{dj}, \qquad (8)$$

$$q_{fj}^* = \beta_1 P_f + \beta_2 q_{dj} + \beta_3'Z_{fj} + \beta_4'X_j + \beta_5\phi + \beta_6\delta + \beta_7\omega_E + \beta_8\omega_{EF} + \varepsilon_{fj} \qquad (9)$$

where j is the index for the firm, Z_{ij} is a *(1 x K)* vector of cost variables specific to market i, X_j is a *(1 x J)* vector of cost variables common to both markets, α_3 and β_3 are *(1 x K)* vector of coefficients. α_4 and β_4 are *(1 x J)* vector of coefficients, and ε_{ij} is a normally distributed error term for market i and firm j, with zero mean and a constant variance. From equation (6) and (7) α_2 and β_2 are negative.

Equation (8) and (9) represent a simultaneous-equation model with a censored variable and since our interest is in the firm's export decision the study focuses the estimation on the probability that a firm will export and estimate the dummy variable y_j which indicates whether or not a firm has positive exports which gives the consistent estimates of the parameters in the two equations.

$$\begin{cases} y_j = 1 & if \ q_{fj} > 0 \\ y_j = 0 & otherwise \end{cases} \qquad (10)$$

One advantage of this approach is that it is straight forward to address certain issues such as endogeneity of regressors. Equations (8) and (9) are transformed to reveal the determinants of the optimal quantity of output to be exported as follows:

$$q_{fj} = \beta_1 P_f + \beta_2(\alpha_1 P_d + \alpha_3'Z_{dj}) + \beta_3'Z_{fj} + (\beta_2\alpha_4'+\beta_4')X_j + (\beta_2\alpha_5 + \beta_5)\phi +$$
$$(\beta_2\alpha_6 + \beta_6)\delta + \beta_7\omega_E + \beta_8\omega_{EF} + \varepsilon_j$$

where $\varepsilon_j = \beta_2\varepsilon_{dj} + \varepsilon_{fj}$ \hfill (11)

Using equation (10) the probability that firm j has positive exports is estimated as follows:

$$\Pr(y_j = 1) = \Pr\left[\begin{matrix} \beta_1 P_f + \beta_2(\alpha_1 P_d + \alpha_3'Z_{dj}) + (\beta_2\alpha_4'+\beta_4')X_j + (\beta_2\alpha_5 + \beta_5)\phi + \\ (\beta_2\alpha_6 + \beta_6)\delta + \beta_7\omega_E + \beta_8\omega_{EF} + \varepsilon_j \geq 0 \end{matrix}\right] \qquad (12)$$

From equation (12) the probability of firm exporting is a function of the price of the goods, firm specific production costs, distribution costs in the foreign and domestic markets, exporting activity in the country and several aspects of the presence of multinationals such as their exporting activities, technological innovation activities and competitive pressure their activities entail. Equation (4) and (5) imply that $\Pr(y_j = 1)$ is increasing in ϕ, δ, ω_E and ω_{EF}. The distributional assumption of on ε_{dj} and ε_{fj} imply that ε_j is normally distributed, which permits equation (12) to be a binary probit.

4.1 Empirical model

Building on the framework above an empirical model is developed to analyse the effects of foreign firms or multinationals on export behaviour of domestic firms. The export behaviour is considered as involving both the decision to export and the proportion of production exported. This avoids sample selectivity biases.

The export decision and the export propensity equations to be estimated are presented respectively as follows:

$$EX_i = \alpha + \beta_1 W_i + \beta_2 KI_i + \beta_3 TP_i + \beta_4 TURN_i + \beta_5 FUNDS_i + \beta_6 PC_i + \beta_7 RDF_i +$$
$$\beta_8 RDD_i + \beta_9 SEI_s + \beta_{10} PP_s + + \beta_{11} MNEM_s + \beta_{12} MNEX_s + \varepsilon_i$$

$$(13)$$

and

$$EP_i = \alpha + \beta_1 W_i + \beta_2 KI_i + \beta_3 PT_i + \beta_4 TURN_i + \beta_5 PC_i + \beta_6 RDF_i +$$
$$\beta_7 RDD_i + \beta_8 SEI_s + \beta_9 PP_s + \beta_{10} MNEM_s + \beta_{11} MNEX_s + \mu_i$$

$$(14)$$

where

$$\varepsilon_i \sim N(0,1)$$
$$\mu_i \sim N(0,\delta)$$
$$corr(\varepsilon_i, \mu_i) = \rho$$
$$(\varepsilon_i, \mu_i) \sim \text{bivariate normal } [0,0,1,\delta,\rho]$$

Subscripts i and s refer to the firms and industry.

4.2 Variables

Equation (13), the export decision equation is estimated for the full sample and EX is a dichotomous variable which takes the value of 1 or 0 depending on whether the domestic firm decides to export or not. This equation also performs the sample selection criteria for the second model that focuses exclusively on the export propensity of the subset of the firms that decide to export. Equation (14) has EP as the export propensity variable which is defined as the share of output exported to total turnover. It is computed as a ratio of exports to turnover. The spillover model is extended to capture the possibility that spillovers are expected to differ across sectors; we divide our data set into modern and traditional sectors and estimate equations (13) and (14) on these two separate sets of data. The other variables to be used are discussed in the in the next section.

4.2.1 Spillovers Variables

Building on the theoretical model developed earlier, a number of export spillovers are included. First, three regressors are included to test for possible spillovers. RDF is the expenditure of Research and Development (R&D) carried out by foreign firms in Malaysia. This captures the contribution of MNEs to the available stock of technological knowledge, on the assumption that the more innovation activities carried out by MNEs,

the larger the potential for imitation from which domestic firms can benefit. MNEM is the relative weight of MNEs in total employment in a sector. It accounts for the relative importance of MNEs at the sector level in the domestic market. The greater their relative importance, the stronger the competitive pressure on domestic firms. Finally, MNEX is the relative importance of MNEs' export activities in a sector scaled by the relative importance of MNEs' exports in total exports. It is assumed that the greater the importance of MNEs in the exports of a given sector, the higher the scope for domestic firms to benefit from information externalities. Positive coefficients are expected for RDF, MNEM and MNEX. These variables will be obtained from the firm level data.

4.2.2 Firm specific variables

Several variables are included to reflect domestic enterprise heterogeneity as follows. *W* is defined as the ratio of total wages (remuneration) to the number of employees in each firm. A positive relationship between average labour remuneration and the probability of a firm being an exporter would capture the importance of labour cost and skills for competitiveness of the Malaysia firms' production in the world market. This is consistent with the export production as being relatively skill intensive. It also reflects individual specific human capital. PT is the firm's profitability measured as profit after tax which reflects its ability to meet fixed costs associated with entering the export market. KI is capital intensity defined as the ratio of the fixed assets to the number of employees. Both PT and KI are expected to be positively associated with both the decision to import and export intensity. There is a well established link between firm size and exports and therefore firm turnover (TURN) is included. It is expected that relatively large firms are more capable of absorbing any fixed costs associated with entering an export market and to exploit economies of scale in the exporting process. The study also includes domestic firms expenditure on R& D (RDD), which captures the domestic contribution to the total innovation activities carried out in Malaysia, since this will affect the likelihood of exporting. Finally, in the export decision equation, we control for shareholders' funds per unit of output available to the domestic firm (FUNDS) measured as the ratio of the shareholders funds to turnover[3]. This captures the domestic firms' financial capacity to meet the extra costs associated with setting up export operations and is only included in the first estimating equation since the firm's ability to overcome liquidity constraints influences the decision to export but not export propensity as it relates to fixed rather than variable costs. These variables too will be obtained from the firm level data.

4.2.3 Sectoral and Industrial Variables

Several sectoral specific variables are included: PP, domestic producer price indices and PC, average production cost. PP is measured in terms of the five digit level International Standard Industrial Classification (ISIC) 2000 sectors' producer price index numbers of products manufactured in Malaysia. PC is computed using three digit ISIC (2000) sector data and the number of firms in the respective sector. These variables control for changes in prices and costs of commodities affecting specific sectors. To control for the fact that MNE's may locate in sectors with higher export ratios the SEI[4], which is the relative importance of sector *i* in domestic exports. This captures the export structure of the host country and controls for factors that affect a sector's overall export profile. The variable

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[3] As used by Greenaway et al (2004).

[4] This variable is also controls for the possibility that foreign firms choose to invest in those sectors that are more export oriented. It has been used by Franco and Sasidharan, (2009).

IND is included to control for industry size at the national level (in terms of employment), which allows for possible general spillovers not directly associated with export activity. Dummy variables are included for the years under consideration. These variables too will be obtained from the national statistics.

4.3 Estimation Procedure

This study uses an econometric technique based on the Heckman selection model which takes into account the truncated nature of the sub sample of firms used in the export propensity model and incorporates a sample selection mechanism given by the export decision[5]. The firm level data is pooled, and clustered by firm, which allows the use of robust standard errors and unspecified serial correlation within firms while assuming independence between them. Due to the expected strong correlation between MNEM and MNEX, they will be estimated separately. The parameters in the two estimating equations will be estimated using maximum likelihood. Likelihood-ratio tests validate the choice of the Heckman selection model. Estimating these equations separately using OLS without correcting for the sample selection would lead to omitted-variable bias. Wald tests are used to test the overall significance of the models.

Additional econometric problems that are anticipated and will be addressed include unobserved heterogeneity (across regions, industries, years, and firms), heterogeneous impact of FDI as well as the need to conduct robustness tests of the results[6].

5. Data and Empirical findings

The study uses data annual for the period 2000-2006 collected by the Department of Statistics in Malaysia (DSM). This annual data is based on the Malaysia's Standard Industrial Classification, 2000. This is a mail enquiry survey where the respondents are given one month to complete and return the questionnaires to the Department. DSM also conducts economic census of the Manufacturing sector once every 5 years. In this sample period this was conducted in 2000 and 2005. These statistics are a good representation of the manufacturing sector in Malaysia since the establishment frame comprises of 36,870 firms.

5.1 Descriptive Statistics

An overview of the structure of the manufacturing sector is presented in table three. Based on the economic census for 2000 and 2005, the number of foreign firms in the manufacturing sector has been on the decline. The share of the foreign firms participating in the export market decreased from 70.31 percent in 2002 to 56.73 percent in 2006. This could suggest that some export oriented industries since 2002 have either closed down or become more domestic oriented. The proportion of domestic firms participating in the export market decreased from 16.51 percent in 2002 to a low of 7.79 percent in 2005 before rising again to 12.29 percent in 2006. Thus most of foreign firms in Malaysia are more export oriented while most of the domestic firms produce for the domestic market. This decline in foreign firms as noted earlier can be partly explained by rising production costs as well global competition from China and India.

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[5] A similar approach is used by Greenaway et al 2004; Ruane and Sutherland 2004; Kneller and Pisu, 2007; among others for panel data.

[6] These problems are well discussed in Wooldridge (2003) and the study will follow his approach.

Table 3: Manufacturing sector in Malaysia

	2000	2001	2002	2003	2004	2005	2006
Foreign	1646	1426	1435	1414	1360	1539	1100
Export	68.71	67.46	70.31	65.13	52.72	56.08	56.73
Non Export	31.29	32.54	29.69	34.87	47.28	43.92	43.27
Domestic	18759	12471	12002	12212	11048	26655	9193
Export	12.13	15.51	16.51	13.86	12.30	7.79	12.29
Non Export	87.87	84.49	83.49	86.14	87.70	92.21	87.71
All	20405	13897	13437	13626	12408	28194	10293

A sectoral analysis of the manufacturing sector based on the economic census of 2005 in table 4 provides further insights on the structure of the manufacturing sector. The highest concentration of foreign firms is in the electrical and electronic products which comprise a major proportion of the manufactured goods exported. There are also many foreign firms producing the same products for the domestic market. The sector has attracted domestic firms with some producing for the export market. The other sectors with a high concentration of foreign firms include plastic products, Chemical and Chemical Products, fabricated metal products, Machinery and Equipment and Textile, Apparel and foot wear. Interestingly in all the sectors that foreign firms are involved there appears to be a concentration of both exporting and non exporting firms. This seems to suggest the presence of agglomeration effects.

Table 4: The structure of the manufacturing sector for the year 2005

Malaysia Industrial Classification		2005			
		Foreign Firms		Domestic firms	
		Exports	Non Exports	Exports	Non Exports
30001-32300	Electrical and Electronic products	188	128	143	512
23200-24111	Petroleum Products	3	10	10	49
17111-19200	Textile, Apparel and Foot wear	45	30	162	6454
20100-20299	Wood and Wood Products	35	19	260	1223
25111-25199	Rubber Products	39	43	111	262
29110-29300	Machinery and Equipment	50	36	69	1002
33110-33300	Medical, Optical and scientific equipment	15	11	5	86
24119-24300	Chemical and Chemical Products	77	44	90	462
26100-26990	Non Metallic minerals	38	27	143	1086
24130;25201-25209	Plastic Products	89	75	236	976
15201-15499	Food Products	36	30	89	2951
34100-35990	Transport Equipment	20	19	52	482
15111-15149	Off estate processing	15	14	78	1022
28110-28999	Fabricated Metal products	70	62	118	2723
27100-27320	Basic Metals	32	38	74	786
21010-21099	Paper and Paper products	21	18	69	425
22110-22300	Printing and publishing services	19	17	46	1557
15510-15542	Beverages	3	6	64	59
16000	Tobacco Products	2	2	0	166

36101-37209	Other manufacturing	69	41	249	2308
	Total	**866**	**670**	**2068**	**24591**

Domestic firms on the other hand have concentrated in the production of manufactured goods for the domestic market. The highest concentration of domestic firms is in the textile industries which tend to be labour intensive. Other important sectors to domestic firms include food products, fabricated metals, printing and publishing, wood and wood products, non metallic minerals and off estate processing. Domestic firms largely dominate the traditional primary industries while foreign firms concentrate in the modern sectors. This has been the outcome of selective policies that the Malaysia's government has pursued over the years.

Over the years foreign direct investment has been the engine of manufactured export expansion in Malaysia (Athukorala and Menon, 2004, Lall, 1995). However data from table 5 does suggest that this is no longer the case. Domestic firms have a higher export value, value added, employment and local content than the foreign firms. Foreign firms on the other hand have higher investments in staff training, information and technology and import content of direct raw materials. Both domestic and foreign firms invest in research and development in comparable proportions.

Table 5: Manufacturing sector selected statistics (percentage)

	2001	2002	2003	2004	2005	2006
Domestic						
Value added	32.08	57.15	58.40	58.26	63.09	63.20
Employment	60.86	61.88	62.06	60.84	67.36	64.34
Export Value	55.23	57.21	55.87	51.36	59.79	64.96
Staff Training Costs	48.42	31.23	28.60	39.52	42.73	35.01
Research & Development costs	48.55	56.57	58.46	51.91	32.26	44.10
Information Technology costs	36.22	37.02	36.26	38.36	39.03	42.49
E-Commerce	100.00	1.89	2.06	0.76	100.00	70.41
Direct Raw Materials imported	29.65	27.27	32.31	35.10	34.11	28.91
Direct Raw Materials Local	58.44	62.20	61.75	61.83	69.54	68.35
Foreign						
Value added	67.92	42.85	41.60	41.74	36.91	36.80
Employment	39.14	38.12	37.94	39.16	32.64	35.66
Export Value	44.77	42.79	44.13	48.64	40.21	35.04
Staff Training Costs	51.58	68.77	71.40	60.48	57.27	64.99
Research & Development costs	51.45	43.43	41.54	48.09	67.74	55.90
Information Technology costs	63.78	62.98	63.74	61.64	60.97	57.51
E-Commerce	0.00	98.11	97.94	99.24	0.00	29.59
Direct Raw Materials imported	70.35	72.73	67.69	64.90	65.89	71.09
Direct Raw Materials Local	41.56	37.80	38.25	38.17	30.46	31.65

Based on this table several conclusions can be drawn. Most of the foreign firms are export oriented while most of the domestic firms are domestic oriented. In the recent years, Domestic firms in Malaysia have played a more significant role in both the domestic and foreign market than the foreign firms as indicated by the export value. Domestic firms have low import content and a high local content of direct raw materials compared to foreign firms. Hence domestic firms seem to have created more vertical backward linkages than the foreign firms. This structure of the manufacturing sector in Malaysia

was important in insulating Malaysia from the severe consequences of the economic recession.

There is some evidence of export spillovers from foreign firms to domestic firms in various sectors. This is based on the concentration of domestic firms in the export sectors dominated by foreign firms. Several important channels of export spillovers can be identified. The expenditure in research and development by foreign firms is higher than for domestic firms and this could suggests imitation an important channel. Domestic firms employ more labour than the foreign firms and this suggests moderate evidence on the competitive pressure. There is also evidence of information externalities from foreign firms to domestic as evidenced by the number of firms concentrated in the export sectors dominated by foreign firms. These externalities are sector specific and in the next section this paper uses econometric analysis to investigate presence of spillover effects.

7.   References

Aitken B., G. H. Hanson and A. E. Harrison (1997) "Spillovers, foreign investment, and export behavior", *Journal of International Economics*, 43(1-2), 103-132.

Anuwar, A. (1992) *Malaysia's Industrialization, the Quest for Technology*. Singapore: Oxford University Press.

Athukorala, P.C. and J. Menon (1996) "Foreign Investment and Industrialization in Malaysia: Exports, Employment and Spillovers" *Asian Economic Journal* 10(1): 29-44

Athukorala, P.C. and J. Menon (2004) "Export-led industrialization, employment and equity: the Malaysian case", paper can be found: http://dspace.anu.edu.au/bitstream/1885/41789/2/965.pdf

AW, Y.T and T.C Tang (2009) "The Determinants of Inward Foreign Direct Investment: the case of Malaysia" Discussion Paper 22/09, Monash University.

Baxter, M. and M.A.Kouparitsas (2005) "Determinants of business cycle comovements: A robust analysis" *Journal of Monetary Economics* 52 (1): 113-157

Bems, R., Johnson, R., and K.M. Yi (2009) "The collapse of global trade: Update on the role of vertical linkages" in Baldwin, Richard eds. *The Great Trade Collapse: Causes, Consequences and Prospects.* VoxEU.org Ebook.:

Bitzer, J., Geishecker, I and H. Gorg (2007) "Productivity spillovers through vertical linkages: Evidence from 17 OECD countries" *Economic Letters* 99(2):328-331

Borensztein, E. J. De Gregorio and J-W. Lee. (1998) "How does foreign direct investment affect economic growth?" *Journal of International Economics*, 45(1):115-135

Brambilla, I, Hale, G and C. Long (2009) "Foreign Direct Investment and the incentives to innovate and imitate" *Scandinavian Journal of Economics* 111(4):853-861

Burke, A, Gorg, H and A. Hanley (2008) " The impact of foreign direct investment on new firm survival in the UK: evidence for static versus dynamic industries" *Small Business Economics* 31 (4): 395-407

Capannelli, G., (1999) "Technology transfer from Japanese consumer electronic firms via buyer-supplier relations". In eds Jomo, K. S., G. Felker, and R. Rasiah: *Industrial Technology Development in Malaysia: Industry and Firm Studies*.: 191–230 Routledge, London.

Chandran, V.G.R and V. Pandiyan (2003) "Export Specialization, Concentration and Inter Industry Trade: Evidence from Malaysia". *Jurnal Akademik* 3: 99-111

Cheung, K.Y and P. Lin (2004) "Spillover effects of FDI on innovation in China: Evidence from the provincial data" *China Economic Review* 15(1):25-44

Chudnovsky, D and A. Lopez (2007) "Foreign direct investment and development: the MERCOSUR experience" *Cepal Review* (92): 7-23

Chung, W., Mitchell, W and B. Yeung (2003) "Foreign direct investment and host country productivity: the American automotive component industry in the 1980s" *Journal of International Business Studies* 34(2) : 199-218

de Mello, L. (1997) "Foreign Direct Investment in Developing Countries and Growth: A Selective Survey", *Journal of Development Studies*, 34 : 1-34.

Drabble, H. J (2000). *An Economic History of Malaysia, c. 1800-1990: The Transition to Modern Economic Growth*. Great Britain. Macmillan Press.

Du, J and Girma, S (2007) "Finance and firm export in China" *Kyklos* 60 (1): 37-54

Eichengreen, B and Tong, H (2006) "How China is reorganising the world economy" *Asia Economic Policy Review* 1: 73-97

Girma, S, Gorg, H and M. Pisu (2008) "Exporting, linkages and productivity spillovers from foreign direct investment" *Canadian Journal of Economics-Revue Canadienne D Economique* 41 (1): 320-340

Giroud, A (2007) "MNEs vertical Linkages: The experience of Vietman after Malaysia" *International Business Review* 16(159-176)

Giroud, A and J. Scott-Kennel (2009) "MNE linkages in international business: A framework for analysis" *International Business Review* 18 (6): 555-566

Giroud, A. (2003). *Transnational corporations, technology and economic development: Backward linkages and knowledge transfer in South East Asia*. Cheltenham, Northampton: Edward Elgar.

Gorg, H and E. Strobl (2005) "Spillovers from foreign firms through worker mobility: An empirical investigation" *Scandinavian Journal of Economics* 107(4) : 693-709

Greenaway D., N. Sousa and K. Wakelin (2004) "Do Domestic Firms Learn to Export from Multinationals?", *European Journal of Political Economy*, 20, 1027-1043.

Greenaway D., N. Sousa and K. Wakelin (2004) "Do Domestic Firms Learn to Export from Multinationals?", *European Journal of Political Economy*, 20, 1027-1043.

Greenaway, D and R. Kneller (2008) "Exporting, productivity and agglomeration" *European Economic Review* 52 (5): 919-939

Greenaway, D., and R. Kneller (2007). "Firm Heterogeneity, Exporting and Foreign Direct Investment". *Economic Journal* 117 (517): 134–161.

Iguchi C. (2008) "Determinants of backward linkages: The case of TNC subsidiaries in Malaysia". *Asian Business and Management*, 7, 53-73.

Imbs, J (2004) "Trade, Finance, Specialization and Synchronization". *The Review of Economics and Statistics* 86(3): 723-743

Ismail, M.N (1999) "Foreign firms and national technological upgrading: the electronic industry in Malaysia" in Jomo, K.S, Felker,G and Rasiah, R(eds) *Industrial Technology Development in Malaysia: Industry and Firm studies*. Routeledge

Jabbour, L and J.L Mucchielli (2007) "Technology transfer through vertical linkages: The case of the Spanish manufacturing industry" *Journal of Applied Economics* 10 (1): 115-136

Kato, T (2009) "Impact of the global financial crisis and its implications for the East Asian Economy" Paper presented at the Korean International Financial Association First International Conference, Seoul, Korea. October.

Kawai, M (2009) "The Impact of the Global Financial Crisis on Asia and Asia's Response" Paper presented at the Crisis Developments and Long Term Global Responses Conference in Kiel July.

Kim, S.H., Kose, M.A and M.G. Plummer (2002) "Contagion or Simple Transmission of Business Cycles? The case of the Asian Crisis" in Richard Hooley and Jang-Hee yoo (eds) *The Post Financial Crisis Challenges for Asian Industrialization*. Oxford, United Kingdom.

Kneller R., M. Pisu (2007) "Industrial Linkages and Export Spillovers from FDI", *The World Economy*, 30(1), 105-134.

Kokko, A., R. Tansini and M. Zejan (1997) "Trade regimes and spillover effects of FDI: Evidence from Uruguay". Mimeo, Stockholm School of Economics.

Kose, M.A., Otrok, C. and C.H. Whiteman (2008a) "Understanding the evolution of world business cycles". *Journal of International Economics* 75(1): 110-130

Kose, M.A., Otrok, C. and E. Prasad (2008b) "Global business cycles: convergence or decoupling?" Discussion paper series 1: Economics statistics No 7, Deutsche BundesBank

Lall, S (1995) "Malaysia: Industrial Success and the Role of the Government," *Journal of International Development* 7(5): 759-773

Lee, G.H.Y and M. Azali (2009) "The Endogeneity of the Optimal Currency Area Criteria in East Asia" Discussion Paper no 15, Monash University, Business and Economics.

Lim, Y.C. L and E.F. Pang (1991) *Foreign Direct Investment and Industrialization in Malaysia, Singapore, Taiwan and Thailand*. OECD, Paris.

Lipsey, R.E. (1999) "Affiliates of US and Japanese multinationals in East Asian production and trade." NBER Working Paper 7292.

Liu, X and T, Buck (2007) "Innovation Performance and channels for international technology spillovers: Evidence from Chinese high tech industries" *Research Policy*, 36 (3): 355-366

Mariotti, S and L. Piscitello (2009) "The impact of international involvement on firms' export performance" *European Journal of International Management* 3 (3): 365-381

Markusen, J.R and N. Trofimenko (2009) "Teaching locals new tricks: Foreign experts as a channel of knowledge transfers" *Journal of Development Economics* 88(1): 120-131.

Mengistu, A.A (2009) "Do physical and Human Capital Matter for Export Diversification?: A Comparative Analysis of Sub-Saharan Africa and East Asia" *African and Asian Studies* 8 (1-2): 1-46

Ministry of International Trade and Industry (MITI) (2006) *Third Industrial Master Plan: Towards Global Competitiveness*. Malaysia.

Noor, A. H. M (1999) "Technological effort: a study of its influencing factors in MNCs and local firms in the electronics and electrical industries in Malaysia". Unpublished Ph.D. Thesis, Cardiff Business School, University of Wales, UK

O'Brien, L., (1993), "Malaysian Manufacturing Sector Linkages," in Jomo. K.S (ed.) *Industrialising Malaysia: Policy, Performance and Prospects*, London: Routledge: 147-62.

Porter, J., Moore, B and R. Spires (2002) "The wider effects of inward foreign direct investment in manufacturing on UK industry" *Journal of Economic Geography* 2(3): 279-310

Rasiah, R. (2002) "*Systemic Coordination and Human Capital Development: Knowledge Flows in Malaysia's MNC-Driven Electronics Cluster*" INTECH Discussion Paper No. 2002-7, United Nations University.

Rasiah, R. (2004) "Technological Capabilities in Korea, Taiwan, Malaysia and Thailand: Does Network Strength Matter?" *Oxford Development Studies* 32(3): 433-454

Schneider,M.R, Schulze-Bentrop,C and M. Paunescu (2010) "Mapping the institutional capital of high-tech firms: A fuzzy-set analysis of capitalist variety and export performance" *Journal of International Business Studies* 41 (2): 246-266

Singh, A (2010) "Asia Leading the Way" *Finance and Development* 27(2): 1-2

Stockman, A.C (1988) "Sectoral and National Aggregate Disturbances to Industrial Output in Seven European Countries" *Journal of Monetary Economics* 21(2-3): 387-409

Tanaka, K (2009) "Trade Collapse and Vertical Foreign Direct Investment." VoxEU

UNCTAD (2009) *Global Economic Crisis: implication for trade and development*. Geneva

UNDP (2010) *The Global Financial Crisis and the Malaysian Economy: Impact and Responses*. UNDP, Malaysia

United Nations (2010) *World Economic Situation and Prospects 2010*. UN: New York

Wen, M. (2007) "Foreign direct investment, regional market conditions and regional development - A panel study on China" *Economics of Transition* 15 (1): 125-151

Wong, K.N, Tang, T.C., and D.K Fausten (2009) "Foreign Direct Investment and Services Trade: Evidence from Malaysia and Singapore" *Global Economic Review* 38(3): 265-276

World Bank (1997) *Malaysia: Enterprise Training, Technology and Productivity*, A World Bank Country Study, Washington, D.C.

Yi, Kei-Mu. (2009). "The Collapse of Global Trade: The Role of Vertical Specialization" in Richard Baldwin and Simon Evenett, eds *The Collapse of Global Trade, Murky Protectionism, and the Crisis: Recommendations for the G20* : 45-48.

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