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GVCs and Premature Deindustrialization in Malaysia

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Abstract

Malaysia has experienced premature deindustrialization since the early 1990s. The decline in the relative contribution of manufacturing to the economy has been underpinned by changes in the key component industries of the electronic, electrical and machinery industries. The relative decline in manufacturing has also been accompanied by a decline in the country's participation in global value chains (GVCs). This is particularly true for backward GVC participation. Macro-level evidence suggests that the decline in export growth is likely amplified by reductions in the foreign value added in the manufacturing sector. Micro-level evidence points to weaknesses in terms of human capital and technology.

JEL Classification: F12, L63, O1421, F23, R42

Keywords: Structural Change, Deindustrialization, Global Value Chain

GVCs and Premature Deindustrialization in Malaysia

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1. Background

Malaysia is an upper middle-income country with a per capita income of US$11,415 in 2019.[2] It is thus on the threshold of becoming a high-income country.[3] However, the Covid-19 pandemic in 2020 plunged the Malaysian economy into a recession. The Malaysian economy is forecasted to contract by 4.5 percent in 2020.[4] Though the economy is expected to recover eventually, the structural changes in the Malaysian economy renders its long-term growth prospects uncertain. The Malaysian economy has been deindustrializing for the past twenty years. The manufacturing sector's contribution to the economy (GDP) stood at 21.4% in 2019, down from a peak of 30.9% in 1999. As this decline occurred before it became a developed economy, Malaysia has undergone "premature deindustrialization". Changes in the country's participation in global value chain (GVC) is likely to be a key driver of the country's premature deindustrialization. Thus far, scarcely any research has been undertaken to examine this phenomenon.

The goal of this study is to examine the role of GVC participation in Malaysia's premature deindustrialization experience. This will be achieved in part by comparing the country's GVC participation in manufacturing during the industrialization (1960-1999) and premature deindustrialization (after 2000) periods.

The outline of this paper is as follows. Section 2 will review the literature on structural and premature deindustrialization including the role of GVC. Section 3 examines Malaysia's experience in industrialization and premature deindustrialization. The trends in Malaysia's participation in GVCs is discussed in Section 4. Section 5 concludes the paper by summarizing some of the key findings and by drawing some policy implications.

[1] The author thanks Urata Shujiro, Ayako Obashi and other participants of the Workshop for the GRIPS-ERIA Project Policy Research Network on Contemporary Southeast Asia. This paper was written for the GRIPS-ERIA project focusing on foreign direct investment, global value chains, and economic growth. Editorial assistance from Joey Erh and Gloria Lin is much appreciated. The usual caveat remains.

[2] In current prices. Source: World Bank.

[3] The current definition of a high-income country is a country with a per capita income exceeding US$12,535. For World Bank's latest classification, see: https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021

[4] Ministry of Finance's forecast in the 2021 Budget released on 6th November 2020.

2. Literature Review

The study of deindustrialization can be situated within a broader framework of structural change. However, there are also specific lines of enquiries devoted to deindustrialization. The literature is thus reviewed along these lines – structural change and deindustrialization.

2.1 Structural Change

The term economic structure is interpreted to mean the relative importance of different types of economic activities (or sectors) in an economy. Structural change or structural transformation refers to the reallocation of economic activity across the three broad sectors of the economy - namely, agriculture, industry and services (Herrendorf et al, 2014). [5] A standard characterization of structural change is to frame it in terms of shifts in the predominance of different sectors. One key structural change is **industrialization** which involves a shift in the relative importance of economic activities (in terms of output and employment) from agriculture to manufacturing (Syrquin, 1988). The process of structural change is complex, involving many dimensions such as demand, technology, employment, factor accumulation, employment, migration, location, demography, income distribution and environment.

The theories and empirics of structural change have focused on several drivers[6]. From a domestic demand perspective, a rise in per capita real income is accompanied by a decline in the share of food in final demand and an increase in producer goods, machinery, and social overhead (Chenery and Syrquin, 1986). Not only is there an increase in the production of manufactured goods with greater income elasticity, but intermediate goods also form a greater proportion of the increase. This leads to greater inter-sectoral interactions and dependencies. Sectoral change is also driven by the prices of manufactured goods relative to agricultural goods – brought about by differences in productivity growth.

[5]The more "modern" studies of economic structure and structural change date from the 1930s, following the Great Depression. The early pioneering works focused on the development of the data collection methods and tools such as national accounts (Simon Kuznets, Colin Clark, and Richard Stone) and input-output analysis (Wassily Leontief). The study of economic structure and structural change is not a recent endeavour. An early precursor is Quesnay's Tableau Économique (first published in 1758) which depicted the economy as comprising three classes - the proprietary class (landlord), productive class (farmer and farm labourer) and sterile class (artisan and foreign merchant). In a more dynamical and historical approach, Adam Smith – influenced by the ideas of Samuel Pufendorf and Francis Hutcheson - theorized that societies evolve through four stages, namely hunters, shepherds, agriculture, and commerce. See Okan (2017).

[6] For a comprehensive review, see Herrendorf et al (2014) and van Neuss (2018).

For many countries, especially smaller countries less endowed with natural resources, the rise in the trade of manufactured goods is another characteristic of industrialization (Syrquin, 1988 and Syrquin and Chenery, 1989). Recent empirical work has also emphasized the importance of country-specific technological factors (Eberhardt and Teal, 2012).

2.2 Premature Deindustrialization

The process of industrialization took centre stage in the analysis of structural change in the early years following the publication of Kuznet's pioneering work in 1966. In the same year, Kaldor's (1966, p.3) inaugural lecture described the deindustrialization of the British economy in terms of having "reached a high stage maturity earlier than others, with the result that it has exhausted the potential for fast growth before it had attained particularly high levels of productivity or real income per head". He termed this state of affairs as "premature maturity". Thus, the notion of a "mature point" was conceptualised as an inflection point in the share of manufacturing in total employment. Beyond this point forward, employment in the agriculture sector would reach such low levels that any further reallocation of labour into services would have to come from the manufacturing sector.

In an early work, Singh (1977) also argued that deindustrialization could be due to a decline in the competitiveness of manufactured exports. The drivers of deindustrialization were further theorized and clarified in subsequent works. Rowthorn and Wells (1987) proposed three types of deindustrialization, namely, (i) positive deindustrialization – driven by rapid productivity growth in manufacturing and in which workers are re-allocated to a vibrant service sector (ii) negative deindustrialization - in which labour shed by the manufacturing sector is not absorbed by the services sector, and (iii) deindustrialization induced by structural change in trade where net exports shifts away from manufactures towards other goods and services (ibid, p.6). Thus, the weakening of manufactured exports is the driver for deindustrialization. The authors also emphasized on the importance of changes in the composition of demand, which shifts first from food (agriculture) towards manufactured goods, then towards services as income per capita rises. In follow-up works, Rowthorn and Ramaswamy (1997, 1998) argued that among these drivers, trade was not deemed the key driver of deindustrialization as it accounted for only one-fifth of deindustrialization in the advanced economies.

The phenomenon of premature deindustrialization in developing countries was highlighted by Dasgupta and Singh (2006). The authors showed that the turning point for the share of manufacturing output and employment has declined to a lower level of per capita income than

experienced previously. This, they argued, could be either due to: (i) manufacturing employment growing in the employment sector, or (ii) countries industrializing based on current comparative advantage (Washington consensus industrial policies) rather than long-term dynamic comparative advantage (state-driven industrial policies).

Rodrik (2016) argued that premature deindustrialization in developing countries are driven by globalization and labour-saving technological progress in manufacturing; due to technological progress in other countries, rise of China and domestic trade liberalization, the relative price of manufactures decline. Hence, this reduction in the relative prices of manufactures in world markets would exceed the productivity growth differential between manufacturing and non-manufacturing sectors.

More recent research on deindustrialization has shifted towards micro-level analysis. Bernard et al (2017) used microdata to show that deindustrialization in advanced economies could involve two phenomena: (i) firms transiting from the manufacturing to service industry, and (ii) continuing firms evolving into more service-like enterprises. This micro-level approach has not been extended to the study of premature deindustrialization in developing countries.

2.3 Premature Deindustrialization and Global Value Chain

As discussed earlier, premature deindustrialization has been linked to trade. It is not surprising that with the advent of GVCs, some attention has begun to be paid to the possible role of GVCs in premature deindustrialization. In an early work indirectly related to this topic, Nicoud-Robert (2008) argued that offshoring can delay deindustrialization by maintaining the comparative advantage of industrialized countries in complex or strategic functions. This implies that countries experiencing premature deindustrialization are those unable to do the aforementioned.

Stijepic (2011) also argued that offshoring can slowdown the process of deindustrialization, albeit through a different process. Offshoring enhances the productivity of the manufacturing sector, which drives the reallocation of labour from consumption goods production to investment goods production.

In a more recent paper, Sumner (2019) argued that premature deindustrialization is related to GVCs through several channels, namely: (i) trade liberalization and the decline in relative prices of manufactured goods; (ii) developing countries trapped in low value-added sections of GVCs, and (iii) spreading and thinning out of manufacturing activities across increasingly large

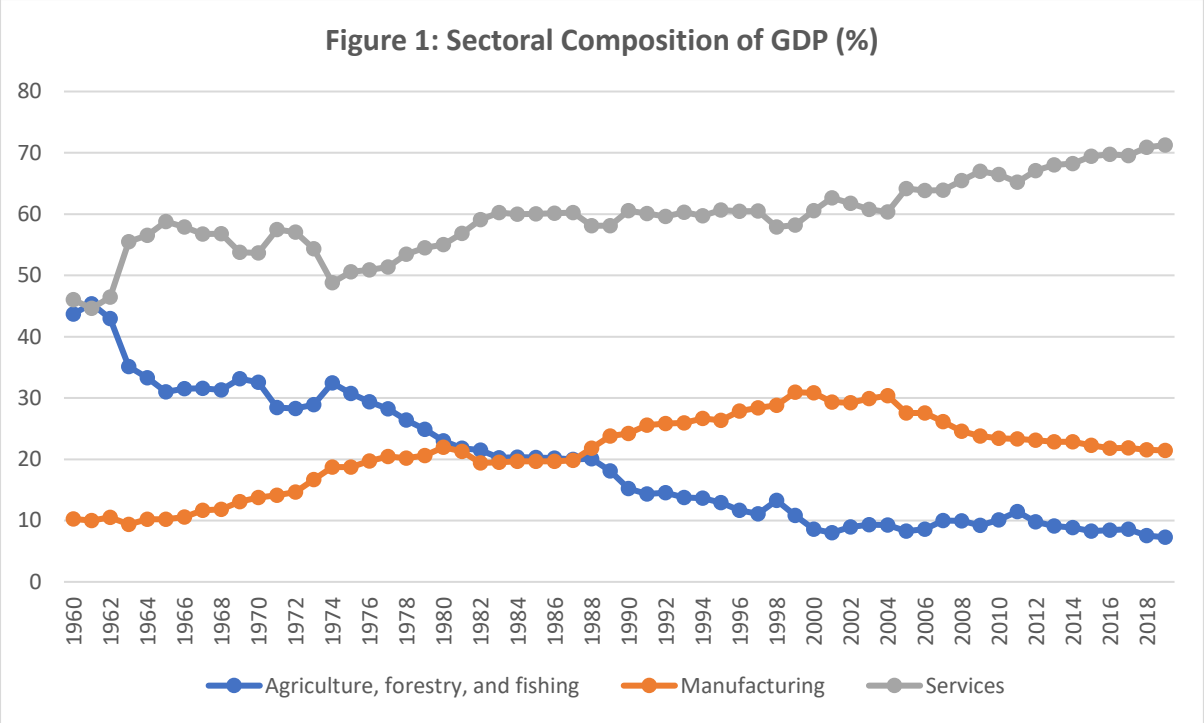
numbers of developing countries. Finally, a lack of institutions that can upgrade GVC engagement could be why countries engaged with GVCs could deindustrialize prematurely. Sumner (2019) has argued that such institutions promote contract completeness, lower administrative burden, business friendliness, stable policies and labour market-enhancing outcomes for workers. In this regard, World Bank (2020) provides a broad list of institutions that are important for upgrading GVC participation. These include institutions for governance, standards certification, contracts, and intellectual property rights.

3. Structural Change in the Malaysian Economy

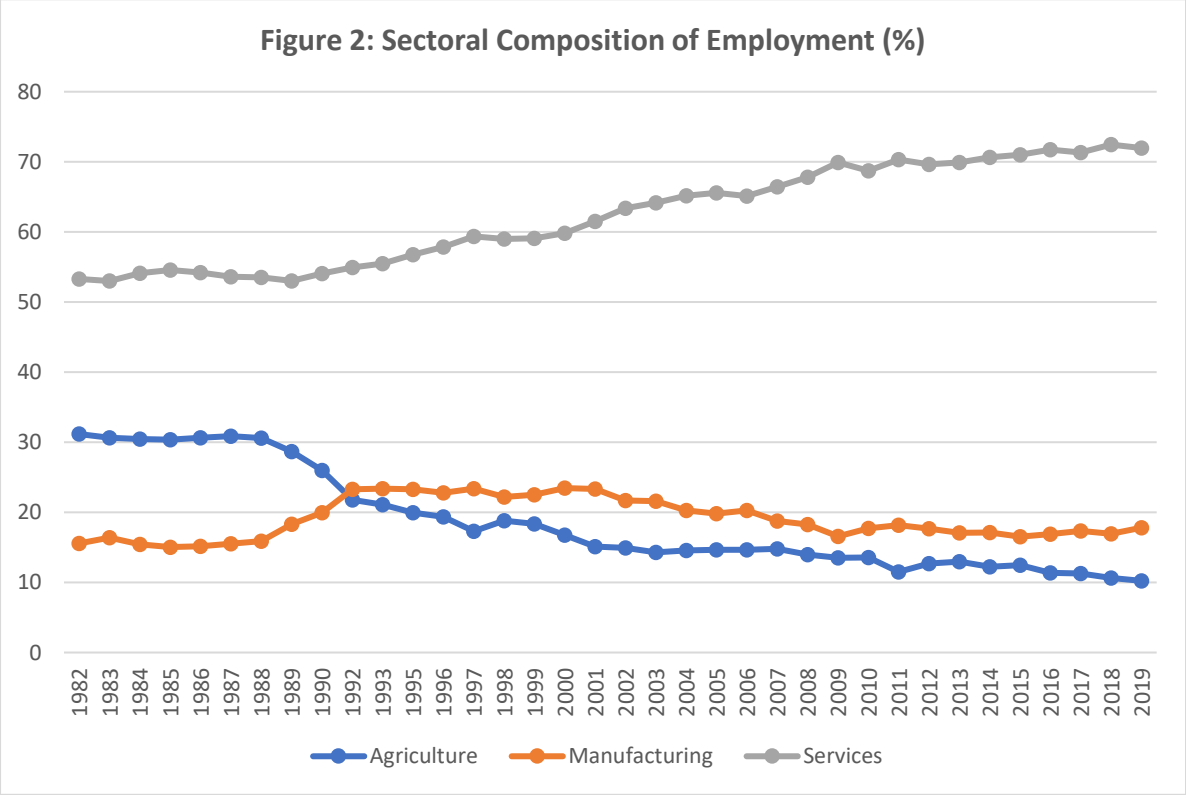
Structural Change at the Broad Level

Malaysia's experiences in the structural change of its economy is similar to many countries which have undergone the process of industrialization and de-industrialization. There are several distinct phases or stages in the trajectory of the structural change. In the first phase, covering the period from the late 19th century until the 1960s, the primary sector (agriculture, tin, rubber and mining) predominated the economy. From the 1960s onwards, the agriculture sectors' role in the Malaysian economy – in terms of GDP share – began to decline continuously from 45% in 1961 to 7% in 2019 (**Figure 1**). In the second phase, which covers the period of the 1960s until 1999, the manufacturing sector's share of GDP increased. In the third phase (1999 – today), the relative contribution of the manufacturing sector began to decline; this is the deindustrialization phase. Malaysia's deindustrialization can be regarded as "premature" as it has occurred at a per capita income level considerably lower than that experienced by developed nations in the past (Rasiah, 2011 and Tan, 2014).

Another often-used measure of structural change is the sectoral composition of total employment. Available data suggest that the manufacturing sector's share of total employment reached a plateau of 23% at around 1992 and began declining since 2001 to reach a low of 16% in 2009 (**Figure 2**). Thereafter, it has been fluctuating around 16-18%. Although the relative decline of manufacturing is less drastic compared to that of suggested by sectoral GDP data, employment data also indicates that Malaysia has been experiencing deindustrialization since the 1990s.



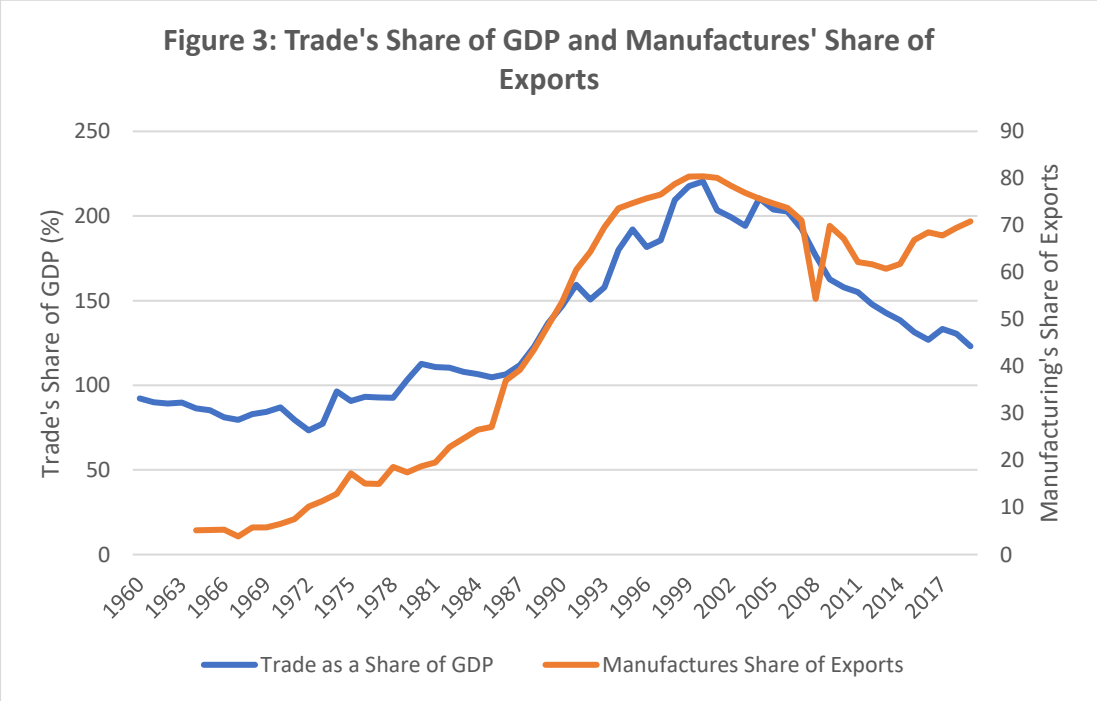
Source: World Bank



Source: World Bank

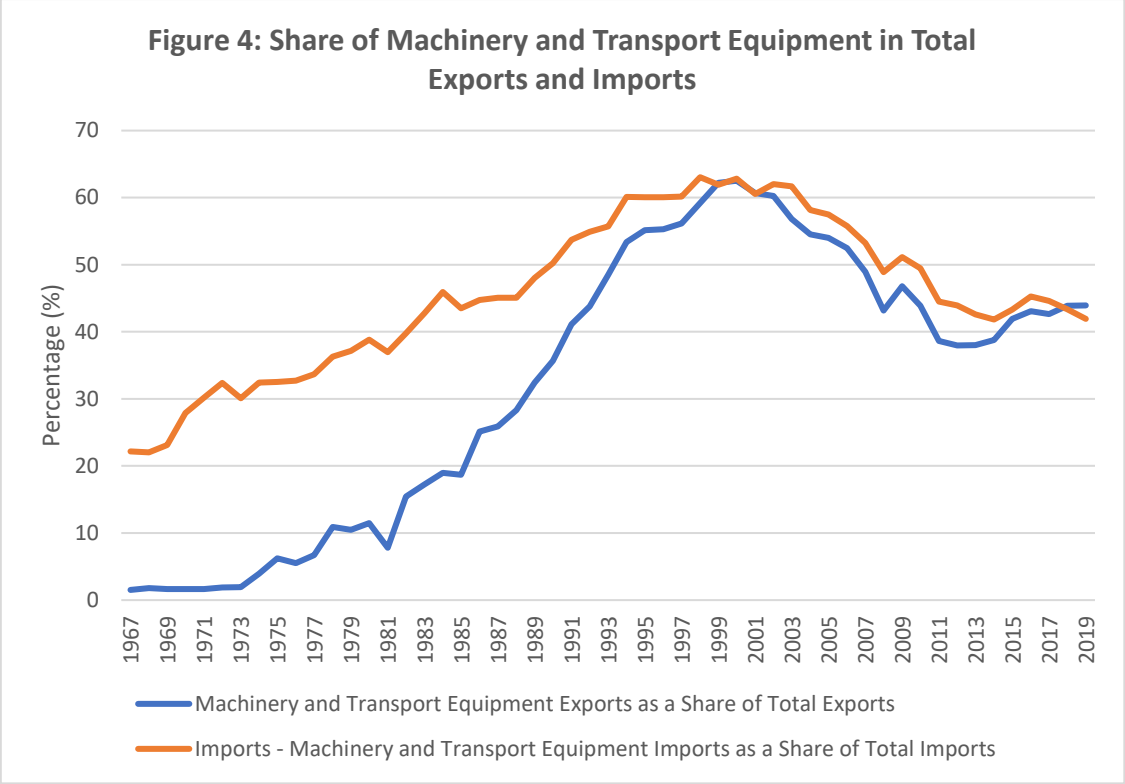
Structural Change in Manufactured Exports

Given that much of Malaysia's manufactured products are exported, the relative decline in manufacturing is also reflected in the decline observed in the share of manufactures in total merchandise exports and that of trade in GDP (**Figure 3**). The country's share of manufactures of exports peaked at 80% in 2000. Though this share increased after 2013, the level remains below 70%. The decline in the country's trade ratio is more conclusive – having peaked at 159% in 1991 but declining to 123% in 2019.

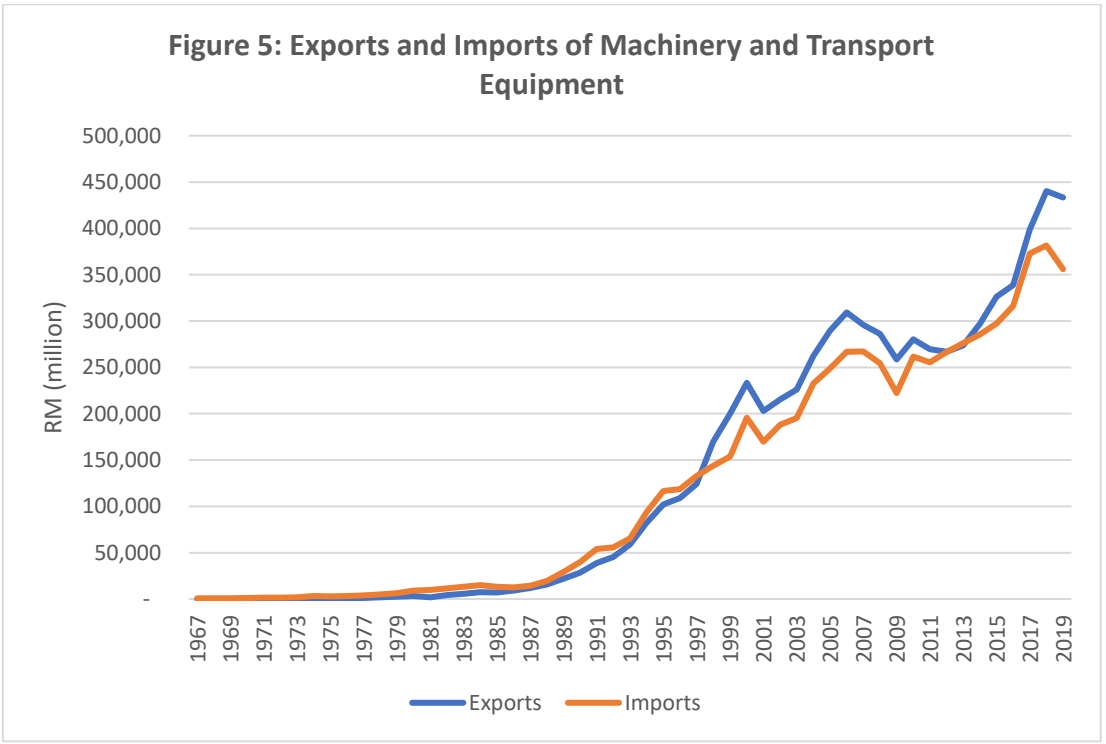


Source: World Bank

A key component of the relative decline in the manufacturing sector in Malaysia has been the relative decline in the export of machinery and transport equipment (**Figure 4**). At its peak in 1998, machinery and transport equipment exports accounted for 63% of Malaysia's total exports but declined thereafter to a low of 38% in 2012. The industry's share of exports has since recovered only slightly, reaching 44% in 2019. In terms of volume of exports and imports of machinery and transport equipment, there was a decline in the total value of machinery and transport equipment between 2006 to 2009.

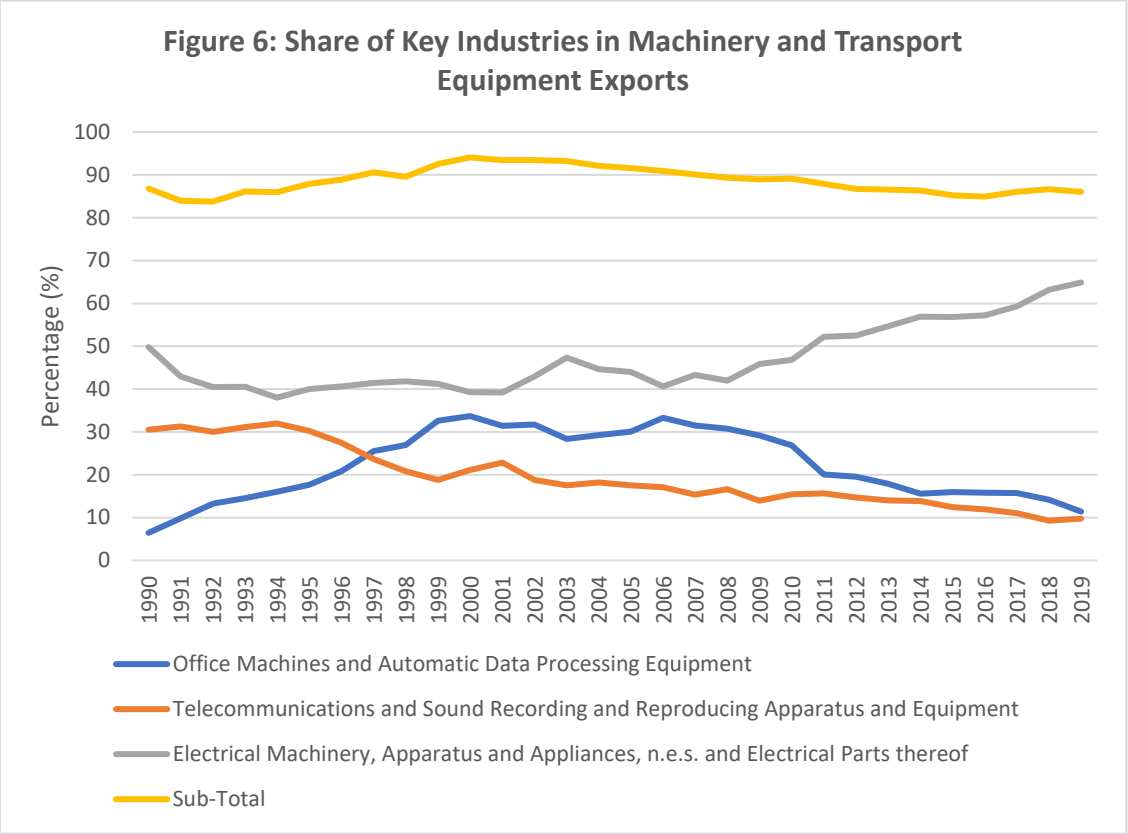


Source: Department of Statistics, Malaysia



Source: Department of Statistics, Malaysia

Within the machinery and transport industry (SITC-1 Code 7), three sub-industries dominate, namely: (i) office machines and automatic data processing equipment [SITC-2 code 75] (ii) telecommunications and sound recording and reproducing apparatus and equipment [76] (iii) electrical machinery, apparatus and appliances, n.e.s. and electrical parts thereof [77]. These three sub-industries account for between 86%-94% of exports from the machinery and equipment industry (**Figure 6**). However, the share of electrical machinery, apparatus and appliances of exports has clearly increased from 41% in 2006 to 66% in 2020. In contrast, the shares of each of the other two sub-industries have declined to about 10%. The total value of exports from the office machines and automatic data processing equipment industry has actually declined since 2006 (**Figure 7**). About 80% of the exports from the electrical machinery, apparatus and appliances industry (777) comes from one industry namely: thermionic valves and tubes, and photocells etc. (SITC-3 Code 776).



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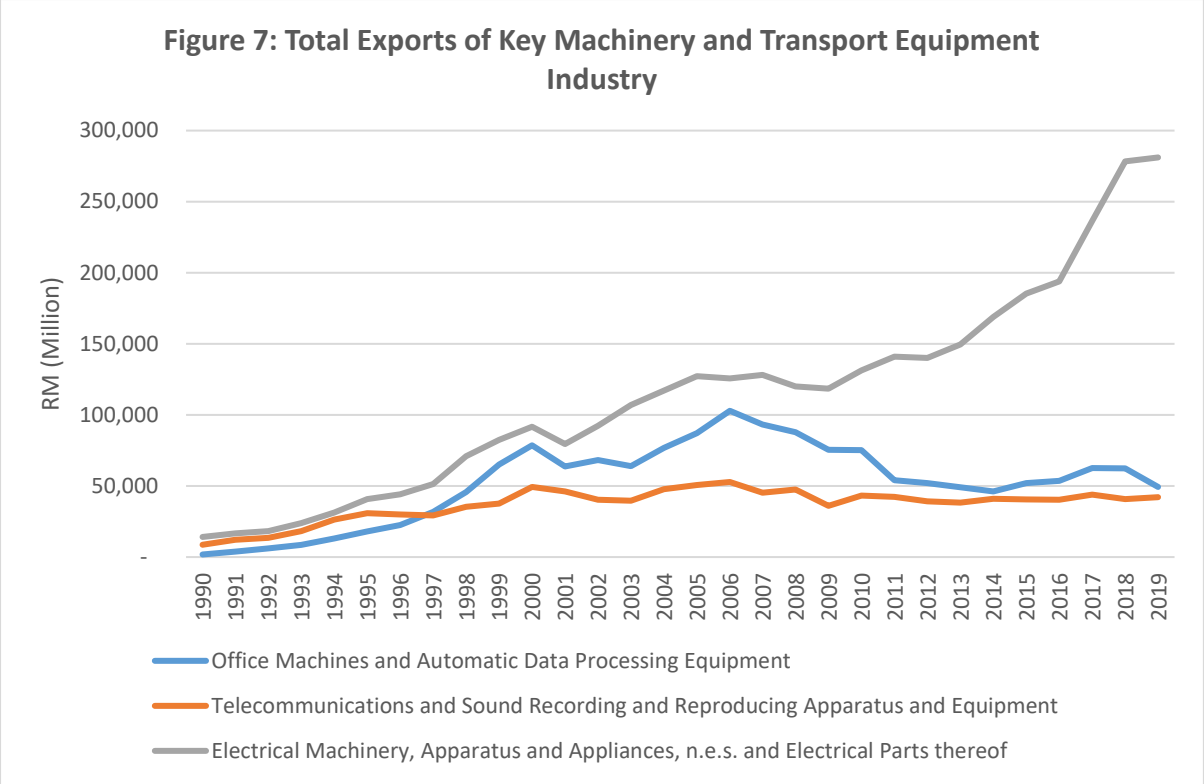
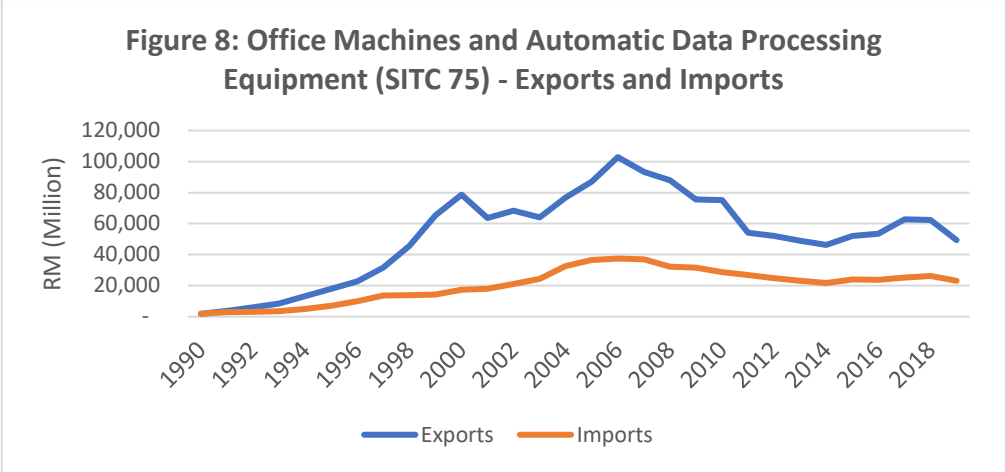


Source: Department of Statistics, Malaysia

A potential source of structural change in Malaysia's machinery and transport equipment industry is the country's participation in the global value chains. An analysis of the trends within the three key sub-industries could provide useful insights. For the office machines and automatic data processing equipment industry [SITC 75], the decline in exports after 2006 was also accompanied by a decline in imports, with the gap between the two narrowing (**Figure 8**). In the case of the telecommunications and sound recording and reproducing apparatus and equipment industry [SITC 76], exports first declined (2006-2012) and stabilized thereafter (2007-2019) (**Figure 9**). However, imports continued to increase over time – resulting in a higher import/export ratio. The exports-imports trends for the electrical machinery, apparatus, and appliances industry (SITC 77) are quite different (**Figure 10**). From 1990 to 2010, the value of imports exceeded exports in this industry. However, after 2010, not only did exports exceed imports, the gap between the two widened. As far as global value chains (GVCs) are important in the machinery and transport equipment industry, the changes in exports and imports trends in this industry could reflect changes in the country's participation in GVCs.



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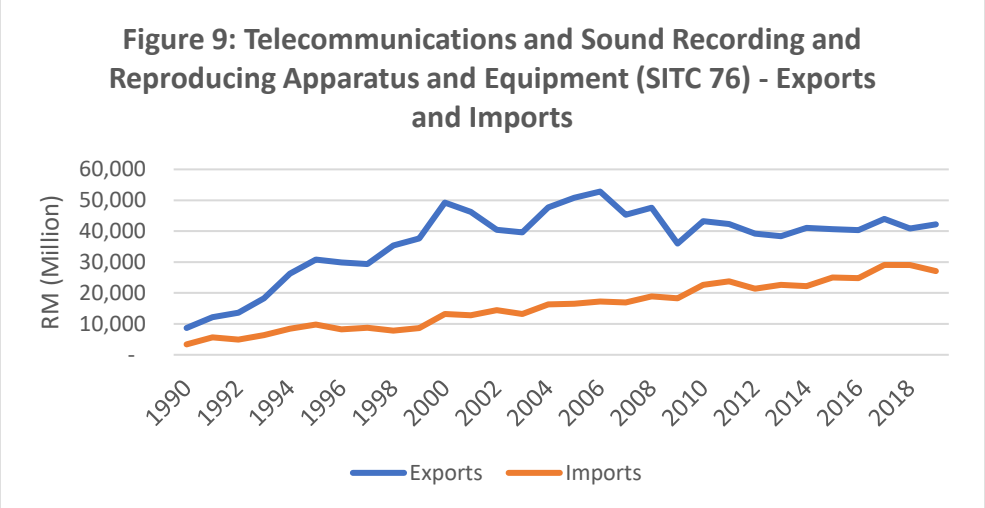

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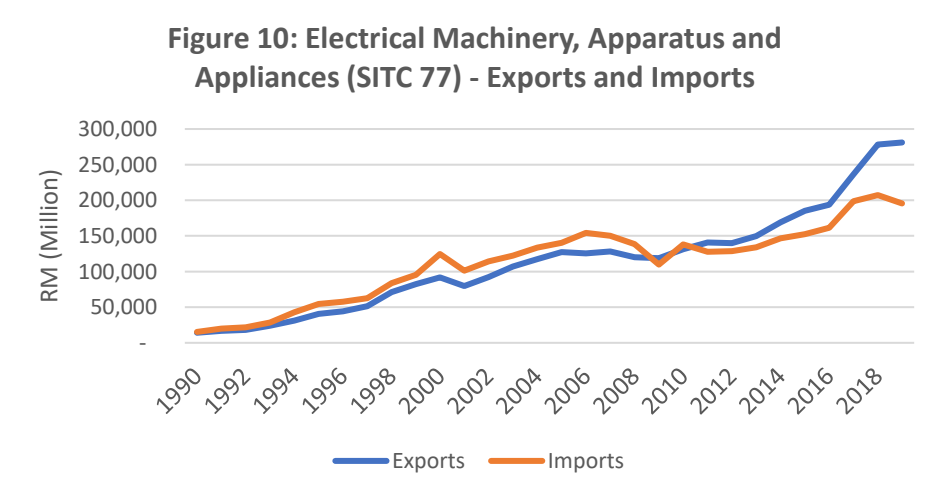
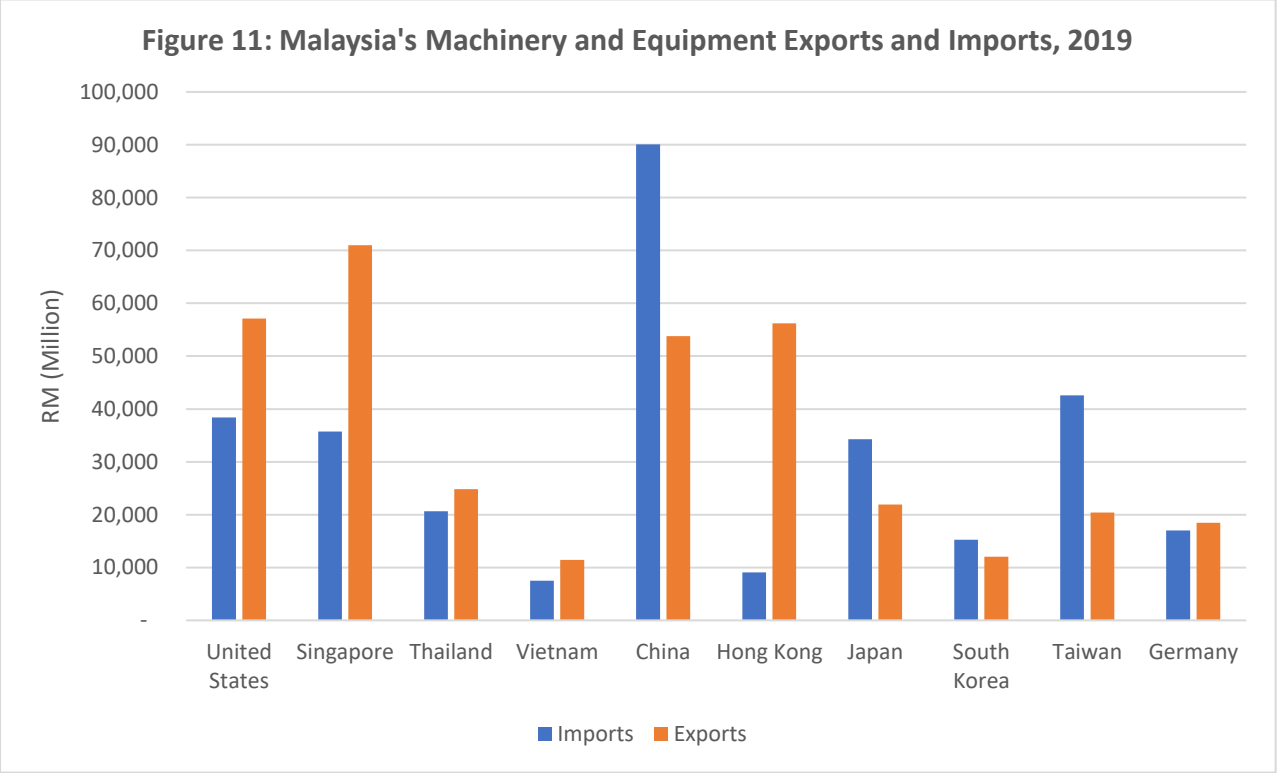


Source: Department of Statistics, Malaysia

The two industries – SITC 75 and SITC 76 - that have experienced a decline in exports, seem to indicate that production fragmentation could have shifted the production of some of components away (from Malaysia) to other countries. The experience of the electrical machinery, apparatus and appliances industry (SITC 77) could be the reverse – more electronic components are now produced and exported than incorporated into final good exports.

Finally, ten countries account for 87% and 80% of Malaysia's imports and exports of machinery and equipment, respectively (**Figure 11**). The trade balance in this industry differs across countries. The largest source of imports in 2019 is China – Malaysia has a substantial trade deficit in this industry. Malaysia has substantial surplus in machinery and equipment trade with United States, Singapore, and Hong Kong.



Source: Department of Statistics, Malaysia

It is difficult to draw any definitive conclusions of how the GVCs have evolved without comparing the sources of value-added creation in terms of domestic and foreign dimensions. This issue is examined in the next section.

4. Malaysia's Participation in Global Value Chain

4.1 Global Value Chains: Definition and Measurement

Antras (2020, p.3) defines a global value chain or GVC as consisting of "a series of stages involved in producing a product or service that is sold to consumers, with each stage adding value, and with at least two stages being produced in different countries. A firm participates in a GVC if it produces at least one stage in a GVC."[7] An important characteristic of a GVC is the structure of the production networks. Elements of these networks include spider-like structures (with inputs are simultaneously sourced from different countries) or snake-like structures (in which value is added sequentially).[8] The goal of measuring GVC is to identify and quantify the distribution of value added at the different stages of production across different countries.

A measure of GVC-related trade is the share of total trade that flows through at least two borders (Borin and Mancini, 2015, 2019). Two highly aggregated measures of GVC participation are:

- **Backward GVC Participation** of country i – country i's imports embodied in country i's exports / country i's total exports
- **Forward GVC Participation** of country i – exports of country i that are embodied in other countries exports / other countries' exports

These two measures are used to characterize the position of a country's GVC participation. The factor endowment of a country will affect its GVC position. Countries that are more abundant with physical capital and skilled labour tend to have higher levels of forward GVC participation and lower levels of backward GVC participation (World Bank, 2020).

It is technically difficult to measure GVC participation using trade statistics, which measure trade flows that cross through one border. It is for this reason that input-output data is often used to measure GVC participation. Several sources of data are often used for international comparisons of GVC. They include: World Input-Output database (WIOD, 2000-2014), Trade in Value-Added (TiVA, 2005-2015) and the UNCTAD-Eora Global Value Chain database (Eora, 1990-2017). Malaysia is only covered in the TiVA and Eora databases.

[7] The boundaries between production and post-production can be blurry. Some manufactures prefer to lease out their products rathe them selling them outright.
[8] See Baldwin and Venables (2013).

4.2 Global Evolution of GVCs

An analysis of Malaysia's participation requires some understanding of the evolution of GVCs. GVC trade grew very rapidly in the 1990s and 2000s (World Bank, 2020). However, this trend began to reverse after the Global Financial Crisis in 2008. The decline has been attributed to lower growth and a decrease in trade-to-income elasticity (World Bank, 2020). The latter has been attributed to more countries "internalising" a larger extent of the value chain. As a result, almost all major exporters of electrical and electronic goods experienced a decline in the share of intermediate imports (World Bank, 2016).

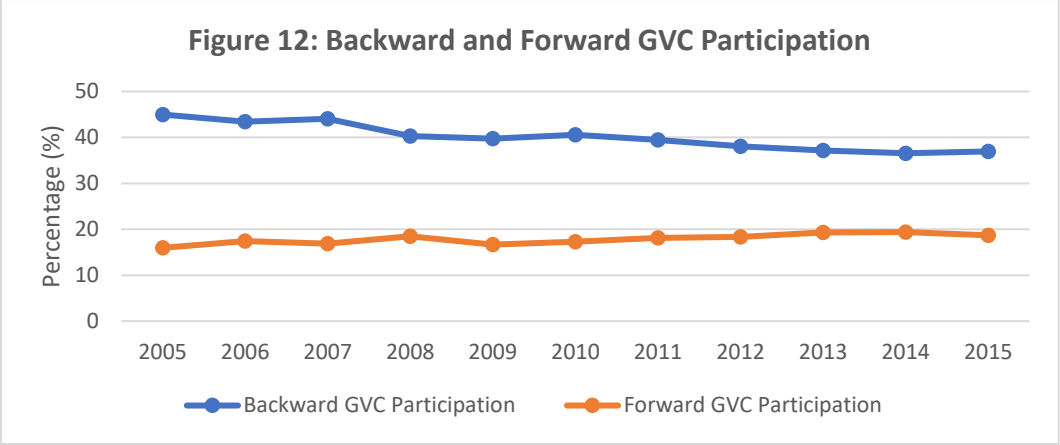
GVC participation differs across countries and time. Some countries' GVC participation position has declined while other have increased. These changes are related to geographical proximity and trade agreements (Johnson and Noguera, 2017). Another important feature is the length of the GVC measured by the number of production stages across countries. In general, there has been an overall increase in the length of GVCs (De Backer and Miroudot, 2013). The centrality of GVC networks has also changed such as in Asia's GVC networks where the centrality of Japanese industries has declined (Criscuolo and Timmis, 2018). These changes have important implications for Malaysia's participation in GVCs.

4.3 Malaysia - Macro Evidence

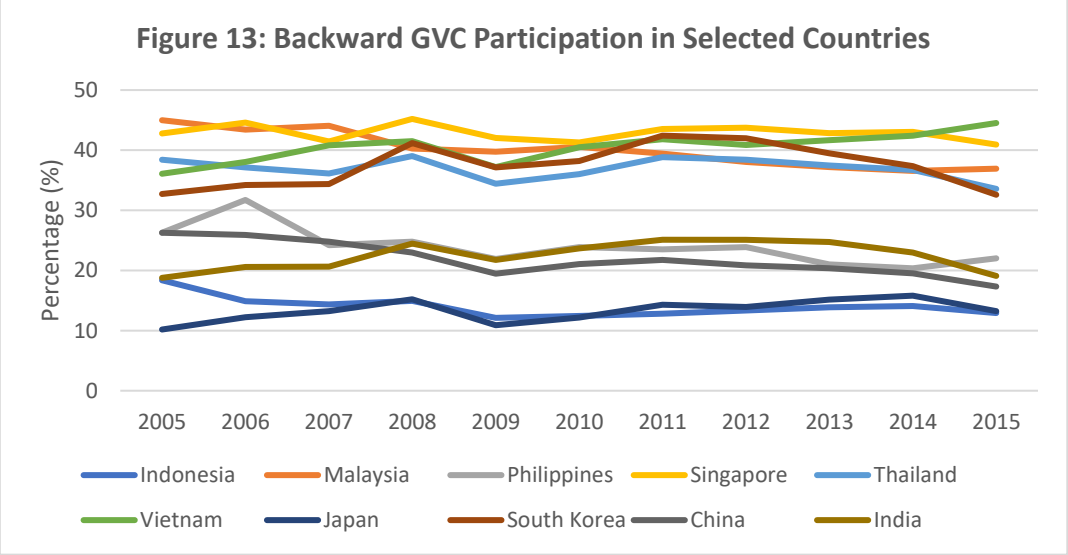
Trends in Malaysia's GVC Participation

Malaysia's overall backward GVC participation has declined consistently from 45% in 2005 to 37% in 2015 (**Figure 12**). This is in contrast to the experiences of other industrialized and industrializing countries in Asia; these other countries increased their backward GVC participation during the period of 2009-2013 (**Figure 13**). Malaysia's overall forward GVC participation remained relatively stable during the period 2005-2015, fluctuating between 16% and 19%.

A more detailed look at the experience of the manufacturing sector indicates that the decline in backward GVC participation was prevalent across almost all the manufacturing industries (**Figure 14**). The machinery and equipment industry had, on average, the highest degree of backward GVC participation across all industries. However, the computer, electronic and optical products industry experienced a 12% decline in backward GVC participation during the 2005-2016 period.

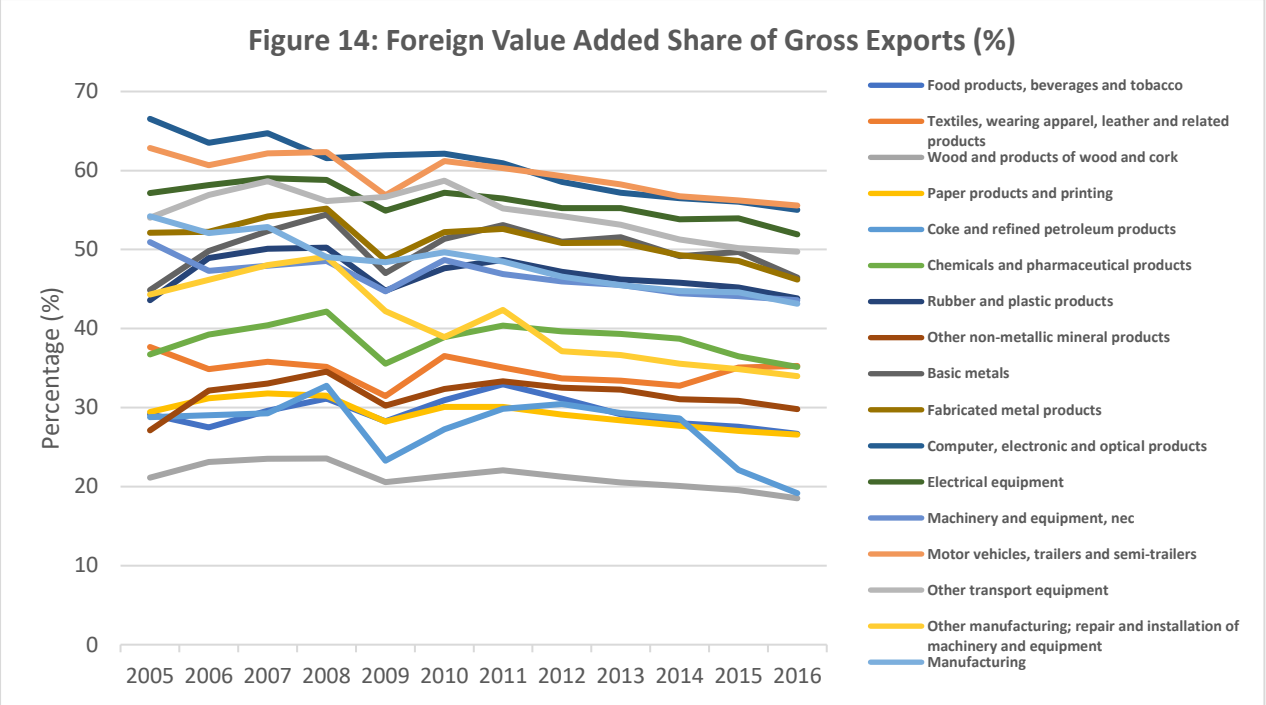


Source: TiVA, OECD

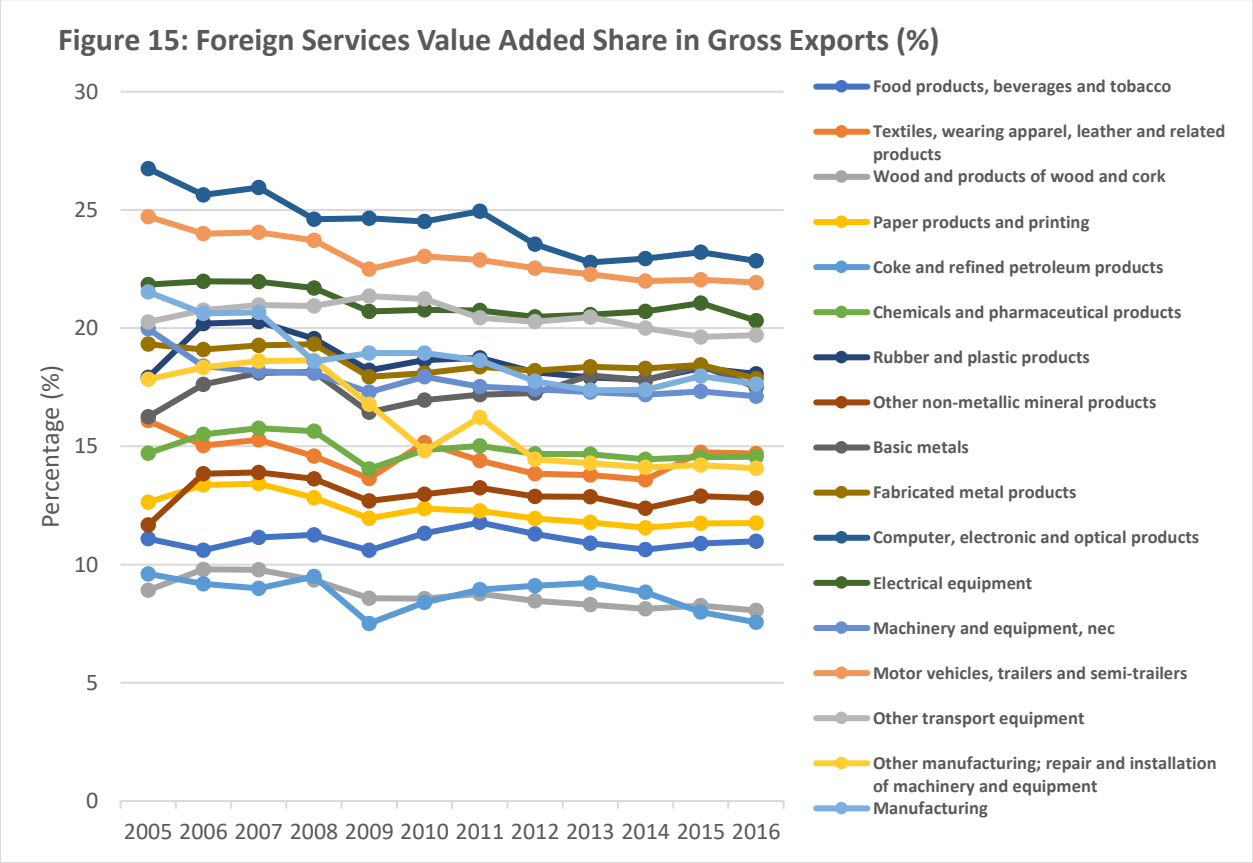


Source: TiVA, OECD

Some have argued that the relative decline in manufacturing could be due to the services sector – either through outsourcing of services inputs and/or through manufacturing firms engaging in providing services. Based on input-output data, there is no evidence that services inputs into manufacturing has increased. The reverse has happened in many industries; the foreign services value-added share of exports – the equivalent of a "backward GVC participation for services" - has declined for most manufacturing industries (**Figure 15**). Thus, Malaysia's reduction in GVC participation has two dimensions – one through the manufacturing, the other through services.



Source: TiVA, OECD



Source: TiVA, OECD

Manufacturing Exports Growth and GVCs

The GVC's contribution to the growth of manufacturing exports can be examined by decomposing gross export growth (EXGR) into several components - domestic direct value-added component (EXGRDD), domestic indirect value-added component (EXGRDI) and foreign value-added component (EXGRF) (World Bank 2016, p.117). The panel-data econometric specification for industry *i* at time *t* is modelled as follows:

$$D.lnEXGR_{it} = \alpha_0 + \alpha_{1t} D.lnEXGRDD_{it} + \alpha_2 D.lnEXGRDI_{it} + \alpha_3 D.lnEXGRF_{it} + \varepsilon_{it} \quad (1)$$

Industry level data at the 2-digit level based on input-output tables from TiVA (OECD) is used. The data covers the period 2006-2015. GVC participation is captured through the EXGRF variable which proxies backward GVC participation. The summary statistics of the data is provided in **Table 1**. There are 160 observations in the panel data. The average size of foreign value-added component is slightly less than half of the size of gross exports. The variations across industry are fairly significant for all the variables.

Table 1: Summary Statistics for Gross Exports and Input Components

Variable	Obs	Mean	Std. Dev.	Min	Max
EXGR	160	9159.731	14081.23	693.5	67974.8
EXGRDD	160	2351.579	3619.799	119.7	17291.9
EXGRDI	160	2381.264	2770.219	175.2	12136.4
EXGRF	160	4398.583	8476.529	216.3	43993.5

Separate regressions were also undertaken for industries with extensive GVC participation. Two distinct periods were also analysed – before and after the Global Financial Crisis (GFC) in 2008-2009. Thus, four separate regressions were undertaken for the following data segments: (i) All industries (ii) Electronics, Electrical and Machinery (EEM) industry (iii) 2006-2008 (iv) 2011-2015. The Hausman specification test indicates that a random effects model should be used. The results are summarized in **Table 2** below.

Table 2: Drivers of Export Growth in Malaysian Manufacturing

	(1)	(2)	(3)	(4)
	ALL	EEM	< 2009	> 2010
VARIABLES	EXGR	EXGR	EXGR	EXGR
EXGRDD	0.260***	0.315***	0.230***	0.325***
	(0.0144)	(0.014)	(0.0174)	(0.018)
EXGRIDI	0.258***	0.167***	0.243***	0.312***
	(0.0157)	(0.0125)	(0.027)	(0.0192)
EXGRF	0.442***	0.535***	0.489***	0.339***
	-0.0146	-0.0145	-0.0299	-0.0177
Constant	0.00187	-0.00157	0.00299	-0.00263
	(0.00147)	(0.00121)	(0.00389)	(0.0017)
Observations	160	30	48	80
Number of ind	16	3	16	16
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

The results indicate that as much as 44% of gross exports growth of the manufacturing sector are driven by foreign value-added components. This figure rises to 53% for the electronics, electrical and machinery industries. Comparing the period before and after the GFC, the contribution of foreign value-added to manufactured exports declined from 49% to 34%.Thus, GVCs' contribution to export growth has declined over time. This is consistent with the observation that Malaysia has become less plugged into GVC networks (World Bank, 2016, p.97).

4.4 Malaysia - Micro Evidence

GVC participation at the firm level in the manufacturing sector can be analysed using probit estimation:

$$Y_i = \boldsymbol{X}_i'\beta_1 + \boldsymbol{D}_i'\beta_2 + \varepsilon_i \qquad (2)$$

Where Y is binary variable indicating GVC participation, $\boldsymbol{X}$ the vector of firm characteristics (age, ownership, human capital, ICT usage, innovation) and $\boldsymbol{D}$ the vector of industry dummies.

Table 3 provides a summary of the variables used in the analysis. A firm is defined as a participant in GVCs if it simultaneously exports and imports.

Table 3: Description of Variables

Variable	Description
GVC	The variable takes on the value of 1 if a firm exports and imports simultaneously, it is 0 otherwise
Size	Number of workers
Age	Number of years since establishment
Foreign	Percentage of equity owned by foreigners
Product Innovation	The variable takes on the value of 1 if a firm has product innovation, it is 0 otherwise
SkillPW	Percentage of production workers that are skilled
SkillNPW	Percentage of non-production workers that are skilled
Email	The variable takes on the value of 1 if a firm uses email for business
Website	The variable takes on the value of 1 if a firm uses a website for business

The data used for this analysis was obtained from the World Bank's enterprise survey for Malaysia covering the year 2015. There are a total of 581 firms from the manufacturing sector in the dataset. **Table 4** provides a summary statistic of the data. The average firm size indicates that the sample data is biased towards large firms. This could explain that 32% of firms participated in GVCs.

Table 4: Summary Statistics

Variable	**Obs**	**Yes**	**%**	**No**	**%**
GVC	581	189	32	392	68
Product Innovation	581	70	12	511	88
Email	581	440	76	141	24
Website	581	332	57	249	43
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Size (workers)	568	2249	498	2	5160
Age (Years)	581	46	203	8	2029
Foreign Ownership (%)	581	9	19	0	100
Skill Prod Workers (%)	572	84	21	0	100
Skill Non-Prod Workers (%)	549	78	31	0	100

The results of the estimates are summarized in **Table 5**. For all manufacturing firms, the propensity to participate in GVCs is related to several factors such as size (+), foreign ownership (+), product innovation (+) and proportion on skilled non-production workers (-).

The results are weaker for the sub-sample for electronics electrical and machinery (EEM). Only two explanatory variables are statistically significant for two variables – age (+) and proportion of skilled non-production workers (-). It is plausible that older firms involved in the EEM industries that have participated in GVCs for a long time have continued to do so. The negative coefficient of the skilled non-production workers indicates that Malaysia's GVC participation by firms in the sector is on the relatively lower end of the technology ladder. This is consistent with evidence on Malaysia's position being further upstream in the value chain (World Bank, 2016).

Table 5: Determinants of GVC Participation

Variables	**ALL**	**EEM**
Size	0.135***	-0.0226
	(0.0521)	(0.112)
Age	-0.0002	0.0373**
	(0.000382)	(0.0189)
Foreign Ownership	0.0116***	0.0104
	(0.0037)	(0.0063)
Product Innovation	1.032***	0.434
	(0.195)	(0.43)
Skilled Production Workers	9.66E-05	0.00186
	(0.00314)	(0.00694)
Skilled Non-Production Workers	-0.00814***	-0.0126***
	(0.00207)	(0.00422)
Email	-0.0578	0.201
	(0.161)	(0.344)
Website	-0.101	-0.423
	(0.15)	(0.312)
Industry Dummies	Yes	Yes
Constant	-0.407	0.523
	-0.567	-1.039
Observations	536	110
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

5. Conclusions

The Malaysian economy has been undergoing premature deindustrialization for the past two decades. Some of the key components of the electronic, electrical and machinery (EEM) industries have declined relative to others. Part of this is likely due to a decline in the country's GVC participation in these industries. Macro evidence suggests that this is amplified by the importance of foreign value added in the manufacturing sector. Micro-level evidence also provides some clues pointing to the EEM firms being possibly stuck at lower-level technologies.

Given the importance of manufacturing as a driver of the country's future growth, there are a number of key policy implications from the empirical findings of this study. Greater focus on human capital development and technological innovation are likely to be important drivers that require greater policy attention. Although this study did not include institutional factors in the empirical analysis, the research literature on GVCs does point to the importance of institutions. Hence, institutional reforms – focusing on regulatory and legal environment – should be another area of focus.

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