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Abstract

Increased international outsourcings have spurred trade in intermediate goods, which is termed as processing trade. Malaysia is one the countries that actively participating in the processing trade activities in the Asian region. While empirical evidences in other countries clearly indicate the unfavorable effects on local economies, empirical works to quantify the impact of increased international outsourcing in Malaysia are clearly lagged behind. The fact is that the conventional national accounts framework does not separate the processing trade activities in the calculation of gross domestic products (GDP). In this paper, we further improve the GDP accounting by separating the manufacturing sectors according to domestic and processing trade sectors, and integrating them consistently in a so-called ‘dualistic’ input-output table. Results clearly show that the processing trade sectors do not only associated with higher foreign content but also have lower growth linkages to the domestic economy. From the overall processing exports, only 39.6% are benefited to the domestic value added while another 60.4% are attributed to foreign content. Based on the findings, we strongly suggest the government to review the current Free Zone policies by putting more emphasize on the domestic manufacturing sectors and finding new focused sectors for exports.

Processing Trade Activities in Malaysia: Measure and Contribution to Domestic Economy

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**1. Introduction**

Rapid globalization has transformed the current international trade practices. Most of the goods nowadays are not produced in a single location, whereby the production activities have been fragmented and outsourced globally. From the design of the product to the manufacture of the components, assembly, processing, and packaging activities are distributed from one country to another country (Cadarso et al., 2008). As results, trade in parts, components and intermediate goods has grown at a faster pace as compared to the trade in final product (IDE-JETRO and WTO, 2011). In the past 14 years world exports of intermediate goods have tremendously increased by 93% from 1995 to 2009 (US$ 2,774 to US$5,373 billion), with an average growth rate of 4.8% per annum. In fact, Malaysia is ranked number four among the major Asian traders who own huge share of intermediate goods in the country trade account, constituted 68% of the country total exports and 72% of its total imports for non-fuel goods in 2009 (IDE-JETRO & WTO, 2011).

Widespread practices on international outsourcing, trade fragmentation and processing trade have raised concerns and debates on proper accounting approach of the trade as wells the impacts towards the value added, firms productivity, society, and environment (see Koopman, 2012; Timmer, 2014; Zhang et al., 2012; Xia et. Al., 2014; Yu and Tian, 2012; Wang and Yu, 2012)[[1]](#footnote-1). This is because today trade seems to be deviated from the normal trade practice, moving from “trade in goods” towards to the “trade in task” which encourage specialization of different economies in particular task that adds value along the production chain (IDE-JETRO & WTO, 2011). Therefore, the traditional practice in accounting for exports must be improved to reduce bias and misleading in interpreting the contribution of exports to the gross value of the goods instead of the amount that the country actually adds or contributes to the products (Zhang et al., 2012).

Given the considerable growth in outsourcing activities it is not surprising that a sizeable amount of research has now been devoted to attempting to understand the causes and consequences of this disintegration of production. Empirical works across developing countries clearly show that international outsourcing is unlikely to have substantial contribution to the generation of gross domestic products (see Koopman et al., 2012) but rather enlarges income inequality (see Ho et al., 2005), lower productivity spillover (see Gӧrg and Hanleya, 2005) and reduces CO2 emission (see Su et al., 2013). In the context of employment, it generates less employment as compare to the normal export industries, mostly hires low skilled labors, and pays lowest wages to the workers (Feenstra and Hong, 2010; Chen et al., 2012; Wang and Yu, 212; and Yu and Tian, 2012).

Malaysia is one of the Asian countries actively participate in processing trade activities with strong support from the government. To-date, Malaysia has developed 35 areas of FTZ which are divided into 18 Free Industrial Zones and 17 Free Commercial Zones (FCZs). However, to the best of our knowledge, the impacts of processing trade activities on the Malaysian economy are completely limited. This is because the current national accounts framework for the estimation of gross domestic product (GDP) does not make distinctions the export-oriented sectors into processing trade activities and normal trade activities. This lacking has two implications: (i) we do not know exactly the relative size and contribution of processing trade activities on macroeconomic indicators, and (ii) we do not know the magnitude spillover effects of processing trade activities into the local economy. Thus, this paper develops a so-called ‘dualistic’ input-output table that separate an export-oriented sector into processing trade and normal trade activities. Based on the dualistic input-output table, we analyze the structural characteristics of the processing trade activities and their contribution to the domestic economy.

This paper is structured into five sections. Next section illustrates briefly the concept of processing trade activities or outsourcings. It also reviews cross-countries studies on the impacts of processing trade activities on domestic economy. Section 3 presents our methodology for the construction of the dualistic input-output table along with the data sources. Section 4 presents the main findings from our analysis. Section 5 provides concluding remarks.

**2. Empirical Evidences on Impacts of Processing Trade**

The key idea behind the processing trade is that countries increasingly link sequentially to produce goods. Processing trade refers to final goods that produced using parts, components, accessories and packaging materials from abroad with free of duty. More formally, processing trade occurs when:

1. A good is produced in two or more sequential stages;
2. Two or more countries provide value-added during the production of the goods; and
3. At least one country must use imported product in its stage of the production process, and some of the resulting output must be exported.

Note that processing trade involves both an import side and an export side. On the import side, processing trade is essentially a subset of intermediate goods trade. While all trades of intermediate goods are consistent with (A) and (B), only the subset of intermediate goods imports that become embodied in exported goods is consistent with the third condition. On the export side, processing trade can involve either intermediate goods or final goods. Figure 1 illustrates an example of processing trade chain involving three countries. Country 1 produces an intermediate good and exports it to Country 2. Country 2 combines the imported intermediates with capital and labor (value added) and domestically produced intermediate input to produce a final good (gross output). Finally, Country 2 exports some of the final goods to Country 3.

**“Insert Figure 1 here”**

This paper estimate and create a new dataset by disaggregated export into processing and non- processing trade sectors with the goal of assessing the value added content of processing trade to the Malaysian economy. Thus, the global paradigm shift in international trade from trade driven by comparative advantage to trade driven by value chain and trade in task that revolutionize international trade worldwide is major motivation of this paper. In particular trade in task has emerged to dominate processing trade. Hence processing trade is conceptualized as a production system where multinational companies are allocated in free industrial zones to import raw material good from abroad and further process it through re-packaging, re-assembling and incorporate additional value before exporting to other countries. This has encouraged specialization of various economies to different processing tasks called trade in tasks.

International outsourcing or domestic content is now a growing phenomenon that led to increase in trade flows in intermediate inputs. This has contributed to the doubling of global export between 1995-2009 with a transaction equivalent between USD 2,774 and USD 5,373 billion. More interesting is that Asian exports of intermediate good grew much faster at 7.2% compared to world average of 4.8%. As such, Asian region is a key player in international outsourcing with Malaysia as one the countries that participated actively. While empirical evidence has clearly revealed the effects of processing trade on other economy, the empirical evidence on the impact of processing trade on the Malaysian economy is still vague.

Furthermore, processing trade has gained more attention in literature due to increasing concern of the impact of processing trade on the domestic economy. More importantly, the benefit of providing free industrial zones in terms of value added and employment to domestic economy is different across the world (see, Hummels et al., 2001; Xikang et al. 2007; Koopman et al., 2008; Xing, 2012; Koopman et al., 2012; Foster-McGregor and Stehrer, 2013). While some economies may benefit from providing free industrial zones, most economies are worst off due to very low backward linkages and the connectivity between the processing trade and domestic firms in those countries.

Most empirical findings suggest that processing trade products contain low domestic value added and employment than the normal trade due to over reliant on foreign intermediate inputs (see for example, Wang and Yu, 2012; Zhang et al., 2012; Xing, 2012). For example, Koopman et al. (2012) reveal that processing exports in China dominate 50% of total exports in 2007 but contribute only 37% to domestic value added. Besides the increasing tendencies that processing trade activities may not show considerable contribution to the domestic value added, there is also the tendency that processing trade would increase pollution in the domestic economy. China’s active participation in the global trade fragmentation activities has contributed the larger carbon dioxide emissions for industrial production which exceeded the consumption based carbon dioxide by 18.8% in 2005 (Lin and Sun, 2010).

Despite that processing trade is consider beneficial in reducing unemployment and improves income re-distribution of workers, the processing firms in China are found to be least effective because they employ low skilled labors with lower wages (Wang and Yu, 2012; Yu and Tian, 2012; Chen et al., 2012b). For instance Wang and Yu (2012), Yu and Tian (2012), Chen et al. (2012) estimate that $1,000 of ordinary (normal) exports from China leads to 0.70 of workers employment per year, and $1,000 of processing exports leads to 0.06 of workers employment per year. In fact, Feenstra and Hong (2010) and Chen et al. (2012) find that employment generated by processing trade is much lower and 3 times less than employment by domestic sectors. As such, Wang and Yu (2012) conclude that processing trade is a double-edged sword since it may help to increase demand and employment of unskilled labor in the domestic economy but the trade activities are specialized in low value added production segment despite of the various incentives given by the government.

This research work creates a new database by disaggregating exports into processing and non- processing trade activities with the aim of examining the impact of processing trade to value added generation in the Malaysian economy. Creating this new dataset is the major contribution to existing body of literature. Following the international best practices, we have estimated the impact of processing trade on value added in Malaysia by using the extended input-output method. The benefits of using the extended input-output analysis in comparison to other methods is it consistency with national accounting and its ability to provide framework to accurately measure the real gain on export of processing and non-processing trade that is relevant for policy makers.

**3. Construction of Dualistic Input-Output Table**

The first sub-section presents the structure of our dualistic input-output table and the standard analysis that can be conducted using the new database. The second sub-section discusses the data sources and estimation technique.

3.1 Accounting for processing trade activities

Input-output model has been widely used in a context of international trade analyses where the interactions between sectors within a single country as well as in a multi-country are explicitly taken into account (see for example, Koopman et al., 2008; Xing, 2012). In relation to the processing trade, input-output table is considerably the most appropriate approach to account for value added and domestic content induced by processing exports. It does not only link explicitly the processing trade industries with normal trade industries but also confirms that all economic flows fulfill the accounting and adding-up constraints and thus ensuring the consistency of the table. Next, let us discusses the input-output structure with special features of processing exports.

Table 1 shows a simplified input-output table with *n* industries when processing trade activities are not separated from the data. For clarification, we define matrix as domestic intermediate deliveries from industry *i* to industry *j*, vector indicates import of intermediate deliveries, vector is domestic value added, vectors and stand for domestic final demands (i.e. private consumption, government consumption, gross fixed capital formation and change in stock) consumption on domestic and imported goods, vectors denotes exports, scalar indicates re-exports, vector is gross output (=input) and scalar *m* is total import (intermediate and final goods).

**“Insert Table 1 here”**

In Table 1, economic flows of processing trade activities are “hidden” and consolidated in the “average” sectors. For example, vector includes both exports by processing activities and normal exports. Specific economic flows on consumption of domestic intermediate inputs, imported intermediate inputs and value added generated by the processing export industries are unknown. To account economic flows of processing trade activities, an extended input-output as in Table 2 is proposed. For a distinction, we use superscript (*D*) and (*P*) to represent production of normal trade and processing trade.

**“Insert Table 2 here”**

There are two main features of this extended input-output table that differs than the standard one (refer to Table 1). First, the “hidden” flows of processing trade activities are now explicitly revealed. For example, we separate the domestic intermediate input into two users: for production of normal exports and for processing trade . Similarly, imported intermediate inputs are distributed into that used by production of normal exports and that of processing trade . Second, this framework provides an estimation of value added generated by the processing trade activities . In contrast, the standard input-output table “averages” the contribution of processing trade activities in to the calculation of GDP.

The connection between Table 1 and Table 2 can be shown be the following accounting identities:

for intermediate demand;

for exports;

for imported intermediate inputs;

for value added; and

for output (=input)

Our framework of disaggregating processing and normal trade activities follows closely the framework of Koopman et al. (2012), Dietzenbacher et al. (2009), Dean et al. (2007) and Chen et al. (2012). Accordingly, all production output that takes place in the free industrial zones are for exports only. In Malaysia, firms that operate in the free industrial zones allow, to some extents, to sell their products into the domestic economy with the permission of the authority. We could not measure outflows from free industrial zones to the domestic economy due to unavailability of data. This limitation is unlikely to affect our estimation because we believe the output volumes of domestic sold by the processing trade activities are marginal.

For modeling purposes, let us start with an expanded modeling with imports separated from the domestic deliveries, the independencies domestic and processing sectors can be shown based on the following system of equations;

(1)

(2)

(3)

(4)

where gives the coefficients for direct requirement of domestic intermediate input used by production of normal export, indicates coefficients for direct requirement of domestic intermediate input used by production of processing exports, and are coefficients for direct imported intermediate goods by production of normal and processing exports, and are coefficients for value added to gross output for production of normal and processing exports, and is the summation of vector consisting ones. Accounting identities ensure that total imports should be to the sum of intermediate and final imported goods (see equation (2)) and adding-up constraint in input-output confirms that total output of a particular sector has to be equal to the sum of domestically produced and imported intermediate goods, and value added (see equations (3) and (4)).

Equation (1) can be transformed and solved in matrix notation as following;

which equivalent to

(5)

where is the identity matrix, is known as the generalized Leontief inverse matrix. Each element of the matrix shows total output effects (both the direct and indirect effects) for any sector *j* to satisfy each unit of final demand.

The generalized Leontief inverse for this expanded model can be computed as follows:

(6)

Substituting (6) into (5), we have:

(7a)

(7b)

The above modeling formulation can be further extended to capture domestic (i.e. value added) and foreign (i.e. intermediate input) content in final demand and export. This can be simplified as follows:

for domestic content (8a)

for foreign content (8b)

where and are diagonal matrices with and as their diagonal elements. In this model formulation, value added and import are assumed to be linearly related to output per sector, in a way that each industry generates value added and import demand in fixed proportions with respect to output. Following the definition of (7), (8) can be expanded as follows:

(9a)

(9b)

The above framework shows the general modeling for the decomposition of value added into processing and ordinary exports. The similar approaches as in (9) can be applied to measure the effects of processing exports on other policy variables such as income, employment, income inequality, productivity and environment indicators.

**3.2 Data sources and estimation**

In Malaysia, processing trade activities can be traced according to the following industrial locations: Free Industrial Zones (FIZ), and Free Commercial Zones (FCZ). In this paper we reduce the scope by concentrating on the FIZ for two main reasons. First, dataset that available for the disaggregation of processing trade activities are superior for the FIZ and they can be linked with other databases. For example, data for processing trade firms that captured in the 2010 Economic Census only cover for the manufacturing sector and these data serve as cross-references for other databases. Second, the manufacturing sector is the key drivers for the Malaysian economy, in particular the Electric and Electronic (E&E) sector and thus, analyzing processing trade activities within the manufacturing sector would provide new insights on the issue of value added content in exports of the sector.

Specifically, FIZ firms mostly concentrate in manufacturing trade activities while FCZ focus on intra-port services such as repackaging, re-bulking, storage and logistic services provider. As mentioned previously, this study focuses only on FIZ as the representation of processing trade activities. From the Companies Commission of Malaysia (CCM) database, FIZ firms consists of 70% number of establishment from the total firms operating in the Free Zones (1670 number of FIZ firms out of the total 2371 FZ firms) and represents 88% of share capital invested in Free Zones throughout Malaysia (RM15 billion from total RM17 billion Free Zones share capital). Hence, FIZ has strong justification to be a representative in studying the nature of international outsourcing and processing trade in Malaysia context.

The main challenge in estimating processing trade activities is data availability. Compare to China, data for processing trade activities in Malaysia are not properly collected by the authority. As a result, we have used all the available information along with assumptions. The disintegration of export sectors between normal trade and processing trade begins with the identification of firms that operate inside the FIZs. Recall that processing trade firms refers to firms that involve with outsourcing activities by enjoying special privileges provided by government and operated inside the FIZs. The “best” of available data that support the estimation of processing trade firms is the report of establishment, compiled by the CCM. The dataset provides information about the firms’ basic information, ownership background, business activity, business address, balance sheet as well as profit and loss account. From the dataset, we have sorted the firms that only operate inside the FIZs by looking at the business addresses.

In the database, there are 1,988 processing trade firms that have the similar business address postcodes with the FIZ areas. However, further filtering the individual firm by using online available information are required to ensure only firms that operate in the FIZs are included in the analysis. There are possibilities that the firms may be placed nearby the FIZ areas but actually they are positioned outside of the zones and are not part of the FIZ firms who enjoy the privileged provided. After the filtering, only 1,670 firms are identified and grouped as processing trade sectors.

The Department of Statistics Malaysia (DOSM) does provide dataset of FIZ manufacturing firms that covers only 50 firms. The dataset provides information regarding the firms’ output, input, value added, salary and assets. However, this dataset is limited and unable to represent the whole processing trade “population”. We run the correlation between firm revenue in the CCM database and output of the 50 firms provided by the DOSM. The objective is to validate whether the CCM revenue data are able to represent the output of processing trade sectors. Results show that revenue and output are highly correlated with 95% degree of similarities. Thus, this has justified the validity of using CCM revenue data to estimate the output of processing firms as well as the total exports of the processing sectors. All in all, the DOSM dataset serves as “control” values for validation and sensitivity analysis.

It should be noted that due to data constraints, our model assumes all output that produced by the processing firms are sold to the foreign market as exports. Based on this assumption, output of processing trade () is equal to the exports (. The similar assumption is used to estimate exports and output of processing trade in China (see for example, Koopman et al., 2012) and in Mexico (see for example, De La Cruz et al., 2011). As shown in Table 2, exports of normal trade ( can be easily obtained by taking a difference between the total exports ( and exports of processing trade (. The total exports are taken directly from the ordinary input-output table while the exports of processing trade are estimated from the CCM dataset.

Generation of value added ( and import requirement ( by the processing trade firms are generalized from the ordinary input-output table. In other words, the same coefficients that derived from the ordinary input-output table of the particular sector are applied for the processing trade sectors. Initially, profit from CCM dataset is adopted to estimate value added because profit is one of the value added components. However, the profit data is unrealistic due to the accounting profit nature that can be in negative values. In this case, it is impossible to be adopted for value added variable in the input-output table. Hence, the value added coefficient for processing trade sectors is generalized from the ordinary input-output table and supplemented by the DOSM data. In other words, any processing trade sector that has the information on value added per output from DOSM dataset is utilized, while estimation for the rest of the sectors is generalized from the ordinary input-output table. We have validated this assumption by comparing our estimate with the China’s processing trade. We compare the value added per output for domestic manufacturing sector and the value added per output for processing manufacturing sectors. Specifically, for the Chinese case the differences are less than 12% while for the Malaysian case, the differences are less than 17%.

Lastly, we compare the value added coefficient for the processing trade sectors between Malaysia and China by calculating the Mean Absolute Deviation (MAD) and Dissimilarity Index (DI)[[2]](#footnote-2). Results show that the two coefficients are comparable with the MAD and DI indices are moderate at 10% and 23% respectively (the first figure indicates that the two coefficients are 90% similar). Altogether, the analyses provide a validation of our estimation.

Due to the data unavailability, imports ( are estimated by calculating the import content that are embodied in the output or export of processing trade. The formula is developed by Hummels et al. (2001) to measure the vertical specialization or imported inputs from the country total output. Initially, the vertical specialization share is estimated from the ordinary input-output table. To get the imports of processing trade firms, we multiply the coefficient for import content with the exports of processing sectors (. Similar to the estimation of value added, we have validated this assumption by comparing it to the China’s processing trade. Results for the MAD and DI are 21% and 20%, respectively. Hence, the Malaysian processing imports are representative and the structures are almost 80% similar to the China’s processing trade.

Subsequently, after output, exports, imports and value added for the processing trade firms have been compiled, the intermediate deliveries matrices ( and are estimated by the means of RAS technique. There are two information are required before we RAS-ing the matrix and . First, the total intermediate demand and the total intermediate inputs must be provided as the targeted column and row. Let us denotes matrix of intermediate deliveries as , then the row sum of matrix can be obtained by using the following accounting identity: . The column sum of matrix and can be obtained by using the following accounting identity: and . These total intermediate demand and the total intermediate inputs will be used as the control total for the RAS technique. The second information are initial estimates of the and matrixes. We cannot apply the intermediate matrix from the national input-output table because it formed only one matrix (. Therefore, the share of total intermediate input will be used to decompose the national intermediate deliveries ( into two: processing () and domestic sectors (. For instance, the total intermediate input for Food sector are RM 280 million, which 20% constituted by Food processing and 80% Food domestic sectors. We use these shares to allocate each intermediate demand delivery between domestic ( and processing (). The similar procedures are applied for the disaggregation for the rest of the sectors. Using the provided control totals and the initial estimates for the intermediate matrixes, the and matrixes are adjusted by using the RAS technique.

**4. Results and Discussion**

This section presents the main findings of the study that analyzed based on the estimated dualistic input-output table. The emphasis is given on the discussion of structural characteristics of the processing trade sectors compared to the domestic sectors and the relative contribution of the processing trade sectors on the domestic economy.

**4.1 Overview of the processing trade sectors**

Our dualistic input-output table consists of 248 sectors while the standard input-output table has 124 sectors. Due to data constraints, not all sectors can be separated into domestic and processing trade sectors. The ‘best” separation only can be achieved for the 56 manufacturing sectors. For exposition, we provide a simplified version of the dualistic input-output table in Appendix 1. In Appendix 1, only 9 aggregated sectors for which domestic and processing trade sectors are distinguished.

Table 3 summarizes the shares of exports and imports for the broad manufacturing sectors. Columns (1) and (2) show the export and import shares at national aggregated sectors, columns (3) to (6) further separate the aggregated sectors into domestic and processing trade sectors. Results in columns (1) and (2) are taken directly from the standard input-output table while results in columns (3) to (6) are derived from our dualistic input-output table. Results in the first column clearly shows that Electronic and Electrical (E&E) sector is the key for the Malaysian exports that contribute 28.37% of the total exports in 2010. But equally important to note that this sector also is the largest import consumer with 25.36%. The other national key export sectors within the manufacturing group are Foods (9.94%), Machineries (8.95%) and Petroleum Refineries (6.66%) sectors.

**“Insert Table 3 here”**

Specifically, from the analysis conducted there are 56 manufacturing sectors classified and categorized under the processing trade sectors. These processing trade sectors contribute approximately 18% (RM85 billion) of the total Malaysian manufacturing exports in 2010 (RM477 billion). Columns (5) and (6) indicate that the (E&E) sector contributes almost half of the processing exports by 50.43% and consumes 60.80% of imported inputs. Specifically, within the processing E&E subsectors, the largest exports are sourced from Semi-Conductor Devices, Electronic Valves, Tubes & Printed Circuit Boards sector, (41.13%) and Television & Radio Receivers & Transmitters, Sound or Video Recording or Reproducing Apparatus & Associated Goods (8.81%). In fact, these two mentioned E&E subsectors also utilized the largest imported inputs shares by 51.33% and 8.98%, respectively. The full information on export and import shares for each processing trade sectors is presented in Appendix 2.

Although the E&E sector is the key for the Malaysian exports, the large export volumes does not necessarily bring the considerable return on the domestic economy. This is because the distribution of exports and imports that presented in Table 3 shows that exports of E&E sector also content large volume of imported inputs. The greater the import content use in the production, the smaller the return of exports on the domestic economy. Therefore, the disintegration of the Malaysian manufacturing sectors into dualistic trade structures will help the country to accurately measure the real return of the manufacturing exports due to the differences in the levels of the import intensities used in the production. The next sub-section further details the discussion by analyzing the domestic and foreign contents in the exports of domestic and processing trade sectors.

**4.2 Relative contribution of processing trade sectors**

* + 1. *Domestic and foreign contents in exports*

Processing trade is argued to have lower contribution to the domestic economy due to the higher foreign content for each production of exports. In turn, it generates relatively smaller value added and fewer linkages to the domestic economy. Literature on processing trade and international outsourcing mostly emphasizes the quality of exports based on how much the domestic value added gained from the exports (Koopman et al., 2008; Xing, 2012; Hummels et al., 2001). The higher the foreign content embedded in the exports means the smaller the return towards the domestic economy and vice versa. In fact, the current national accounting practices only record export earnings by the gross value of the products without properly measure the domestic and foreign contents in the exports. Thus, there is a likely tendency to overestimate the return of exports. Therefore, assessing the domestic value added content in exports is one the most appropriate measure to account for the country real export return.

Table 4 demonstrates the results for the domestic and foreign contents in exports. At the national level we calculate the foreign and domestic value added shares separately between the exports of the whole economic sector (including agriculture, mining, manufacturing and services sectors) and manufacturing goods only. The results show that the overall return of export earnings to the domestic value added is only 59.20% with 40.80% of foreign content embedded in the exports. This implies that from the total country export of RM644.53 billion in 2010 only RM381.56 billion is actually earned by the country. When we measure the manufacturing sector separately, we observe a much lower domestic value added share at 51.25% and higher foreign content share at 48.95%. Recall that the manufacturing sector is the biggest contributor to the Malaysian total exports with the value of RM477.08 billion in 2010. However, after properly measure the domestic and foreign contents, the actual gains from the manufacturing exports are only half of the total exports which equivalent to RM244.51 billion.

Considering the dualistic trade structures, the shares of foreign and domestic value added content shows significant differences. Manufacturing sectors that categorized under the processing trade regime are given special incentives and facilities for import and export activities. In fact, free duty on import treatment encourage processing firms to use more foreign inputs and lower local sourced materials. As result, foreign content for processing manufacturing sectors is found to be higher at 60.35% as compare to 46.23% for domestic structure. Hence, value added or export returns generated from the processing exports is much smaller only at 39.64%. Despite of various privileges and incentives provided by government towards the processing firms, the value added or return of exports is smaller than the manufacturing firms operate under the domestic trade regime.

**“Insert Table 4 here”**

Table 5 further details the domestic and foreign contents for broad manufacturing sectors. It only specifies the results for 13 aggregated manufacturing sectors and the full results are supplemented in Appendix 3. Results for the processing trade sectors (see columns (3) and (4)) indicate that Motor Vehicle, Tyres & Rubbers, and Electronic & Electrical have the highest foreign content. For motor vehicle for example, for each unit of processing export contents 0.74 unit of foreign content and 0.26 unit of domestic value added. There are several processing trade sectors associated with the higher domestic value added content such as Petroleum Refineries (67.44%), Other Manufacturing (61.68%), and Foods sectors (60.71%). Equally important, the degree of the export returns also depends on the size of the export shares. Column (6) shows that the following two sectors have lower export shares: Petroleum Refineries (almost approaching 0) and 12.67% for Foods.

The export share for processing-Petroleum Refineries is smaller because there are very few number of FIZ firms that involve in this sectors, which contribute only RM20 thousand in 2010. Moreover, Other Manufacturing sector contain high domestic value added at 61.68% under the processing trade regime because it includes Repairs & Maintenance as one of the subsector. Repairs & Maintenances sector has higher domestic value added shares at 51.42% due to the nature of the sector as the maintenance service provided for the manufacture of machineries and equipment. Thus, as the manufacturing service provider, Repairs & Maintenances mostly consume domestic inputs and utilize less foreign inputs (imports).

On the other hands, for the domestic sectors such as Tobacco Products, Foods, and Petroleum Refineries are among the highest domestic value added contents as stated in columns (1) and (2). In fact, the export shares of these sectors also are quite substantial as demonstrated in Column (6). Moreover, under the same trade structure, a significance amount of foreign content is found in Motor Vehicles (60.42 %), Machineries (57.87 %), and Electronic and Electrical (57.11%). On overall, domestic value added contents in exports are higher for the domestic trade sectors than the processing trade sectors. This implies that the domestic trade structure provides more returns of export and more promising to the Malaysian economy than processing trade structure. Processing trade causes more loses towards the economy due to the considerable foreign content in the production that will deprive the return of the exports.

**“Insert Table 5 here”**

* + 1. *Output and value added multipliers*

The relative contribution of the processing trade sectors also can be assessed by examining the output and value added multipliers. Output multiplier refers to how much output generated for every ringgit increase of the sectoral final demand, and value added multiplier indicates the value added generated from the additional final demand. Table 6 exhibits the output multipliers for national, domestic, and processing trade sectors, taking into account the size of final demand. Methodological details for the derivation of multipliers that take into account the relative sectoral size are provide in Appendix 4.

Column 1 highlights that that Foods, Electronic & Electrical (E&E) and Petroleum Refineries contributes the largest output multiplier for the Malaysian economy. For the interpretation purposes, we use E&E sector as an example. For every 1 Ringgit increases in final demand of E&E sector, there will be RM0.209 of output generated to the whole domestic economy. Notice that this E&E sector consists of domestic and processing trade sectors. After taking into consideration the dualistic manufacturing structures, the output generated for each additional final demand varies significantly. Out of RM0.209, RM0.160 are contributed by the E&E domestic and RM0.049 contributed by the E&E processing. This indicates that the multiplier size of E&E processing trade is only 23.43% of the total national multiplier of the sector.

Overall, the contribution of processing trade sectors to the output multiplier is relatively lower because of higher foreign content. Among the processing trade sectors, there are few sectors may consider to have considerable output-effects on the domestic economy such as Chemicals and Woods & Paper sectors.

**“Insert Table 6 here”**

Nonetheless, totally depending on the output sizes sometimes can be deceptive and misleading. This is because higher volume of output does not ensure higher return (because some portions output are imports). Thus, for a better analysis we calculate the value added multiplier in Table 7. For the domestic sectors, the highest value added multiplier are sourced from Foods (0.060), Electronic & Electrical (0.051) and Petroleum Refinery (0.037). Conversely, for processing trade sectors, the highest value added multipliers are attained by Electronic & Electrical (0.005), Chemical (0.003), and Woods & Paper (0.002). For the processing trade sectors, we observe that Chemicals and Woods and Papers sectors are among the sectors that have considerable impacts on the domestic value added. Linking the output and value added multipliers, it can be seen that capacity of processing trade sectors in generating value added is lower than that of output. This is contrast to the domestic sectors that associate with the higher value added multiplier than the output multiplier. All in all, our results are in line with the findings in the literature in which processing trade sectors are found to have lower contribution to the domestic economy.

**“Insert Table 7 here”**

* + 1. *Domestic linkages*

A sector with higher domestic linkages is always preferable to the economy because it has strong capacity to stimulate the other domestic sectors. The magnitude of the domestic linkages depends on the degree of utilization of domestic inputs in the production. In providing a better explanation on the value added linkages of processing sector to the domestic economy, we provide a scenario case as presented in Table 8. The case explains how much the total value added created to the economy (as shows in column (1)) and value added gained from the use of domestic input (as indicates in column (2)) for additional RM 1 million increase in the final demand of each processing trade sector. In other words, Table 8 presents the value added multiplier gained from the use of domestic input by the processing trade sectors which are presented in monetary value as result of addition RM 1 million increase in final demand.

Table 8 shows that for every RM 1 million increase in final demand of Food sector, potentially generates RM606.64 million of total value added gained to the whole economy. But out of RM606.64 million, only RM 468.78 million are earned by the domestic sectors from the local input used. Column (3) expresses the percentage share of domestic value added gained. It clearly shows that Tyres & Rubbers (79.69%), Foods (77.27%), and Chemicals (72.91%) are among the processing trade sectors that have high linkages and benefit the most to the domestic sectors. The rest of the processing trade sectors have lower growth spillover effects to the domestic sectors.

**“Insert Table 8 here”**

**4.2 International comparisons**

It should be mentioned that it is not easy to assess the accuracy of our estimation because the “true” input-output table that separated the processing trade sectors is not available to be compared. The similar problem was encountered by Koopman et al. (2008) in assessing the estimation for China. Alternatively, Koopman et al. (2008) replicate their methodologies to estimate the processing trade sectors in Mexico and compare the results with the actual input-output table[[3]](#footnote-3). In the absence of input-output table with the separation of processing trade sectors and based on the available data in the literature, we are only able to assess the variation in the value added content between Malaysia and China across sectors (whenever possible). Generally, processing trade sectors tend to have higher degree of similarities in terms of domestic value added and foreign contents due to the higher degree of intermediate input used in the production.

Chinese input-output table for 2007 that separates the processing trade sectors is used to compare with our input-output table. After harmonizing the sectors between our input-output table and the Chinese input-output table, the degree of similarities between the two tables are assessed by calculating the correlation coefficients. Results indicate the structure of processing trade sectors between the two countries has higher degree of similarities with 85% for domestic value added content and 94% for foreign content or vertical specialization share. These results provide a justification that our estimation of the domestic value added content and foreign content for the processing trade sectors is comparable to that of the Chinese processing trade sectors.

Table 9 presents the domestic and foreign content shares of processing trade sectors for Malaysia and China. It decomposes the total value added content into domestic content and foreign content, expressing in the percentage form. It can be observed clearly that the domestic value added content and foreign content is more or less similar for large number of sectors. However, there are few sectors that show considerable differences between Malaysia and China such as Food Products & Tobacco, Wearing Apparel, Leather, Furs, & Related Products; and Petroleum Processing, Coking & Refineries. For example, foreign content in the manufactured of Food Products & Tobacco in China is 62.77% while that of Malaysia is 38.12%. There are several drivers that can be put forward to explain the differences. First, this structural differences could be attributed to the difference in the use of domestic inputs and policy differences in the use of domestic content in the two countries. For example Malaysia has a stringent policy measure that emphasis on the use of local contents in its processing trade compared to China. Second, these two countries have different resource endowments. China has higher foreign content in the petroleum, coking and refineries because they have lower resource-intensity (petroleum) and mostly have to be imported to support the large and growing economy. Third, the differences could be associated to the use of difference benchmark input-output tables that make the comparisons are not perfectly equal.

**“Insert Table 9 here”**

**5. Concluding Remarks**

Malaysia has actively participated in global production sharing and processing trade activities as early as 1970s since the first establishment of Free Industrial Zones (FIZs) in Penang. Excessive involvement in this trade structure have mislead the real return of the Malaysian export earnings. Electronic and Electrical (E&E) is the key for Malaysian exports, which contributes the largest export share in 2010. However, this sector consumes the biggest import portion in which the magnitudes of the imports are varies according to different types of trade structures; domestic activities and processing trade activities. Higher degree of import content in the production implies lower domestic value added gains from the exports.

The development of the dualistic input-output table that separates the domestic and processing trade sectors has provided a clear implication for the current trade policies. We have validated that the processing trade sectors have associated with low growth linkages to the domestic sectors and contained higher foreign content. Ignoring the different characteristics of trade structures caused bias in measuring the country GDP as well as in the productivity measures of the economy. To emphasize, this study act an initial step that provides an overview on the export returns of the processing trade activities that covers the Free Industrial Zones as the sample of the overall processing trade “population”. Due to data constraints, this study is unable to include Licensed Manufacturing Warehouse (LMW) firms that also receive the same privileges like the FIZ firms but more flexible in terms firms locations and located more disperse throughout Malaysia. Therefore, future studies that cover the both the LMW and FIZ may help in providing the bigger picture of processing trade and international outsourcing in Malaysia.

Based on our analysis, we may argue that the processing trade sectors or specifically Free Zones policies are less beneficial to the country in the sense that the export gained from this trade structure has limited implication on the generation of value added and limited backward linkages to the domestic economy. Almost half of the exports produced by Free Industrial Zones firms are generated by Electronic and Electrical (E&E) sector which has significant foreign content and lower domestic return. In fact, E&E under the domestic structure shows much similar trend in the context of domestic value added and foreign content which an arguable why FIZ should promote E&E processing trade activities.

Therefore, government need to find measures to increase more value added content in the exports by putting more emphasize on the domestic manufacturing sectors and finding new focus sectors for exports. Foods, Woods & Paper, Chemicals, and Tyres & Rubbers are the other potential manufacturing sectors that have higher domestic content and strong domestic linkages. Success story of Export Processing Zones in Korea provides lesson that the zones need to be able to stimulate the growth of the domestic sectors especially through technological and knowledge spillover. Eventually, with the help of foreign multinational companies Korean Electronic and Electrical industries are able to create their own branding and become more competitive to the world market (Stein H., 2012).

Moreover, the upcoming Malaysia involvement with The Trans-Pacific Partnership Agreement (TPPA) has raised the concern whether Malaysia still need the Free Zones policies in stimulating the exports and attracting more Foreign Direct Investment into Malaysia. This is because TPPA promotes more liberalize international trade and open market to the members of the countries. Therefore, under the TPPA free import tax and export duty will be imposed to facilitate more growth of international trade. Hence, Free Zones seems to lose it functions and government need to quickly review this policy before TPPA starts to be implemented in the near future.

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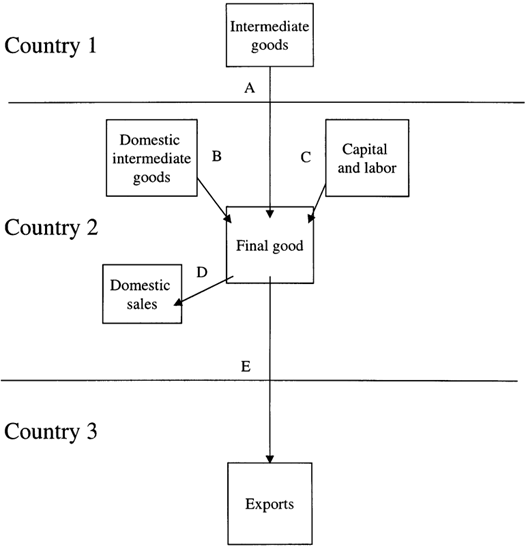
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**Figure 1.** Illustration of processing trade activities

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Source: Hummels et al. (2011).

**Table 1.** A simplified standard input-output table without processing trade

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Domestic production | | | | Final use | | Gross  output |
| 1 | . | . | *n* | Domestic (*f*) | Foreign (*e*) |
| Production for domestic use and exports | 1 |  | | | |  |  |  |
| . |
| . |
| *n* |
| Imported input | |  | | | |  |  | *m* |
| Value added | |  | | | |  |  | |
| Gross input | |  | | | |

Notes: for clarity, matrices are indicated by bold, upright capital letters; vectors by bold, upright lower case letters, and scalar by italicized lower case letters. Vectors are columns by definition, so that row vectors are obtained by transposition, indicated by a prime (e.g. ). A diagonal matrix with the elements of vector x on its main diagonal and all other entries equal to zero are indicated by a circumflex (e.g. )

**Table 2.** An extended input-output table with processing trade

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Domestic production (*D*) | | | | Processing trade (*P*) | | | | Final use | | Gross output |
| 1 | . | . | *n* | 1 | . | . | *n* | Domestic (*f*) | Foreign (*e*) |
| Production for domestic use and normal exports (*D*) | 1 |  | | | |  | | | |  |  |  |
| . |
| . |
| *n* |
| Production for processing trade (*P*) | 1 | 0 | | | | 0 | | | | 0 |  |  |
| . |
| . |
| *n* |
| Imported input | |  | | | |  | | | |  |  | *m* |
| Value added | |  | | | |  | | | |  |  |  |
| Gross input | |  | | | |  | | | |

Notes: gray color indicates flows that are not revealed in the standard input-output and they must be estimated.

**Table 3**. Export and import shares of national, domestic and processing trade sectors in 2010

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No | Sectors | National | | Domestic sectors | | Processing sectors | |
| Export share % | Import Share % | Export share % | Import Share % | Export share % | Import Share % |
|  |  | (1) | (2) | (3) | (4) | (5) | (6) |
| 1 | Foods | 9.94 | 4.70 | 10.01 | 4.68 | 9.51 | 4.84 |
| 2 | Tobacco Products | 0.04 | 0.07s | 0.05 | 0.08 | - | - |
| 3 | Textiles | 0.98 | 0.84 | 0.90 | 0.80 | 1.50 | 1.14 |
| 4 | Woods & paper | 3.15 | 2.01 | 2.34 | 1.53 | 8.43 | 5.94 |
| 5 | Petroleum Refinery | 6.66 | 5.45 | 7.67 | 6.11 | 0.00 | 0.00 |
| 6 | Chemical | 5.29 | 5.14 | 4.23 | 4.57 | 12.21 | 9.88 |
| 7 | Tyres & rubber | 1.95 | 1.96 | 2.01 | 2.01 | 1.54 | 1.57 |
| 8 | Plastic & glass | 1.79 | 2.30 | 1.83 | 2.39 | 1.56 | 1.62 |
| 9 | Clays & metals | 3.82 | 7.46 | 3.56 | 7.67 | 5.50 | 5.76 |
| 10 | Machineries | 8.95 | 8.05 | 10.00 | 8.78 | 2.09 | 2.04 |
| 11 | Electronic & Electrical | 28.37 | 25.36 | 24.99 | 21.05 | 50.43 | 60.80 |
| 12 | Motor Vehicles | 2.06 | 4.79 | 1.95 | 4.97 | 2.77 | 3.29 |
| 13 | Other manufacturing | 1.02 | 1.08 | 0.50 | 0.83 | 4.47 | 3.14 |
| 14 | Rest of sectors\* | 25.98 | 30.79 | 29.95 | 34.54 | - | - |
| Total | | 100 | 100 | 100 | 100 | 100 | 100 |

Notes:

\* The rest of sectors refer to other sectors than manufacturing which include agricultural, mining and quarrying, and services sectors.

- Columns (1) and (2) refer to the share of exports and imports from the national input-output table 2010

- Columns (3), (4), (5) and (6) are the share of exports and imports from total exports and imports for each category.

**Table 4**. Domestic value added and foreign contents, 2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Total foreign content | Total domestic value added | Share to the total exports | Domestic value added |
|  | % | % | % | RM Mil |
|  | (1) | (2) | (3) | (4) |
| **(i) National export** |  |  |  |  |
| All merchandise from the whole economic sectors | 40.80 | 59.20 | 100 | 381,564.00 |
| Manufacturing goods only | 48.75 | 51.25 | 74.02 | 244,505.49 |
| **(ii) Dualistic manufacturing export** |  |  |  |  |
| Manufacturing goods for domestic sectors | 46.23 | 53.77 | 60.77 | 210,593.13 |
| Manufacturing goods for processing sectors | 60.35 | 39.64 | 13.25 | 33,863.83 |

Note: summation of columns (1) and (2) should equal to 100%

**Table 5**. Domestic value added and foreign contents in exports for broad manufacturing sectors, 2010.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Domestic sector | | Processing sector | | Export share % | |
| No | Sectors | Domestic value added | Foreign content | Domestic value added | Foreign content | Domestic | Processing |
|  |  | % | % | % | % | % | % |
|  |  | (1) | (2) | (3) | (4) | (5) | (6) |
| 1 | Foods | 73.18 | 26.82 | 60.71 | 39.29 | 87.33 | 12.67 |
| 2 | Tobacco Products | 80.07 | 19.93 | - | - | 100.00 | - |
| 3 | Textiles | 63.49 | 36.51 | 52.17 | 47.83 | 79.74 | 20.26 |
| 4 | Woods & Paper | 71.16 | 28.84 | 53.21 | 46.79 | 64.51 | 35.49 |
| 5 | Petroleum Refinery | 72.79 | 27.21 | 67.44 | 32.56 | 100.00 | 0 |
| 6 | Chemical | 60.40 | 39.60 | 45.08 | 54.92 | 69.41 | 30.59 |
| 7 | Tyres & Rubber | 48.72 | 51.28 | 30.57 | 69.43 | 89.53 | 10.47 |
| 8 | Plastic & Glass | 49.66 | 50.34 | 43.27 | 56.73 | 88.49 | 11.51 |
| 9 | Clays & Metals | 50.08 | 49.92 | 35.38 | 64.62 | 80.89 | 19.11 |
| 10 | Machineries | 42.13 | 57.87 | 41.31 | 58.69 | 96.90 | 3.10 |
| 11 | Electronic & Electrical | 42.89 | 57.11 | 31.03 | 68.97 | 76.44 | 23.56 |
| 12 | Motor Vehicles | 39.58 | 60.42 | 26.17 | 73.83 | 82.20 | 17.80 |
| 13 | Other Manufacturing | 66.34 | 33.66 | 61.68 | 38.32 | 42.11 | 57.89 |
| 14 | Rest of sectors | 81.88 | 18.12 | - | - | 100.00 | - |

Notes:

* Summation of domestic value added share and foreign content should equal to 100%. For instance, column 1 + column 2= 100%
* Summation of columns (5) and (6) also will equal to 100%.

**Table 6**. Output multiplier generated by domestic and processing trade sectors.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Sectors | Output multiplier | | | Contribution | |
| National | Domestic | Processing | Domestic  % | Processing % |
|  |  | (1) | (2) | (3) | (4) | (5) |
| 1 | Foods | 0.219 | 0.205 | 0.014 | 93.41 | 6.59 |
| 2 | Tobacco Products | 0.002 | 0.002 | - | 100.00 | - |
| 3 | Textiles | 0.014 | 0.013 | 0.002 | 88.98 | 11.02 |
| 4 | Woods & Paper | 0.041 | 0.031 | 0.010 | 75.69 | 24.31 |
| 5 | Petroleum Refinery | 0.088 | 0.088 | 0.000 | 100.00 | 0.00 |
| 6 | Chemical | 0.060 | 0.044 | 0.016 | 73.12 | 26.88 |
| 7 | Tyres & Rubber | 0.032 | 0.030 | 0.002 | 93.56 | 6.44 |
| 8 | Plastic & Glass | 0.021 | 0.020 | 0.001 | 93.93 | 6.07 |
| 9 | Clays & Metals | 0.041 | 0.035 | 0.006 | 85.84 | 14.16 |
| 10 | Machineries | 0.071 | 0.069 | 0.002 | 97.11 | 2.89 |
| 11 | Electronic & Electrical | 0.209 | 0.160 | 0.049 | 76.57 | 23.43 |
| 12 | Motor Vehicles | 0.050 | 0.047 | 0.003 | 94.63 | 5.37 |
| 13 | Other Manufacturing | 0.009 | 0.004 | 0.004 | 50.79 | 49.21 |

Note: summation of columns (4) and (5) should equal to 100%

**Table 7**. Value added multiplier generated by the domestic and processing trade sectors

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Sectors | Value added multiplier | | | Contribution | |
|  |  | National | Domestic | Processing | Domestic  % | Processing % |
|  |  | (1) | (2) | (3) | (4) | (5) |
| 1 | Foods | 0.063 | 0.060 | 0.003 | 95.02 | 4.98 |
| 2 | Tobacco Products | 0.001 | 0.001 | - | 100.00 | - |
| 3 | Textiles | 0.005 | 0.005 | 0.000 | 95.69 | 4.31 |
| 4 | Woods & Paper | 0.012 | 0.010 | 0.002 | 86.30 | 13.70 |
| 5 | Petroleum Refinery | 0.037 | 0.037 | 0.000 | 100.00 | 0.00 |
| 6 | Chemical | 0.016 | 0.013 | 0.003 | 82.61 | 17.39 |
| 7 | Tyres & Rubber | 0.006 | 0.006 | 0.000 | 95.69 | 4.31 |
| 8 | Plastic & Glass | 0.005 | 0.005 | 0.000 | 98.61 | 1.39 |
| 9 | Clays & Metals | 0.010 | 0.010 | 0.001 | 93.45 | 6.55 |
| 10 | Machineries | 0.020 | 0.020 | 0.000 | 99.04 | 0.96 |
| 11 | Electronic & Electrical | 0.056 | 0.051 | 0.005 | 90.66 | 9.34 |
| 12 | Motor Vehicles | 0.010 | 0.010 | 0.000 | 97.88 | 2.12 |
| 13 | Other Manufacturing | 0.002 | 0.002 | 0.000 | 80.46 | 19.54 |

Note: summation of columns (4) and (5) should equal to 100%

**Table 8**. Scenario analysis on value added impacts of RM 1 million increase in final demand

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Sectors | Total value added created | Value added generated from the use of domestic inputs | Shares of value added gained by domestic sectors |
|  |  | RM | RM | % |
|  |  | (1) | (2) | (3) |
| 1 | Foods | 606,644.41 | 468,781.05 | 77.27 |
| 2 | Tobacco Products | - | - | - |
| 3 | Textiles | 517,394.43 | 196,793.39 | 38.04 |
| 4 | Woods & paper | 524,900.10 | 278,058.35 | 52.97 |
| 5 | Petroleum Refinery | 674,460.12 | 455,103.55 | 67.48 |
| 6 | Chemical | 448,990.65 | 327,365.78 | 72.91 |
| 7 | Tyres & rubber | 304,638.62 | 242,770.38 | 79.69 |
| 8 | Plastic & glass | 431,694.12 | 65,454.15 | 15.16 |
| 9 | Clays & metals | 352,388.31 | 172,847.86 | 49.05 |
| 10 | Machineries | 410,916.57 | 132,719.83 | 32.3 |
| 11 | E&E | 309,486.88 | 147,759.85 | 47.74 |
| 12 | Motor Vehicles | 247,788.84 | 110,400.20 | 44.55 |
| 13 | Other manufacturing | 577,423.87 | 131,943.97 | 22.85 |

Notes: results in column (3) are obtained as follows: (3) = [(2)/(1)×100]

**Table 9**. Domestic and foreign content shares for processing sectors in Malaysia and China

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sectors | China | | Malaysia | |
| Domestic content  % | Foreign content | Domestic content | Foreign content  % |
| Food Products & Tobacco | 37.23 | 62.77 | 61.88 | 38.12 |
| Textile Goods | 40.85 | 59.15 | 52.17 | 47.83 |
| Wearing Apparel, Leather, Furs, & Related Products | 36.52 | 63.48 | 55.55 | 44.45 |
| Sawmills And Furniture | 58.00 | 42.00 | 56.34 | 43.66 |
| Paper Products, Printing & Record Medium Reproduction | 45.75 | 54.25 | 52.93 | 47.07 |
| Petroleum Processing, Coking & Refineries | 15.09 | 84.91 | 67.44 | 32.56 |
| Chemicals | 19.79 | 80.21 | 45.08 | 54.92 |
| Nonmetal Mineral Products | 31.05 | 68.95 | 49.84 | 50.16 |
| Metals Smelting & Pressing | 21.90 | 78.10 | 30.54 | 69.46 |
| Metal Products | 42.33 | 57.67 | 38.71 | 61.29 |
| Common & Special Equipment | 26.13 | 73.87 | 40.68 | 59.32 |
| Transport Equipment & Motor Vehicle | 33.38 | 66.62 | 25.94 | 74.06 |
| Electric Equipment & Machinery | 27.84 | 72.16 | 40.97 | 59.03 |
| Telecommunication Equipment, Computer & Other Electronic Equipment | 35.66 | 64.34 | 30.99 | 69.01 |
| Instruments, Meters, Cultural & Office Machinery | 33.08 | 66.92 | 31.57 | 68.43 |
| Other Manufacturing Products | 20.38 | 79.62 | 57.85 | 42.15 |

Note: Malaysia processing sector data refer to year 2010 data, while China processing data refers to year 2007.

**Appendix 1.** Simplified dualistic input-output table, 2010

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **DOMESTIC** | | | | | | | | |
|  | **RM Mil** | **Commodity** | Agriculture | Mining | Foods & tobacco | Textiles, woods & papers | Petroleum refineries, chemicals & rubbers | Metals & machineries | E&E | Motor vehicle & other manufacturing | Services |
|  | **Commodity** |  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| **DOMESTIC** | Agriculture | **1** | 7,766.03 | - | 57,714.33 | 8,982.78 | 2,884.39 | 30.88 | 21.86 | 1,411.06 | 6,170.14 |
| Mining | **2** | 38.56 | 947.96 | 866.24 | 26.19 | 57,729.13 | 688.74 | 39.41 | 463.00 | 2,958.43 |
| Foods & tobacco | **3** | 3,937.77 | 9.89 | 47,332.80 | 33.28 | 4,183.72 | 22.52 | 3.81 | 135.55 | 15,480.02 |
| Textiles, woods & papers | **4** | 221.24 | 17.83 | 295.14 | 7,874.92 | 990.02 | 709.13 | 484.53 | 462.90 | 14,547.94 |
| Petroleum refineries, chemicals & rubbers | **5** | 9,076.22 | 3,799.62 | 2,226.70 | 3,006.05 | 44,233.25 | 4,557.64 | 5,130.44 | 2,838.25 | 49,867.84 |
| Metals & machineries | **6** | 262.90 | 1,362.29 | 1,026.96 | 879.15 | 1,613.21 | 19,348.38 | 3,956.87 | 5,330.28 | 14,265.16 |
| E&E | **7** | 4.31 | 18.15 | 1.11 | 7.75 | 38.94 | 849.65 | 2,419.90 | 381.47 | 1,204.92 |
| Motor vehicle & other manufacturing | **8** | 588.24 | 143.27 | 453.41 | 574.50 | 355.84 | 398.04 | 569.42 | 8,173.14 | 13,571.00 |
| Services | **9** | 15,145.78 | 5,780.52 | 26,219.84 | 9,936.21 | 30,297.77 | 17,686.35 | 17,224.94 | 6,827.41 | 259,273.30 |
| **PROCESSING** | Agriculture | **1** | - | - | - | - | - | - | - | - | - |
| Mining | **2** | - | - | - | - | - | - | - | - | - |
| Foods & tobacco | **3** | - | - | - | - | - | - | - | - | - |
| Textiles, woods & papers | **4** | - | - | - | - | - | - | - | - | - |
| Petroleum refineries, chemicals & rubbers | **5** | - | - | - | - | - | - | - | - | - |
| Metals & machineries | **6** | - | - | - | - | - | - | - | - | - |
| E&E | **7** | - | - | - | - | - | - | - | - | - |
| Motor vehicle & other manufacturing | **8** | - | - | - | - | - | - | - | - | - |
| Services | **9** | - | - | - | - | - | - | - | - | - |
|  | **Total Intermediate Inputs** | | 37,041.04 | 12,079.54 | 136,136.53 | 31,320.82 | 142,326.28 | 44,291.34 | 29,851.17 | 26,023.06 | 377,338.75 |
|  | Domestic purchase |  | - | - | - | - | - | - | - | - | - |
|  | **Total Inputs** |  | 37,041.04 | 12,079.54 | 136,136.53 | 31,320.82 | 142,326.28 | 44,291.34 | 29,851.17 | 26,023.06 | 377,338.75 |
|  | Imported Commodities |  | 11,179.97 | 6,349.48 | 17,107.94 | 8,357.77 | 57,445.64 | 55,826.77 | 75,630.02 | 20,865.61 | 106,582.45 |
|  | Subsidies on Products |  | 1,042.69 | 425.90 | 1,403.32 | 69.19 | 1,296.87 | 106.01 | 48.91 | 39.82 | 4,628.20 |
|  | Taxes on Products |  | 948.80 | 241.01 | 420.98 | 736.61 | 664.65 | 405.09 | 316.22 | 2,033.45 | 6,597.96 |
|  | **Gross Value Added** |  | 75,737.70 | 88,938.94 | 21,750.29 | 13,509.96 | 48,868.85 | 28,808.38 | 44,380.26 | 11,565.91 | 456,123.77 |
|  | **TOTAL INPUTS** |  | 123,864.83 | 107,183.07 | 174,012.42 | 53,855.98 | 248,008.55 | 129,225.57 | 150,128.76 | 60,448.22 | 942,014.73 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROCESSING** | | | | | | | | |  |  |  |  |  |
| Agriculture | Mining | Foods & tobacco | Textiles, woods & papers | Petroleum refineries, chemicals & rubbers | Metals & machineries | E&E | Motor vehicle & other manufacturing | Services | **Total Intermediate Demand** | **Domestic Demand** | **Export** | **Final Demand** | **TOTAL OUTPUT** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |  |  |  |  |  |
| - | - | 1,992.81 | 602.38 | 165.54 | 0.87 | 5.09 | 40.98 | - | 87,789.14 | 23,501.71 | 12,573.98 | 36,075.69 | 123,864.83 |
| - | - | 32.91 | 6.72 | 347.64 | 30.18 | 10.36 | 66.04 | - | 64,251.54 | (263.87) | 43,195.40 | 42,931.53 | 107,183.07 |
| - | - | 1,695.34 | 1.95 | 618.33 | 1.57 | 1.51 | 30.42 | - | 73,488.47 | 44,277.03 | 56,246.91 | 100,523.95 | 174,012.42 |
| - | - | 12.97 | 1,100.68 | 72.27 | 14.25 | 149.31 | 36.59 | - | 26,989.72 | 8,750.39 | 18,115.86 | 26,866.26 | 53,855.98 |
| - | - | 129.43 | 274.81 | 2,684.11 | 198.64 | 1,631.84 | 247.54 | - | 129,902.37 | 27,708.15 | 90,398.04 | 118,106.19 | 248,008.55 |
| - | - | 22.14 | 149.29 | 56.75 | 837.63 | 986.80 | 164.99 | - | 50,262.79 | 5,513.82 | 73,448.96 | 78,962.78 | 129,225.57 |
| - | - | 0.15 | 0.77 | 0.64 | 7.95 | 723.74 | 19.04 | - | 5,678.48 | 4,706.11 | 139,744.17 | 144,450.28 | 150,128.76 |
| - | - | 10.34 | 36.82 | 18.77 | 16.68 | 174.35 | 242.07 | - | 25,325.88 | 21,420.85 | 13,701.49 | 35,122.34 | 60,448.22 |
| - | - | 974.29 | 932.84 | 1,532.58 | 578.97 | 5,758.72 | 371.16 | - | 398,540.70 | 431,793.52 | 111,680.52 | 543,474.04 | 942,014.73 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | 8,123.17 | 8,123.17 | 8,123.17 |
| - | - | - | - | - | - | - | - | - | - | - | 8,475.62 | 8,475.62 | 8,475.62 |
| - | - | - | - | - | - | - | - | - | - | - | 13,143.79 | 13,143.79 | 13,143.79 |
| - | - | - | - | - | - | - | - | - | - | - | 6,423.12 | 6,423.12 | 6,423.12 |
| - | - | - | - | - | - | - | - | - | - | - | 43,078.02 | 43,078.02 | 43,078.02 |
| - | - | - | - | - | - | - | - | - | - | - | 6,184.72 | 6,184.72 | 6,184.72 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | 4,870.38 | 3,106.26 | 5,496.62 | 1,686.73 | 9,441.72 | 1,218.84 | - | 862,229.09 | 567,407.71 | 644,533.78 | 1,211,941.49 | 2,074,170.58 |
| - | - | - | - | - | - | - | - | - | - | (31,617.11) | 58,350.15 | 26,733.04 | 26,733.04 |
| - | - | 4,870.38 | 3,106.26 | 5,496.62 | 1,686.73 | 9,441.72 | 1,218.84 | - | 862,229.09 | 535,790.60 | 702,883.93 | 1,238,674.53 | 2,100,903.62 |
| - | - | 2,114.90 | 3,093.42 | 5,734.79 | 3,382.50 | 26,576.82 | 2,808.03 | - | 403,056.12 | 143,280.37 | 35,658.36 | 178,938.74 | 581,994.86 |
| - | - | - | - | - | - | - | - | - | 9,060.91 | 3,298.72 | - | - | 9,060.91 |
| - | - | 18.00 | 89.52 | 63.05 | 24.35 | 92.60 | 131.23 | - | 12,783.54 | 14,336.83 | 5,492.15 | 19,828.98 | 32,612.51 |
| - | - | 1,119.89 | 2,186.41 | 1,849.33 | 1,329.53 | 6,966.88 | 2,026.62 | - | 805,162.74 | - | - | - | 805,162.74 |
| - | - | 8,123.17 | 8,475.62 | 13,143.79 | 6,423.12 | 43,078.02 | 6,184.72 | - | 2,074,170.58 | 1,229,198.40 | 1,446,918.37 | 2,676,116.77 | 3,511,612.82 |

**Appendix 2.** Export and import shares by processing trade sectors, 2010 (%)

| No | Sectors | Share of processing export % | Share of processing import % |
| --- | --- | --- | --- |
|  |  | (1) | (2) |
| 18 | Preservation of Seafood | 0.16 | 0.09 |
| 21 | Oils and Fats | 6.29 | 2.36 |
| 22 | Grain Mills | 0.03 | 0.01 |
| 23 | Bakery Products | 0.33 | 0.24 |
| 24 | Confectionery | 0.01 | 0.01 |
| 25 | Other Food Processing | 2.13 | 1.60 |
| 26 | Animal Feeds | 0.48 | 0.46 |
| 28 | Soft Drink | 0.08 | 0.07 |
| 32 | Other Textiles | 0.78 | 0.66 |
| 33 | Wearing Apparel | 0.71 | 0.48 |
| 37 | Veneer Shts, Plywood, Laminated & Particle Board | 0.15 | 0.09 |
| 38 | Builders' Carpentry and Joinery | 0.01 | - |
| 40 | Other Wood Products | 0.01 | 0.01 |
| 41 | Paper and Paper Products and Furniture | 8.25 | 5.84 |
| 45 | Basic Chemicals | 6.04 | 4.23 |
| 46 | Fertilizers | 0.14 | 0.13 |
| 47 | Paints and Varnishes | 0.24 | 0.19 |
| 48 | Pharmaceuticals, Chemicals & Botanical Product | 0.02 | 0.02 |
| 49 | Soap, Detergents, Perfumes, Cleaning & Toilet Preparations | 0.64 | 0.52 |
| 50 | Other Chemicals Product | 5.13 | 4.79 |
| 51 | Tyres | 0.12 | 0.13 |
| 52 | Rubber Processing | 0.01 | 0.02 |
| 54 | Rubber Products | 1.40 | 1.43 |
| 55 | Plastics Products | 1.37 | 1.46 |
| 56 | Sheet Glass and Glass Products | 0.18 | 0.16 |
| 57 | Clay and Ceramic | 0.04 | 0.03 |
| 59 | Concrete & Other Non-Metallic Mineral Products | 0.04 | 0.03 |
| 60 | Iron and Steel Products | 2.51 | 2.72 |
| 61 | Basic Precious and Non-Ferrous Metals | 0.37 | 0.49 |
| 62 | Casting of Metals | 0.02 | 0.02 |
| 63 | Structural Metal Products | 0.40 | 0.37 |
| 64 | Other Fabricated Metal Products | 2.14 | 2.10 |
| 65 | Industrial Machinery | 0.01 | 0.01 |
| 66 | General Purpose Machinery | 0.86 | 0.83 |
| 67 | Special Purpose Machinery | 0.39 | 0.31 |
| 68 | Domestic Appliances | 0.82 | 0.86 |
| 69 | Office, Accounting and Computing Machinery | 0.02 | 0.02 |
| 70 | Electrical Machinery and Apparatus | 0.05 | 0.07 |
| 71 | Other Electrical Machinery | 0.03 | 0.03 |
| 72 | Insulated Wires and Cables | 0.02 | 0.03 |
| 73 | Electric Lamps and Lighting Equipment | 0.37 | 0.35 |
| 74 | Semi-Conductor Devices, Tubes and Circuit Boards | 41.13 | 51.33 |
| 75 | TV, Radio Receivers & Transmitters & Asso. Goods | 8.81 | 8.98 |
| 77 | Measuring, Checking & Industrial Process Equipment | 0.01 | 0.02 |
| 80 | Motor Vehicles | 2.13 | 2.66 |
| 81 | Motorcycles | 0.42 | 0.45 |
| 82 | Building & Repairing of Ships & Boats, Manufacture of Bicycles & Invalid Carriages | 0.02 | 0.02 |
| 83 | Other Transport Equipment | 0.20 | 0.17 |
| 84 | Other Manufacturing | 4.36 | 3.06 |
| 85 | Repair & Maintenance | 0.11 | 0.08 |
|  | Total | 100.00 | 100.00 |

**Appendix 3.** Foreign content, domestic value added share for domestic and processing sector, and export share 2010 (%)

| No. | Sectors | Domestic sector | | Processing sector | | Export Share | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Foreign content | Domestic value Added | Foreign content | Domestic value Added | Domestic | Processing |
|  |  | *%* | *%* | *%* | *%* | *%* | *%* |
|  |  | (1) | (2) | (3) | (4) | (5) | (6) |
| 18 | Preservation of Seafood | 26.94 | 73.06 | 42.50 | 57.50 | 90.25 | 9.75 |
| 19 | Preservation of Fruits and Vegetables | 43.60 | 56.40 | 54.32 | 45.68 | 99.85 | 0.15 |
| 20 | Dairy Production | 43.23 | 56.77 | 55.17 | 44.83 | 99.95 | 0.05 |
| 21 | Oils and Fats | 18.25 | 81.75 | 31.29 | 68.71 | 89.62 | 10.38 |
| 22 | Grain Mills | 22.98 | 77.02 | 32.26 | 67.74 | 94.58 | 5.42 |
| 23 | Bakery Products | 35.14 | 64.86 | 46.16 | 53.84 | 68.19 | 31.81 |
| 24 | Confectionery | 47.41 | 52.59 | 54.97 | 45.03 | 99.77 | 0.23 |
| 25 | Other Food Processing | 34.41 | 65.59 | 46.84 | 53.16 | 47.10 | 52.90 |
| 26 | Animal Feeds | 47.24 | 52.76 | 56.89 | 43.11 | 25.62 | 74.38 |
| 28 | Soft Drink | 45.92 | 54.08 | 58.36 | 41.64 | 85.31 | 14.69 |
| 32 | Other Textiles | 39.16 | 60.84 | 51.85 | 48.15 | 37.89 | 62.11 |
| 33 | Wearing Apparel | 32.98 | 67.02 | 44.40 | 55.60 | 79.72 | 20.28 |
| 34 | Leather Industries | 43.79 | 56.21 | 53.63 | 46.37 | 99.91 | 0.09 |
| 35 | Footwear | 26.13 | 73.87 | 39.37 | 60.63 | 99.36 | 0.64 |
| 37 | Veneer Shts, Plywood, Laminated & Particle Board | 31.54 | 68.46 | 46.43 | 53.57 | 97.87 | 2.13 |
| 38 | Builders' Carpentry and Joinery | 26.58 | 73.42 | 40.21 | 59.79 | 94.30 | 5.70 |
| 40 | Other Wood Products | 29.40 | 70.60 | 42.67 | 57.33 | 96.81 | 3.19 |
| 41 | Paper and Paper Products and Furniture | 31.04 | 68.96 | 47.82 | 52.18 | 36.30 | 63.70 |
| 43 | Printing | 34.62 | 65.38 | 43.71 | 56.29 | 98.08 | 1.92 |
| 44 | Petroleum Refinery | 26.92 | 73.08 | 32.29 | 67.71 | 100.00 | 0.00 |
| 45 | Basic Chemicals | 32.45 | 67.55 | 49.85 | 50.15 | 67.38 | 32.62 |
| 46 | Fertilizers | 45.20 | 54.80 | 55.46 | 44.54 | 92.21 | 7.79 |
| 47 | Paints and Varnishes | 40.16 | 59.84 | 46.27 | 53.73 | 78.55 | 21.45 |
| 48 | Pharmaceuticals, Chemicals & Botanical Product | 39.96 | 60.04 | 46.04 | 53.96 | 97.22 | 2.78 |
| 49 | Soap, Detergents, Perfumes, Cleaning & Toilet Preparations | 38.08 | 61.92 | 51.79 | 48.21 | 67.47 | 32.53 |
| 50 | Other Chemicals Product | 44.33 | 55.67 | 59.01 | 40.99 | 67.12 | 32.88 |
| 51 | Tyres | 53.48 | 46.52 | 66.56 | 33.44 | 75.57 | 24.43 |
| 52 | Rubber Processing | 52.57 | 47.43 | 68.42 | 31.58 | 97.88 | 2.12 |
| 54 | Rubber Products | 43.07 | 56.93 | 70.16 | 29.84 | 65.85 | 34.15 |
| 55 | Plastics Products | 53.39 | 46.61 | 57.08 | 42.92 | 89.33 | 10.67 |
| 56 | Sheet Glass and Glass Products | 43.09 | 56.91 | 55.44 | 44.56 | 72.26 | 27.74 |
| 57 | Clay and Ceramic | 41.35 | 58.65 | 51.35 | 48.65 | 96.64 | 3.36 |
| 59 | Concrete & Other Non-Metallic Mineral Products | 34.22 | 65.78 | 48.18 | 51.82 | 96.05 | 3.95 |
| 60 | Iron and Steel Products | 54.23 | 45.77 | 67.62 | 32.38 | 54.78 | 45.22 |
| 61 | Basic Precious and Non-Ferrous Metals | 68.30 | 31.70 | 79.76 | 20.24 | 96.63 | 3.37 |
| 62 | Casting of Metals | 60.58 | 39.42 | 68.91 | 31.09 | 93.82 | 6.18 |
| 63 | Structural Metal Products | 46.60 | 53.40 | 58.67 | 41.33 | 79.58 | 20.42 |
| 64 | Other Fabricated Metal Products | 48.78 | 51.22 | 61.12 | 38.88 | 70.79 | 29.21 |
| 65 | Industrial Machinery | 53.50 | 46.50 | 64.54 | 35.46 | 99.60 | 0.40 |
| 66 | General Purpose Machinery | 48.91 | 51.09 | 58.10 | 41.90 | 89.65 | 10.35 |
| 67 | Special Purpose Machinery | 40.37 | 59.63 | 52.66 | 47.34 | 94.16 | 5.84 |
| 68 | Domestic Appliances | 51.97 | 48.03 | 61.83 | 38.17 | 76.94 | 23.06 |
| 69 | Office, Accounting and Computing Machinery | 64.19 | 35.81 | 68.43 | 31.57 | 99.96 | 0.04 |
| 70 | Electrical Machinery and Apparatus | 63.06 | 36.94 | 73.36 | 26.64 | 98.59 | 1.41 |
| 71 | Other Electrical Machinery | 56.70 | 43.30 | 62.66 | 37.34 | 99.54 | 0.46 |
| 72 | Insulated Wires and Cables | 75.57 | 24.43 | 76.12 | 23.88 | 99.77 | 0.23 |
| 73 | Electric Lamps and Lighting Equipment | 47.39 | 52.61 | 57.11 | 42.89 | 81.27 | 18.73 |
| 74 | Semi-Conductor Devices,Tubes and Circuit Boards | 60.08 | 39.92 | 70.64 | 29.36 | 61.54 | 38.46 |
| 75 | TV, Radio Receivers & Transmitters & Asso. Goods | 50.92 | 49.08 | 62.06 | 37.94 | 88.15 | 11.85 |
| 77 | Measuring, Checking & Industrial Process Equipment | 63.60 | 36.40 | 65.25 | 34.75 | 99.74 | 0.26 |
| 80 | Motor Vehicles | 67.65 | 32.35 | 77.70 | 22.30 | 49.23 | 50.77 |
| 81 | Motorcycles | 54.80 | 45.20 | 67.64 | 32.36 | 83.76 | 16.24 |
| 82 | Building & Repairing of Ships & Boats, Manufacture of Bicycles & Invalid Carriages | 49.40 | 50.60 | 64.20 | 35.80 | 99.75 | 0.25 |
| 83 | Other Transport Equipment | 41.50 | 58.50 | 54.89 | 45.11 | 58.86 | 41.14 |
| 84 | Other Manufacturing | 33.23 | 66.77 | 41.95 | 58.05 | 42.45 | 57.55 |
| 85 | Repair & Maintenance | 35.74 | 64.26 | 48.58 | 51.42 | 24.76 | 75.24 |

**Appendix 4. Sizes adjusted multipliers**

Analyzing the effect of a one-unit increase in the final demand without considering the relative size of the sectors may not be realistic in policy contexts. Due to a one-unit increase usually requires more efforts in a smaller sector than it does in a large sector (Dietzenbacher, 2005). Thus, the relative size of sectors is an important factor to consider for multiplier measures. Following Miller and Blair (2009), the output multipliers that are adjusted for sectoral sizes can be derived as follows,

(A1)

where is a diagonal matrix showing each sector’s final demand as a proportion of the total final demand, ; that is, a measure of relative sectoral sizes. Therefore, equation (A1) shows the effect on a sector’s output due to a $1 increase in final demand, which is distributed across sectors according to their proportion to total final demand. This type of multiplier is also called ‘growth equalized’ multiplier in Miller and Blair (2009).

To measure the value added multiplier we can extend equation (A1) as follows,

(A2)

It is also important to note that the final demand vector, consists of private consumption, government consumption, investment and exports. Therefore, the equation (A2) has a unique feature that can be further extended to account for the multiplier impact of a specific final demand component on the value added. In the context of this study, we specifically focus on value added acquire from export. Thus, we replace with export value to determine the sectors with the highest multiplier impact on value added for each $1 increase in exports.

**Appendix 5.** Output and value added multipliers for domestic and processing sectors

| No. | Sectors | | Domestic sector | | Processing sector | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Output multiplier | | Value added multiplier | Output multiplier | Value added multiplier |
|  |  | (1) | | (2) | (3) | (4) |
| 18 | Preservation of Seafood | 0.004 | | 0.001 | 0.000 | 0.000 |
| 19 | Preservation of Fruits and Vegetables | 0.001 | | 0.000 | 0.000 | 0.000 |
| 20 | Dairy Production | 0.009 | | 0.002 | 0.000 | 0.000 |
| 21 | Oils and Fats | 0.147 | | 0.045 | 0.011 | 0.003 |
| 22 | Grain Mills | 0.004 | | 0.002 | 0.000 | 0.000 |
| 23 | Bakery Products | 0.007 | | 0.002 | 0.000 | 0.000 |
| 24 | Confectionery | 0.008 | | 0.003 | 0.000 | 0.000 |
| 25 | Other Food Processing | 0.006 | | 0.002 | 0.002 | 0.001 |
| 26 | Animal Feeds | 0.001 | | 0.000 | 0.001 | 0.000 |
| 28 | Soft Drink | 0.006 | | 0.002 | 0.000 | 0.000 |
| 32 | Other Textiles | 0.001 | | 0.000 | 0.001 | 0.000 |
| 33 | Wearing Apparel | 0.005 | | 0.002 | 0.001 | 0.000 |
| 34 | Leather Industries | 0.000 | | 0.000 | 0.000 | 0.000 |
| 35 | Footwear | 0.001 | | 0.000 | 0.000 | 0.000 |
| 37 | Veneer Shts, Plywood, Laminated & Particle Board | 0.012 | | 0.003 | 0.000 | 0.000 |
| 38 | Builders' Carpentry and Joinery | 0.000 | | 0.000 | 0.000 | 0.000 |
| 40 | Other Wood Products | 0.001 | | 0.000 | 0.000 | 0.000 |
| 41 | Paper and Paper Products and Furniture | 0.015 | | 0.005 | 0.010 | 0.003 |
| 43 | Printing | 0.001 | | 0.000 | 0.000 | 0.000 |
| 44 | Petroleum Refinery | 0.088 | | 0.037 | 0.000 | 0.000 |
| 45 | Basic Chemicals | 0.020 | | 0.007 | 0.009 | 0.002 |
| 46 | Fertilizers | 0.002 | | 0.001 | 0.000 | 0.000 |
| 47 | Paints and Varnishes | 0.001 | | 0.000 | 0.000 | 0.000 |
| 48 | Pharmaceuticals, Chemicals & Botanical Product | 0.001 | | 0.000 | 0.000 | 0.000 |
| 49 | Soap, Detergents, Perfumes, Cleaning & Toilet Preparations | 0.002 | | 0.001 | 0.001 | 0.000 |
| 50 | Other Chemicals Product | 0.017 | | 0.004 | 0.006 | 0.001 |
| 51 | Tyres | 0.003 | | 0.001 | 0.000 | 0.000 |
| 52 | Rubber Processing | 0.005 | | 0.001 | 0.000 | 0.000 |
| 54 | Rubber Products | 0.006 | | 0.001 | 0.002 | 0.000 |
| 55 | Plastics Products | 0.019 | | 0.004 | 0.001 | 0.000 |
| 56 | Sheet Glass and Glass Products | 0.002 | | 0.001 | 0.000 | 0.000 |
| 57 | Clay and Ceramic | 0.002 | | 0.001 | 0.000 | 0.000 |
| 59 | Concrete & Other Non-Metallic Mineral Products | 0.001 | | 0.000 | 0.000 | 0.000 |
| 60 | Iron and Steel Products | 0.003 | | 0.001 | 0.003 | 0.001 |
| 61 | Basic Precious and Non-Ferrous Metals | 0.012 | | 0.003 | 0.000 | 0.000 |
| 62 | Casting of Metals | 0.000 | | 0.000 | 0.000 | 0.000 |
| 63 | Structural Metal Products | 0.002 | | 0.001 | 0.000 | 0.000 |
| 64 | Other Fabricated Metal Products | 0.010 | | 0.003 | 0.002 | 0.001 |
| 65 | Industrial Machinery | 0.003 | | 0.001 | 0.000 | 0.000 |
| 66 | General Purpose Machinery | 0.009 | | 0.003 | 0.001 | 0.000 |
| 67 | Special Purpose Machinery | 0.008 | | 0.003 | 0.000 | 0.000 |
| 68 | Domestic Appliances | 0.003 | | 0.001 | 0.001 | 0.000 |
| 69 | Office, Accounting and Computing Machinery | 0.044 | | 0.012 | 0.000 | 0.000 |
| 70 | Electrical Machinery and Apparatus | 0.003 | | 0.001 | 0.000 | 0.000 |
| 71 | Other Electrical Machinery | 0.006 | | 0.002 | 0.000 | 0.000 |
| 72 | Insulated Wires and Cables | 0.010 | | 0.002 | 0.000 | 0.000 |
| 73 | Electric Lamps and Lighting Equipment | 0.002 | | 0.001 | 0.000 | 0.000 |
| 74 | Semi-Conductor Devices,Tubes and Circuit Boards | 0.069 | | 0.020 | 0.039 | 0.008 |
| 75 | TV, Radio Receivers & Transmitters & Asso. Goods | 0.063 | | 0.025 | 0.010 | 0.002 |
| 77 | Measuring, Checking & Industrial Process Equipment | 0.001 | | 0.000 | 0.000 | 0.000 |
| 80 | Motor Vehicles | 0.027 | | 0.005 | 0.002 | 0.000 |
| 81 | Motorcycles | 0.004 | | 0.001 | 0.000 | 0.000 |
| 82 | Building & Repairing of Ships & Boats, Manufacture of Bicycles & Invalid Carriages | 0.016 | | 0.004 | 0.000 | 0.000 |
| 83 | Other Transport Equipment | 0.001 | | 0.000 | 0.000 | 0.000 |
| 84 | Other Manufacturing | 0.004 | | 0.002 | 0.004 | 0.002 |
| 85 | Repair & Maintenance | 0.000 | | 0.000 | 0.000 | 0.000 |

**Appendix 6.** Total value added multiplier, value added multiplier generated from the use of imported inputs, and value added shares gained by the domestic sectors, 2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Sectors | Total value added multiplier | Value added generated from the use of domestic inputs | Shares of value added gained by domestic sectors  % |
|  |  | (1) | (2) | (3) |
| 18 | Preservation of Seafood | 0.000 | 0.000 | 68.81 |
| 19 | Preservation of Fruits and Vegetables | 0.000 | 0.000 | 54.93 |
| 20 | Dairy Production | 0.000 | 0.000 | 51.44 |
| 21 | Oils and Fats | 0.003 | 0.003 | 91.11 |
| 22 | Grain Mills | 0.000 | 0.000 | 62.46 |
| 23 | Bakery Products | 0.000 | 0.000 | 41.71 |
| 24 | Confectionery | 0.000 | 0.000 | 33.07 |
| 25 | Other Food Processing | 0.001 | 0.000 | 40.22 |
| 26 | Animal Feeds | 0.000 | 0.000 | 56.56 |
| 28 | Soft Drink | 0.000 | 0.000 | 51.17 |
| 32 | Other Textiles | 0.000 | 0.000 | 36.98 |
| 33 | Wearing Apparel | 0.000 | 0.000 | 37.92 |
| 34 | Leather Industries | 0.000 | 0.000 | 38.59 |
| 35 | Footwear | 0.000 | 0.000 | 56.44 |
| 37 | Veneer Shts, Plywood,Laminated & Particle Board | 0.000 | 0.000 | 77.12 |
| 38 | Builders' Carpentry and Joinery | 0.000 | 0.000 | 66.60 |
| 40 | Other Wood Products | 0.000 | 0.000 | 63.48 |
| 41 | Paper and Paper Products and Furniture | 0.003 | 0.002 | 51.41 |
| 43 | Printing | 0.000 | 0.000 | 37.07 |
| 44 | Petroleum Refinery | 0.000 | 0.000 | 67.60 |
| 45 | Basic Chemicals | 0.002 | 0.002 | 83.93 |
| 46 | Fertilizers | 0.000 | 0.000 | 51.10 |
| 47 | Paints and Varnishes | 0.000 | 0.000 | 19.59 |
| 48 | Pharmaceuticals, Chemicals & Botanical Product | 0.000 | 0.000 | 25.33 |
| 49 | Soap, Detergents, Perfumes, Cleaning & Toilet Preparations | 0.000 | 0.000 | 45.80 |
| 50 | Other Chemicals Product | 0.001 | 0.001 | 67.02 |
| 51 | Tyres | 0.000 | 0.000 | 68.18 |
| 52 | Rubber Processing | 0.000 | 0.000 | 73.73 |
| 54 | Rubber Products | 0.000 | 0.000 | 80.53 |
| 55 | Plastics Products | 0.000 | 0.000 | 10.09 |
| 56 | Sheet Glass and Glass Products | 0.000 | 0.000 | 49.26 |
| 57 | Clay and Ceramic | 0.000 | 0.000 | 53.47 |
| 59 | Concrete & Other Non-Metallic Mineral Products | 0.000 | 0.000 | 74.31 |
| 60 | Iron and Steel Products | 0.001 | 0.000 | 51.07 |
| 61 | Basic Precious and Non-Ferrous Metals | 0.000 | 0.000 | 88.53 |
| 62 | Casting of Metals | 0.000 | 0.000 | 43.64 |
| 63 | Structural Metal Products | 0.000 | 0.000 | 40.32 |
| 64 | Other Fabricated Metal Products | 0.001 | 0.000 | 43.28 |
| 65 | Industrial Machinery | 0.000 | 0.000 | 40.67 |
| 66 | General Purpose Machinery | 0.000 | 0.000 | 29.01 |
| 67 | Special Purpose Machinery | 0.000 | 0.000 | 38.29 |
| 68 | Domestic Appliances | 0.000 | 0.000 | 32.57 |
| 69 | Office, Accounting and Computing Machinery | 0.000 | 0.000 | 28.56 |
| 70 | Electrical Machinery and Apparatus | 0.000 | 0.000 | 55.62 |
| 71 | Other Electrical Machinery | 0.000 | 0.000 | 26.90 |
| 72 | Insulated Wires and Cables | 0.000 | 0.000 | 1.98 |
| 73 | Electric Lamps and Lighting Equipment | 0.000 | 0.000 | 32.10 |
| 74 | Semi-Conductor Devices, Tubes and Circuit Boards | 0.008 | 0.004 | 45.30 |
| 75 | TV, Radio Receivers & Transmitters & Asso. Goods | 0.002 | 0.001 | 56.79 |
| 77 | Measuring, Checking & Industrial Process Equipment | 0.000 | 0.000 | 8.02 |
| 80 | Motor Vehicles | 0.000 | 0.000 | 43.78 |
| 81 | Motorcycles | 0.000 | 0.000 | 45.80 |
| 82 | Building & Repairing of Ships & Boats, Manufacture of Bicycles & Invalid Carriages | 0.000 | 0.000 | 68.40 |
| 83 | Other Transport Equipment | 0.000 | 0.000 | 36.34 |
| 84 | Other Manufacturing | 0.002 | 0.000 | 22.21 |
| 85 | Repair & Maintenance | 0.000 | 0.000 | 43.92 |

1. Various terms are used in describing “trade in task” in the literature such as trade in value added, international outsourcing, vertical specialization, trade fragmentation, and processing trade. All refer to the same trade concept in which the production process has been sliced up and distributed globally. However, processing trade used by Koopman et al. (2012) is more specific to describe processing and assembling activities using imported inputs for re-export purposes conducted with special incentives given by the government that includes Free Trade Zones, duty drawback scheme, special tariff treatment and other tax incentives. [↑](#footnote-ref-1)
2. Mean Absolute Deviation (MAD) and Dissimilarity Index (DI) are the two measures that have been used extensively in the literature when comparing structural differences between two input-output coefficients (see for example, Saari, 2014). The lower of the indices implies the higher degree of similarities for the two coefficients. [↑](#footnote-ref-2)
3. Fortunately, Mexico’s statistical agency, the Instituto Nacional de Estadística, Geografía e Informática (INEGI), has complied 2003 benchmark input-output table based on economic census, which have separated accounts for Mexico domestic and processing (also termed as Maquiladora) industries. [↑](#footnote-ref-3)