Growth Channels, Imported Inputs and Intra-Industry Trade: A Panel Data Analysis on Malaysian Manufacturing Sector

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

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Abstract

The thesis investigates three selected issues pertaining to the Malaysian Manufacturing sector namely industries growth channels, imported inputs and intra-industry trade determinants. For each of this issue we have adopted a static and a dynamic estimation approach. In the static estimation the result presented are based on Ordinary Least Square, Fixed and Random Effect besides Generalized Least Square estimations. Meanwhile in the dynamic estimation, we focused on result of the difference and system GMM estimations.

For industries growth channels, the findings suggest that at aggregate industry level, fixed capital formation and human capital channels are always statistically significant regardless of the test applied either in static or dynamic models estimation. The significance of fixed capital formation is consistent with the strong and cumulative saving and investment condition in Malaysia which has had a significant effect on the capital formation of the country. Our findings for foreign direct investment channel might suggest that Malaysian manufacturing industries has had problem to absorb the transfer of technology that had impede the growth of the sector. Meanwhile, a negative association between government consumption and economic growth might indicate that the government expenditures pattern might have distort the allocation of resources in the economy especially the manufacturing sector. Our findings suggest that the nature of the relationship between manufactured exports and economic growth is negative which might indicate that Malaysian manufactured exports were actually driven by the economy growth. Further analysis at individual export-oriented industry level shows that manufactured exports and government consumption channels have influence growth in both resource-based and non-resource based industries. Our analysis also include trade liberalization estimation which suggest that trade liberalization has a positive causality relationship with the growth of industries through all selected channels.

Regarding the imported inputs analysis, the dynamic estimation results show that imported inputs have a positive relationship with industries owned by the non-Malaysian, but not for industries owned by the Malaysian. Our finding for industries owned by the Malaysian is consistent with the government actions that have strongly encouraged them to use domestic inputs through implementation of various incentives. This is because the implementation of the first round of the Import Substitution phase (1957-1967), had created an industrialization era which relied heavily on imported inputs and machines which resulted in distortions in domestic product prices, low value added, poor domestic economy linkages and

inequalities in income and employment. On the contrary, our findings for all static and dynamic models suggest that imported input have a positive relationship with the growth of industries owned by non-Malaysian. This result might indicate that industries whose import their intermediate inputs have increased their growth performance and productivity. Meanwhile, at firms' level, imported inputs suggest a positive relationship with firms owned by both Malaysian and non-Malaysian. Our analysis again include trade liberalization estimation which show that trade liberalization have a positive relationship with the imported inputs content in industries owned by Malaysia while at firms level, only non-tariff index shows a positive relationship.

Last issue relates to the intra industry trade in Malaysian manufacturing sector. Our findings suggest that the gross domestic products variables which proxies the market size of a country, the similarity in income and the relative size effects between Malaysia and its trading partners has had influence the share of intra industry trade of the manufactured goods. As for the other country-characteristic determinants, we found a positive relationship between foreign direct investment and the share of intra-industry trade which support the theoretical framework proposed by Grubel and Lloyd (1975) and Greenaway and Milner (1986). Similarly, distance and trade imbalance also indicates a significant negative relationship with the trade share. Meanwhile at individual industry level, our findings suggest that a majority of the gross domestic product variables indicate a statistically significant relationship with the trade share in the dynamic estimation models for the wood, textiles and electrical and electronic industries. Contradictory, the maximum value of gross domestic products has a statistically significant relationship in the static estimation models for the rubber, textiles and electrical and electronic industries, respectively. Meanwhile, the other country-characteristic determinants such as foreign direct investment, trade imbalance and trade orientation have a statistically significant relationship in both static and dynamic estimations models in a majority of the Malaysian export-oriented industries. On the other hand distance, border and asean have a statistically significant relationship in only the static estimation models for the industries.

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List of Abbreviations

AFTA	Asean Free Trade Area
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
CBU	Complete Break Up
DEA	Data envelopment analysis
DSD	Department of Skills Development
EAEC	East Asia Economic Caucus
EEC	European Economic Community
EOI	Export-Oriented Industrialization
EPZs	Export Processing Zones
ERP	Effective Rate of Protection
ETP	Economic Transformation Program
EU	European Union
FCF	Fixed Capital Formation
FDI	Foreign Direct Investment
FTA	Free Trade Zone Area
FTZ	Free Trade Zone
GATT	General Agreement on Tariff and Trade
GC	Government Consumption
GDP	Gross Domestic Products
GLS	Generalized Least Square
GMM	Generalized Method of Moments
GNI	Gross National Income
GNP	Gross National Product
GNS	Gross National Saving
HC	Human Capital
HICOM	Heavy Industrialization Corporation
HIIT	Horizontal Intra-industry Trade
HRDF	Human Resources Development Fund

ICT	Information and Communication Technology
IID	Independent and Identically Distributed
IIT	Intra-industry Trade
ILO	International Labor Organization
IMD	Institute for Management Development
IMP1	First Industrial Master Plan
IMP2	Second Industrial Master Plan
IMP3	Third Industrial Master Plan
ISI	Import Substitution Industrialization
MIDA	Malaysia Industrial Development Authority
MIER	Malaysian Institute of Economic Research
MIIT	Marginal Intra-industry Trade
MITI	Malaysian Ministry of Trade and Industry
MNCs	Multinational Corporations
MNEs	Multinational Enterprises
MQ	Quality of Macroeconomic Policies
MSC	Multimedia Super Corridor
MTR	Mid-term Review
MX	Manufactured Exports
NDP	National Development Plan
NEM	New Economic Model
NEP	New Economic Policy
NIEs	Northern Asian
NKEA	National Key Economic Area
NRP	Nominal Rate of Protection
NOSS	National Occupational Skill Standards
NRP	Nominal Rate of Protection
NVP	National Vision Policy
OECD	Organisation for Economic Co-Operation and Development
OLS	Ordinary Least Square
OPP1	First Outline Perspective Plan

OPP2	Second Outline Perspective Plan
OPP3	Third Outline Perspective Plan
PIA	Promotion of Investment Act
PGU	Peninsular Gas Utilization
PROTON	National Automobile Industry of Malaysia
RA	Reinvestment Allowance
R&D	Research and Development
RM	Malaysian Ringgit
SADC	Southern African Development Community
SITC	Standard Industrial Trade Classification
SMIs	Small and Medium Scale Industries
SSE	South Eastern Europe
SUV	Sport Utility Vehicle
TIFA	Trade and Investment Framework Agreement
TFP	Total Factor Productivity
TRIPs	Trade Related Aspects of Intellectual Property Rights
TVET	Technical and Vocational Education and Training
UNCTAD	United Nations Conference on Trade and Development
USD	United States of American Dollar
VIIT	Vertical Intra-industry Trade
WDI	World Development Indicator
WEF	World Economic Forum
WTO	World Trade Organization

CHAPTER ONE

RESEARCH OVERVIEW

1.1 Introduction

Chapter one mainly describes the overview of the research started with a statement of problems and discussion of the research objectives. Next, we'll further discuss the research questions and hypotheses, followed by the significance and contribution of each section of the research. The statement of problem highlights three main issues that are crucial for Malaysia to maintain its growth particularly in achieving a developed and high income country by year 2020. These issues need to be addressed in the thesis in order to find appropriate recommendation that will be proposed to the related authority for further actions. The extent of the research objectives and hypothesis for each issue that have been highlighted in the statement of problem will be further discussed in the next sub-section and the last part of chapter one will describe the contribution of each of the issues that have been highlighted in the thesis.

1.2 Motivation of Study

Malaysia appears to be a suitable case study given the fact that it is one of the small open economies among the developing countries which recorded consistent economic growth rate since its independence. In the last three decades Malaysia has maintained an average of 7.5 percent growth annually. Malaysia also has had a long history of commodity trade but has been successful in diversifying and shifting its export base toward manufactured goods following the emphasis of government policy which shifted from import substitution to export expansion strategies. It had also managed to sustain economic growth after the Asian crisis in 1997 without major borrowing from the International Monetary Fund (IMF), compared to the other ASEAN countries.

Malaysia also has been the recipient of large inflows of foreign investment since the middle of the 1980s in particular, and these inflows have been spread over a large number of industries. This spread in foreign direct investment flows encompasses both import-substituting and export-oriented industries. This study is also unique in the way that most of the prior studies of foreign direct investment and productivity growth have focused on the experience of aggregate or individual industries in developed countries. The foreign investment flows to developed economies have been drawn in mainly to either avoid tariff and other barriers or to better serve the host market in final goods. On the other hand growth in the foreign investment flows to developing countries such as Malaysia has focused on assembly and process activities in vertically integrated manufacturing industries. Studies especially on the experience of individual industries in developing countries are still lacking and therefore the problems associated with generalizing the result from developed countries to developing countries are still debatable. Besides its role as the major player in the capital accumulation process, the industrial sector also acts as a base for technology transfer that can take place through human resources development and management.

Empirical studies of growth determinants for Malaysia within the framework of cross-country and national level are very rich. The empirical findings of the panel data analysis have showed mixed results[1] which have been massively discussed at national level, however are still lacking at industry level. Among the growth channels included for analysis are the quality of macroeconomic policy and government consumption expenditure both of which portray the quality of the government. The Malaysian government has played a continuous role in sustaining the growth of the economy through formulating and implementing various development and growth plans. Hence it is appropriate to investigate and portray the role of the government specifically in sustaining the growth of the manufacturing sector. The findings of this study will also help to evaluate the success of the implemented plans. With the inclusion of foreign direct investment into the analysis the findings can also be used as guidance to evaluate the investment policies implemented to promote the manufacturing industries. By identifying the relationship between and effects of the selected variables, this study should be able to provide clarification on empirical evidence pertaining to the growth of individual industries together with the growth of the Malaysian manufacturing sector as a whole. Malaysia's development policies have been re-positioned through several important stages from an import substitution policy (1960-1965), through export promotion policy (1965-1970) to import substitution (1970-1975) and export-oriented structural reform (1976-1980). Export-oriented strategies are still being implemented now. The manufacturing sector has been emphasized as the engine of growth since the late 1970s and hence the Malaysian economy has passed through various stages of development, transforming from an agricultural to an outward-oriented industrial economy where the growth rate reached a historic record of around 8 per cent per annum during the 1990s.

Intermediate inputs comprise about half of international merchandise trade in goods for most industrialized countries and models of intermediate inputs trade have been useful in studying the relationship between trade and growth. In the earlier phase of literature, the imported input model was based on the idea that all producers use an identical bundle of imported and domestic goods. However, more recent literature has found that imported inputs are concentrated among relatively few producers and there is substantial heterogeneity in import shares among them[2]. Imported inputs are characterized as cheaper but perfect substitutes for domestic inputs. Imported inputs could also yield productivity gains if imports are of higher quality than comparable domestic inputs. The new intermediate inputs model plays a central role in many trade and growth models. These models predict that firms benefit from international trade through their increased access to previously unavailable inputs, and this process generates static gains from trade.

Studies by Kurz (2006), Kurz and Lengermann (2008) and Kasahara and Lapham (2007) of the United State and Chile data have found that only one quarter of manufacturing plants in both countries use imported inputs and furthermore these importing plants employ (on the average) two to three times as many workers as their non-importing counterparts[3]. Therefore they concluded that at the micro level, producers are heterogeneous in their use of imported intermediate inputs as compared to domestic produced intermediate inputs and in general the size of the importing firms is large compared to the non-importing firms.

Since the 1970s Malaysia had been importing more than 60 per cent of the inputs for production in the manufacturing sector. The sources of import have a close link with the status of ownership of firms in the industries. Many researchers have investigated the ownership structure of Malaysia economy and the usage of imported inputs separately; however fewer have looked at the relationship between imported inputs, ownership structure and the growth of the industry particularly at the micro level. Hence, this study is important to bridge the gap in Malaysia's growth literature and empirical evidence. Such analysis will also have policy implications to further improve Malaysia's policy implementation by the government for example in terms of incentives schemes targeted by the government for sub-sectors and also incentives schemes provided at the micro level for small and medium enterprises or firms.

Since the early 1990s Malaysia's commitment to various regional and international economic associations such as the Association of South Asian Nations (ASEAN), ASEAN Free Trade Area (AFTA), East Asia Economic Caucus (EAEC) and Asia Pacific Economic Cooperation (APEC) has influenced the trade environment of liberalization and changes in the economy as a whole. While countries usually engage in inter-industry trade according to their competitive advantage, trends in intra-industry trade have widely been attributed to the fragmentation of production (outsourcing and offshoring) as a result of globalization and new technologies. According to standard industrial classifications, approximately 25 percent of world trade is intra-industry trade. Intra-industry trade can reap a range of benefits although the act of importing and exporting the same type of products with the international partners may seem strange. The first benefit is that intra-industry trade increases the variety of products in the same industry. Secondly, intra-industry trade gives opportunity for the producers to benefit from economies of scale and comparative advantage. Countries will get more economic benefits if they concentrate on producing specific types of products within a specific range, according to their comparative advantages rather than producing all ranges of specific products. Thirdly, intra-industry trade stimulates innovation in industry where high quality intra-industry trade is driven by technological innovation and spillovers. Technological differences may create comparative advantages and disadvantages between countries which are reflected in the pattern of trade.

Intra-industry trade is an important contribution to Malaysia's economic growth, it has been recognized, and is on a rising trend. Malaysia's intra-industry trade particularly in manufactured goods is a determinant which has been identified as a key factor driving the trade growth. Hence, it is important to estimate the determinants which re-shape the intra-industry trade between Malaysia and its trading partners. Although a number of studies have examined the Malaysian intra-industry trade within the context of ASEAN or Asia Pacific region such as Ariff (1991), Menon (1996a, 1996b), Khalifah (1996), and both Thorpe (1993) and Min (1992) as noted in Chemsripong et al. (2005), and Bruhart and Thorpe (2000), among others, yet empirical analysis of the determinants of intra-industry trade at a sub-industries level is still limited. Furthermore, analysis for Malaysia's case solely has not yet been done. Hence, this study is important to bridge this imbalance between the theoretical and empirical aspects of intra-industry trade in the Malaysian case. It is therefore important to evaluate the existing trade policies, their achievements and to make necessary suggestions for further policy improvement. Based on the above arguments, we believe that Malaysia is a country whose experience with exports and growth is worth careful study.

1.3 Statement of Problem

Malaysia's main sources of growth, through channels such as capital accumulation, foreign direct investment and technology transfer have been proven historically and empirically. Massive researches[4] have shown that these factors have brought major changes to the growth of the economy since the 1960s until the present. According to Lin (1996), from the 1960s to the 1980s, Malaysia had experienced neither a savings-investment gap nor a foreign exchange gap to bridge since there had been a substantial accumulation of foreign reserves over these years.

It has been identified by the government that the manufacturing sector has developed based on the massive inflows of foreign investment into this sector and the development of the human capital. Besides these factors, there are other factors which contribute to the growth such as fixed capital formation, a low rate of inflation, international trade, the role of the government and stable political conditions. Furthermore, according to Kanapathy (1997) Malaysia has built up a competitive industrial structure that has worked extremely well over the last three decades. This competitive strength has been built upon low labor cost, sound physical and policy infrastructure, a fairly educated workforce, availability of support services and retained value added industrial structure. However, as the global and domestic environment changed rapidly, and given its small population base, Malaysia had to face internal and external challenges to sustain its competitiveness. Internal challenges occurred due to the heavy reliance on foreign direct investment as the engine of growth for decades**.** Massive inflows of foreign direct investment occurred in the high-technology industries such as medical and measuring instruments, advanced electronics and computing, automotive and machinery equipment industries, biotechnology and professional and scientific measuring instrument industries.

Although the capital inflows are massive, Malaysia had faced low absorptive capacity especially in term of knowledge and technology transfer. This is shown by low intensity of innovation and research and development progress in these industries. For example, in 2011 the government had allocated only 1.07 percent of the total gross domestic product to research and development expenditure which is low as compared to Singapore and Taiwan which exceed 3 percent, respectively. In fact, according to Rasiah (2011) lack of industrial deepening through institutional change in the manufacturing sector had been acknowledged by the government in the 10th Malaysia Plan. As such, failure to absorb the technological progress and to develop sufficient domestic linkages has resulted in the growth of industries with dependence on high imported input contents.

The manufacturing sector has served as a platform for foreign direct investment inflows into the country; since the 1980s Malaysia has been actively liberalizing its investment regime in this sector. Many incentives were offered to attract foreign investment including pioneer status tax holidays, investment tax allowances for expansion projects, tax deduction for export promotions and the establishment of a Free Trade Zone area. As a result, since then the inflows of foreign direct investment into Malaysia have been very large. For example, total foreign investment in the manufacturing sector (at 2005 prices; also related to all subsequent figures) had increased from RM 2,023 million in 1987 to RM 6,285.2 million in 1997. In 2013 the total foreign investment amounted to approximately RM30, 536 million; an increase of 31 percent from RM20, 919 million in 2012. Most of the inflows in 2013 went to electronics and electrical products which accounted for RM 8,495.6 million (27.8 percent of the total inflows), followed by the basic metal industry which accounted for RM 4,425.8 million (15 percent) and the chemical industry which accounted for RM 3,758.9 million (12 percent).

However, as a share of the total foreign investment inflow into the ASEAN countries, the inflow into Malaysia has been decreasing. For example, in 1970 total foreign inflows amounted to USD94 million which is 20.4 percent of the total foreign inflow into the ASEAN region. The peak of Malaysia's share was from 1980 to 1985 when it increased to more than 30 percent of the total inflow into the region. However in 2005, the share recorded was only 9.7 percent of the total inflows into ASEAN. In 2013 the share recorded was only around 10 percent of the total inflows into the ASEAN. Hence, these figures indirectly give a picture of Malaysia which has dramatically lost its competitiveness in the region as compared to the other countries as mentioned above, especially to Vietnam, Thailand and Indonesia which had gained their strength gradually.

The government perceived that the slowdown of the manufacturing sector growth was largely due to the ineffectiveness of its existing instruments and strategies to support technological catch up. These instruments and strategies are no longer appropriate and have directly resulted in external problems for Malaysia. The first external problem is associated with the increasing production cost arising from a tightening labor market where Malaysia had to compete with lower-wage countries, such as China, India, Vietnam, Indonesia and Thailand, which at the same time have larger domestic markets. The second problem arises with the expansion of cheap exports from these countries that have been aggressively promoting themselves as low-cost export platforms. Therefore, to nurture a more robust industrial sector and retain more value added in the economy, the government has reformulated the existing industrial widening and deepening strategies, such as the strategies to stimulate innovative industrial activities and research and development abilities besides attracting foreign investment that is conducive to developing indigenous supply capability. These new strategies should also be focused to broaden and increase the potential domestic linkages in the local economy and to avoid concentration of foreign investment in certain industries that produce low potential for linkages.

The challenges highlighted indicate the need for the manufacturing sector to move up the value chain so as to remain competitive in the global economy. Innovation leading to new product development and also new production processes will be the key factor in improving productivity through higher added value. The manufacturing sector also needs the infusion of advanced technology and ‘know how’ through technology transfer to support its continuing growth. Greater spending in research and development activities will be a necessary input to achieve these transformations. Furthermore, the cyclical downturn in the demand for semi-conductors in mid 1990s had highlighted the risk of relying on a narrow range of products or a small group of markets.

The Asian financial crisis of 1997 to 1998 has also highlighted the importance of increasing resilience in an integrated global environment where the flows of capital, trade and information transcend national borders. Although the electronics industry was an important factor in Malaysia’s spectacular recovery from the crisis, as a strategy to increase economic resilience, there is a need to identify new growth areas while broadening and deepening the existing ones, so as to widen the range of exports and strengthen the sources of domestically-generated growth. Malaysia is exposed to the above external effects because its economy is integrated with the rest of the world. While it is not possible to be completely insulated from external shocks, there is a need to strengthen Malaysia’s economic, financial and social resilience so that it is able to withstand global volatility and risks without being derailed by them.

According to Kanapathy (1997), based on the experience of many developed economies such as the United States, Germany and Japan, the average share of manufacturing output at about 30 percent of the real output, can be generally regarded as the maximum level of manufacturing share in the economy. One of the examples was pointed out by Baily and Bosworth (2014) where the United States manufacturing output share which was on average at 25 percent in the 1960s had declined to approximately 12 percent in 2010, after more than 50 years of stable and remarkable growth. Similarly, as recorded by the World Bank (2015) database, Germany and Japan also recorded high shares of manufacturing output at 27 percent each in 1991 and 1981, respectively. However, the share had also declined to 23 percent and 19 percent, respectively in 2014. Meanwhile, Newly Industrialized Countries (NICs) such as China which recorded the highest share of manufacturing output at about 38 percent in 1981 had also experienced declining share to 30 percent in 2014. Similarly, Thailand also recorded a decline in the share from 31 percent in 2007 to 28 percent in 2014. Malaysia, classified as one of the NICs, also experienced a similar decrease in the manufacturing output share where its highest recorded share in 1999 at 31 percent had declined to 23 percent in 2014.

Realizing the importance of knowledge and information technology, new policy initiatives, to enhance the knowledge base and strengthening the quality of workforces, which emphasized promoting information technology and multimedia industries, were introduced as new sources of growth in 2000. The objectives of the policy were to diversify into high value added services industries. These two strategic sectors are instrumental in increasing the efficiency, productivity, and competitiveness of the manufacturing sector in realizing the transition to a knowledge-based economy. Since the 2000s also Malaysia has transformed into a service-led economy. Though the manufacturing sector has remained as a substantial force for growth after the structural transformation in the 80s, its share of employment has been decreasing dramatically since the shift into a service-led economy.

Intra-industry trade has been recognized as one of the channels that contribute to Malaysian economic growth. The Malaysian economy has always been trade dependent, and the rising share of manufactures in the total exports of Malaysia for more than three decades was considered by economists to be a result of the growing volume of intra-industry trade flows. Initial analysis pertaining to Malaysian intra-industry trade was conducted by Ariff (1991). Using the Grubel and Lloyd index he had empirically found that intra-industry trade share had significantly increased by more than 50 percent between Malaysia and its major trading partners such as the United States, Japan, Canada, Australia, New Zealand, NIEs and ASEAN from 1970 to 1987.

In our study, we have extended the analysis of the intra-industry trade share from 1995 to 2009, to further investigate the growth of Malaysia's intra-industry trade with its major trading partners. Our findings indicate that from 1995 to 2009, Malaysia has established a strong and continuing intra-industry trade of approximately over 60 percent of its total trade with countries such as Republic of China, Singapore, Japan, Germany, India, and Philippines. Although the empirical literature that includes Malaysia in the trade analysis is massive, previous studies have empirically investigated the share and extent of the intra-industry trade or focused on the analysis of country-specific determinants that influenced the intra-industry trade in a group of countries, such as to include Malaysia as a member of the ASEAN countries. No empirical analysis has investigated the country-specific determinants for Malaysia at industry level.

From the above discussion, this thesis strongly suggests that it has become a priority aspect of study to; firstly investigate the relevant channels of growth which contributes to the growth of particularly the export-oriented sub- industries for further development of the Malaysia manufacturing sector, then recommend relevant policies associated with the channels. The Malaysian government in researches conducted by their agencies such as Malaysian Institute of Economic Research (MIER) has claimed that these sub-industries had depended highly on imported inputs usage in their production. Therefore, our next objective is to examine the relationship between importing inputs and industries' and firms growth in order to determine whether industries and firms owned by Malaysians or by non-Malaysians have used more content of imported inputs than the other. For the analysis, we have classified the industries according to the ownership type. Based on the findings, we expect to make recommendations to improve this situation. Lastly, our study needs to examine which country characteristics determinants which contribute to intra-industry trade growth in the manufacturing sector so that suitable recommendations could be proposed, for further enhancement of the related industries' contribution towards the growth of the Malaysian economy.

1.4 Objectives of Study

The objectives are identified according to the issues selected to be highlighted in this study. The main objectives of studying industrial growth channels are twofold, firstly is to investigate the channels that determine the growth of the industries and secondly to examine the causal relationship between trade liberalization variables and industries' growth through these channels. As such the specific objectives of growth channels issue are; firstly, to identify and discuss the growth channels of the manufacturing sector in Malaysia; secondly to analyze the channels contributing to the growth of the industries; thirdly to identify the problem and policy implications of the manufacturing sector's competitiveness and lastly to discuss future prospects and strategies to deal with these problems. In particular, to determine which growth channels contribute towards industry growth, we will investigate the relationship of economic growth channels at the manufacturing sector as a whole as well as at the individual sub-industry level. A second main objective that has been derived is to examine the issue concerning causal relationship of trade liberalization and industry growth through growth channels in selected export-oriented industries. These export-oriented industries are textiles and wearing apparel products, wood products, petroleum and fuel products, rubber products, machinery products, electrical and electronic products, scientific and machinery equipments and leather products.

The main objectives regarding the second issue of the thesis, namely the imported inputs sections, are also twofold. The first main objective is to determine the use of foreign inputs on industries' growth while the second main objective is to examine the relationship between imported inputs content and industries' growth in selected export-oriented industries. The analysis for both objectives will be categorized according to the ownership of the industries and firms. Thus, the main aim is to identify which industries experienced high growth due to importing foreign inputs; to determine whether importing foreign inputs increases industry growth; and to determine whether either foreign owned or Malaysian owned industries have experienced higher growth due to importing their inputs.

Lastly, the objectives of the study of the third issue, intra-industry trade are also twofold. The first main objective is to analyze the intra-industry trade of manufactured goods at Standard Industrial Trade Classification (SITC) 3-digit level[5]. For comparison and further investigation, we have also calculated the index for total products and the index of other countries such as the United States, the European Union, Japan, China, ASEAN and East Asia which are among Malaysia's major trading partners. The second main objective is to examine the country-specific determinants of intra-industry trade. The analysis will firstly focus to identify the country-specific determinants for manufactured goods meanwhile secondly focusing on selected export-oriented industries. The export-oriented industries selected are rubber products, wood products, textiles and wearing apparels, electrical and electronic products and petroleum and fuel products industries.

1.5 Research Questions

The section on the first issue, growth channels, investigates and examines firstly the relationship between six growth channels and the growth of nineteen selected industries in the manufacturing sector. Secondly, our study examines the causal relationship between trade liberalization variables and industries' growth through the growth channels of selected export-oriented industries. The analysis is focused on determining which channels are the main contributors to different industries' growth, individually and as a whole sector. Since our analysis focused mainly on panel data, the discussion will focus on time-specific and industry-specific effects. However, for the analysis of the trade liberalization causality, our analysis will be focused on time series data.

The second issue is the investigation of the relationship between growth of industries' and firms' revenue and the decision to use imported intermediate inputs. It is claimed that importing intermediate inputs increases the probability of survival (Lopez, 2006) and increases performance (Kasahara and Rodrigue, 2008) at plant-level, and that import competing industries enjoyed productivity gains higher than gains in the non-traded goods sector due to the liberalized trade (Pavenik, 2002). In our study, we will focus on two types of analysis; industry-level and firm-level analysis. 53 sub-industries and 300 and 227 firms have been randomly selected for analysis and these industries and firms are classified into two types of ownership, Malaysian and non-Malaysian, respectively. The analysis examines whether importing their inputs has influence on the industries' or firms' revenue growth. Industries and firms with shared ownership are not included in the study because most of the data are missing. As a result, the number of individual characteristics in the panel data estimation is not enough to represent the whole population when they are aggregated together.

The last issue is pertaining to intra-industry trade between Malaysia and its major trading partners. According to Jing (2009) statistics published by the WTO stated that from 1960 trade between developed countries is approximately more than two-thirds of world trade and the major world trade growth after World War II has been due to the intra industry trade (Hirschberg et al., 1994). Hence, intra industry trade has played a very important role in world trade. Intra industry trade first received attention in an empirical work on the increased trade flows among the European Community (EC) by Pieter Verdoorn and Bela Balassa in the 1960s. Since then an extensive literature has shown evidence of intra industry trade in the trade of developed economies (e.g. Grubel and Lloyd, 1975; Aquino, 1987; Greenaway and Milner, 1984), less developed economies (e.g. Balassa, 1979; Havrylyshyn and Civan, 1983) and centrally planned economies (e. g. Drabek and Greenaway, 1984; Hartman et al., 1993). Herbert Grubel and Peter Lloyd (1975) provided the definitive empirical study on the importance of intra-industry trade and how to measure its index.

1.6 Organization of the Research

The rest of this paper is organized as follows. Chapter one begins with the research overview which describes the motivations of the study, followed by the problem statement, the research questions and the objectives. Chapter two provides a discussion of the literatures on growth channels, imported inputs and intra-industry trade. Next, chapter three highlights the background and development of the Malaysian economy with emphasis on manufacturing industry. Chapter four provides the research methodology of the study including the theoretical framework of the study, hypothesis development and research design including data collection that will be utilized in the study. The next three chapters five, six and seven, show the results and discussions pertaining to the three main issues that have been chosen: growth channels, imported inputs and intra-industry trade. Finally, chapter eight summarizes the findings of the study and draws policy recommendations for each of the issues that have been highlighted. This chapter also presents the limitations of study and suggests a few directions for future possible research.

CHAPTER TWO

GROWTH CHANNELS, IMPORTED INPUTS AND INTRA INDUSTRY TRADE: A REVIEW OF LITERATURES

2.1 Introduction

Malaysia is a fast growing country which has targeted to be a developed country by year 2020. Initially the economic growth depended mainly on the contribution of the agriculture sector: however since the 1980s the growth has been driven by the manufacturing sector. Although from 2000 until the present the contribution of the manufacturing sector to economic growth has started to decrease and was taken over by the service sector, the growth of the industrial activities in Malaysia is still crucial in generating persistent GDP and export growth. Among others, the growth of the manufacturing sector can be attributed to factors such as the growth determinants (channels) outlined in chapter one, the used of imported inputs in its production and the intra-industry trade of the industries.

Hence, this chapter is divided into four sections to review existing literatures of each separate issue addressed in the earlier chapter. The first section presents the literatures about industries' growth channels and the relationship between trade liberalization and industries' growth through these channels in selected export-oriented industries. The second section describes the existing literatures about the relationship between imported inputs and industries' and firms' growth and also the trade liberalization effect on the usage of imported inputs in the export-oriented industries. Finally, the last section discusses the existing literatures about intra-industry trade country-specific determinants.

2.2 Growth Channels Literatures

The role of saving and investment is stressed in the Solow’s neo-classical growth theory. Although Solow’s theory says that higher investment will raise a country’s growth rate only until it reaches its steady state or balanced growth path, Solow and others have estimated that any such adjustment is likely to take several decades (Romer, 2011; Barro, 2015). To that extent, then, even Solow’s theory posits a long-term relation between investment and growth. And, although it was originally put forward in the context of a closed economy, Solow's growth model also implies that capital which is abundant in developed countries would have a natural tendency to flow towards developing countries due to their higher rate of return (according to the law of diminishing returns). It was in the late 1970s that the neo-classical economic theories come to support the idea of positive relationship between foreign direct investment and economic growth, however the theories were still debatable and this has led to the rise of the endogenous growth theories in the late 1980s.

Endogenous growth theory posits a particularly strong and permanent link between investment and growth based on the assumption that more capital itself advances technological progress. Unlike the neo-classical growth theories, this model does not show diminishing returns to capital or labor as it considers the possibility that investments in physical and human capital can generate external economies and productivity improvements by an amount which is sufficient to offset the diminishing returns. The endogenous growth theory framework pointed to a more detailed interpretation of growth, where variables such as research and development~~s~~, human capital accumulation (education), externalities and spillover effects and role of the government are identified as the main determinants of economic growth. The theory also pointed that permanent changes in physical investment rates, human capital investment rates, population growth, export shares, and other policy variables, including government consumption, trade policy, property rights, and regulatory pressure, could lead to permanent changes in economic growth.

According to the endogenous growth theories, the positive impact of foreign direct investment on economic growth is twofold. Firstly through capital accumulation in the recipient economy, foreign direct investment is expected to be growth enhancing by encouraging the incorporation of new inputs and foreign technologies via research and development into the recipient industries. Grossman and Helpman (1990, 1991a, 1991b) and Barro and Sala-i-Martin (1997) focused on the importance of technological spill over and international transmission as sources of growth for open economies, which means that more open economies are better able to absorb advanced technologies. In this condition foreign direct investment is claimed to have a direct impact on economic growth via technological upgrading and knowledge spillover which increase the productivity of the physical capital in the recipient economy. Secondly through knowledge transfer (human capital education) foreign direct investment is expected to augment the existing stock of knowledge in the recipient country through labor training and skill acquisition.

Initial discussion on capital accumulation was highlighted during the years of 'high development theory' which was between the 1940s and 1960s. Under the neoclassical growth theories capital accumulation is an important driving factor towards a steady state level of economic growth. Based on the assumption of constant returns to scale, growth in this growth model can be achieved in the short run through a higher rate of saving and hence a higher rate of capital formation. As such, capital has become a standard variable included in the neoclassical Cobb-Douglas production function. The importance of investment in physical capital for long-run economic growth is also highlighted in the endogenous growth theories. Theoretically gross capital formation affects economic growth in the same way as foreign direct investment; increasing both the amount and the productivity of the physical capital stock in the economy. According to Buckley et al. (2002) the extent to which foreign direct investment contributes to growth depends on the rate of saving and formation of capital in the recipient countries. Generally foreign direct investment is claimed to be used to finance fixed capital formation or to cover a deficit in a company or for loan settlement. It can also be relate to purchases of shares in foreign companies where the buyer has a lasting interest which normally consists of 10 percent or more of voting stock. Malaysia requires a high rate of capital formation to generate and sustain high economic growth. Such investment will boost the country's productive capacity and standard of living without giving rise to inflationary pressure.

The relationship between government spending and economic growth is of contradictory nature. Economists perceive that a higher share of public spending in the economy might either promote or retard economic growth. According to the cost and benefits analysis, the nature of a link between government consumption and economic growth is not clear because an increase in government consumption may enhance economic growth by injecting purchasing power into the economy or may reduce the productivity growth rate by crowding out private investment. Bergh and Henrekson (2011) pointed that the contrasting view exists because of two possible reasons. In developing countries, the public sector is typically small therefore the relationship between government size and growth is positive. Meanwhile the public sector is typically large in developed countries therefore the relationship between government size and economic growth is less positive or may tend to be negative.

Advocates of ‘bigger government’ argue that government expenditure through various programs provide valuable ‘public goods’ such as education and infrastructure and an increases in government spending would bolster economic growth since more money is injected into the economy. The proposed economic rationale is that, while government consumption expenditure can affect the short-run economic performance but eventually merely crowds out private investment in the medium run, government investment may have positive, permanent, effects on potential output. From this standpoint, expansionary fiscal policies can be rescued by their positive supply-side effects. Meanwhile proponents of 'smaller government' claimed that higher spending undermines economic growth by transferring additional resources from the productive sector of the economy to an unproductive sector which uses them less efficiently. Similar to the advocates of 'big government', according to Keynesian theory, increases in government spending would boost economic growth by injecting purchasing power into the economy. They also perceive that the government could reverse economic downturns by borrowing money from the private sector and then returning the money to the private sector through various spending programs. The government could also provide short-term stimulus to help end a recession or depression with deficit spending. The Keynesians are sometimes associated with the advocates of 'bigger government' spending but have no theoretical objection to the proponents of 'smaller government' spending as long as it can be increased temporarily to deal with the sluggish economy.

Another school of thought argued that budget deficits are of negative impact because they allegedly lead to higher interest rates. Since higher interest rates are believed to reduce investment, and investment is necessary for long-run economic growth, proponents of this view assert that avoiding deficits should be the primary goal of fiscal policy. If government spending isn't accompanied by tax, increases in fiscal deficit will raise interest rates, crowding out investment and also impact exports via the effect on the exchange rate. On the other hand if it is accompanied by increases in tax, this may damage growth. While these schools of thought above have very different views on budget deficits, neither of them provide detailed justification for any particular amount of government spending. The opponents of budget deficits are sometimes associated with proponents of 'smaller government' spending but have no theoretical objection to the bigger government spending as long as it is financed by taxes rather than borrowing. Another approach is to study the relationship in developed countries by measuring government size as total taxes or total expenditure relative to GDP where different types of taxes and expenditures will have different growth effects. Expenditures on human capital (education), for example may lead to permanently higher growth rates, but the taxes needed to finance them may have a negative impact on long -run growth levels. However, the consensus for this approach does not imply that government must shrink for growth to increase. There is potential for increasing growth by restructuring taxes and expenditure so that the negative effects on growth are minimized.

Macroeconomic policy is defined as a set of government policies, rules and regulations to control or stimulate the aggregate indicators such as national income, money supply, inflation, unemployment rate, growth rate and interest rate to meet the economic goals at macro level. Since the Keynesian era, both fiscal and monetary policies have been recognized as an effective tool for macroeconomic management. Besides these policies, contract laws, debt management policy and incomes policy are some of the other policies designed to modify macroeconomic indicators of the economy. Our study has employed an Index of Economic Freedom as a proxy for the quality of macroeconomic policy. Economists agree that economic freedom along with political freedom is one of the pillars of a country's institutional structure. The index was initially an annual index and ranking created by the Heritage Foundation and The Wall Street Journal in 1995 to measure the degree of economic freedom for countries worldwide. Later, the index was constructed by another institution known as the Fraser Institute.

Empirical analysis using the index has produced mixed results in term of the areas of index components and cross-country analysis. One part of the findings suggested that the aggregate economic freedom is important in explaining cross-country differences while the other part shows that the effects are different across the components of the index. The most common index used by empirical researchers is the one constructed by the Fraser Institute. In this thesis, we will employ the components of this index in order to establish the potential link between economic freedom and industries' growth. The Fraser institute lists five areas or components of the index of economic freedom namely the size of the government, freedom to trade internationally, legal structure system and security of property rights, access to sound money and regulation pertaining to credit market, labor market and business. The index uses data and statistics from the World Bank, the International Monetary Fund and the Economic Intelligence Unit to classify countries within these areas. Each of the areas above is graded using a scale from 0 to 100, where 100 represent the maximum freedom. A score of 100 signifies an economic environment or set of policies that is most conducive to economic freedom. Each of the five areas above is given equal weight in the final score.

The export-led growth paradigm rose to prominence in the late 1970s when it replaced the import-substitution paradigm that had dominated development policy thinking after the World War II. It rests on a fusion of three strains of argument. The first strain, based on Hecksher–Ohlin–Samuelson comparative advantage theory, is about the gains from trade between economies with different capital–labor ratios (Ohlin, 1933; Samuelson, 1948; Dornbusch et al., 1980). The second strain concerns the benefits of openness for controlling rent seeking, a problem over which import-substitution development was strongly criticized (Krueger, 1974). The third strain has emphasized the benefits of openness for growth where trade encourages technology diffusion and knowledge spillovers that contribute to faster productivity growth (Grossman and Helpman, 1991b). The export-led growth strategy was pioneered by Germany and Japan in 1950s and 1960s. Then it was adopted by the four East Asian Tigers; South Korea, Taiwan, Hong Kong, and Singapore in the 1970s and 1980s. Being spread further, it was adopted by Thailand, Malaysia, and Indonesia and Mexico in the 1980s and 1990s, followed by China in the 2000s. However the model has not been constant, but has instead evolved to fit changes in emerging markets and also to fit individual country conditions. Following a shift from import-substitution strategies to the export-oriented strategies in the 1970s, the Malaysian economy has grown rapidly with a widely held view that such growth is driven by exports particularly of manufactured goods. It was then widely acknowledged that the exports of Malaysia play an important role as a source of its economic growth. Furthermore the export-led growth hypothesis postulates that export expansion especially of manufactured goods is one of the main determinants of economic growth.

The origin of human capital goes back to the emergence of classical economics in 1776, and thereafter was developed as a scientific theory. After the manifestation of the concept as a theory, human capital is recognized as one of important factors for a national economic growth in the modern economy. Human capital corresponds to any skills and stock of knowledge that accumulate over time in the labor force which is either innate or acquired. Generally there are two main sources of human capital firstly through formal education from learning accumulated at school and secondly through training and learning by doing which includes knowledge generated by spillover effects. Some researchers (Gibbons and Waldman, 2004; Hatch and Dyer, 2004) distinguished between three kinds of human capital: general human capital, firm-specific human capital and task-specific human capital. General human capital is defined by generic knowledge and skill, not specific to a task or a company and usually accumulated through working experiences and education. On the other hand the firm-specific and task-specific human capital is usually accumulated through education, training, working experience on 'knowledge specific to a firm or a task'.

Empirical studies on Malaysia's economic growth determinants are massive and they have been conducted at both country and industry specific level. These studies include researches by Gan and Soon (1996), Lim (1997), Ibrahim (2000), Kogid et al. (2010) and Hassan et al. (2010), among others and various exogenous and endogenous determinants have been selected in these studies to identify which variable would actually effects economic growth the most.

Lim (1997) use a time series data from 1965 to 1995 to examine the relationship between selected variables and Malaysian economic growth. The variables are classified according to exogenous and policy variables. The exogenous variables selected are the growth rates of the United States and Singapore. These variables are selected because the United Stated and Singapore are among the top five trading partners of Malaysia from the late 1980s to 1995. Meanwhile the policy variables are ratio of domestic investment to gross domestic product, government expenditure on education, student enrolment in secondary education, ratio of manufacturing to gross domestic product, export growth, import growth, inflation rate and foreign debt. The selection of these variables is based on the growth performance of the economy. The findings show that determinants such as domestic investment, expenditure on education, ratio of manufacturing to gross domestic product and export growth showed a positive relationship with growth of the economy, while import growth and foreign debt showed a negative relationship. The results also show that the growth of Malaysia in the long run was linked to government policies which emphasized the growth of the above policy variables. Similar to this study, we will include an analysis of quality of macroeconomic policy to investigate its effect on industry growth. However, in our study quality of macroeconomic policy analysis will be proxies by the index of economic freedom.

In another study, Ibrahim (2000) examine the role of public and private capital formation and public and private investment during Malaysia's economic success from 1961 to 1995. The estimation was done in two stages, firstly without inclusion of export share and secondly with inclusion of export share. The results without export share inclusion show a positive long-run relationship between the private investment and economic growth. However, in the long-run the public investment is negatively related to the economic growth. The results show a negative relationship between the public capital formation and growth. The finding of the negative relationship between the public capital and growth may stem from the inefficiency of the non-financial public enterprises which was due to sharp increased in development spending by the public enterprises and, at the same time, the reduction in the expenditure by the general government. The ratio of non-financial public enterprises' development expenditure to general government development expenditure was only 0.09 in 1970 increased to 0.20 in 1980 and to 0.90 in 1985. On the other hand, the results with the inclusion of export share show a positive long-run relationship between the public investment and growth. The long-run coefficient on population growth is negative, while export share itself is positively related to economic growth. The study concluded that the private investment and the export performance of the country are positively related to economic growth. Based on the result of positive and significant role played by these variables on economic growth, our study perceived that we should investigate the relationship between foreign direct inflows with industry growth. Although, we have problems to undertaken a long run analysis due to unavailability of data provided by the authority, we assume that the relationship between all these variables with growth is also positive in the short run.

Kogid et al. (2010) investigated the relationship and causal pattern of determinant factors such as consumption expenditure, government expenditure, exports, exchange rate, and foreign direct investment towards economic growth in Malaysia from 1970 to 2007. The results showed that there exist long-run co-integration and short-run causal relationships between economic growth and the determinant factors. Overall findings show that all determinants (when analyzed together) caused economic growth in the short run. However when analyzed individually, the results indicate that only consumption expenditure and exports cause economic growth both in the short-run and long-run. Therefore, the study concluded that in the long-run consumption expenditure and exports play an important role in boosting the economic growth, and government expenditure, exchange rate and foreign direct investment may have a role as a catalyst and complement determinant factors to economic growth in Malaysia during the period from 1970 to 2007. Their study also suggest that whether government expenditure affects economic growth positively or negatively depends on the spending decision made by the government which changed every time when the yearly budget is formulated. Based on the above discussion, our study perceived that the relationship between the government expenditure and industries growth, whether positive or negative, will also depends on the spending decision made by the government.

At industry specific level, a study by Gan and Soon (1996) showed that the ratio of real fixed investment to gross domestic product in Malaysia increased from 22 percent during the early 1970s to 44 percent by 1995. They concluded that the investment was channeled into the manufacturing sector which yielded high returns and approximately half of the annual increase in capital expenditure was spent by the manufacturing sector, 60 percent of this going to the plant and machinery industries. The structure of foreign direct investment allocated in the manufacturing sector had played an important role in generating economic growth, most importantly by increasing domestic capital formation. Foreign direct investment can function as one way to ‘bridge inter-temporal gap of capital demand and supply’ and the contribution made by investment to growth is evident not only by the amount invested but also by its sectoral composition (Krugman and Obsfeld, 1994).

Hassan et al. (2010) examine the effect of export changes on the level of output and employment generated in the manufacturing sector, particularly due to changes in exports from Malaysia to the ASEAN 4 countries namely Indonesia, Philippines, Thailand and Singapore. These countries are the major trading partners of Malaysia and most important destinations of Malaysian manufacturing exports. The analysis was undertaken from 2000 to 2004. This study employed the Input-Output (IO) method since structural analysis deals with economic systems as defined by the set of industries and the relationships between them. The results show that the output and employment generated in Malaysia by the ASEAN 4 countries is highly dependent on which country is importing the Malaysian exports. Singapore makes the most important contributions to output and employment generation, followed by Thailand, Indonesia and the Philippines. Over the five years period, exports increased rapidly and lead to increased in output and employment of 23 percent and 37 percent, respectively. As such this shows that there are positive relationship between export with both the level of output and employment.

Economic theories pertaining to the effects of openness on trade can be classified into two groups; namely those that analyze the benefits of trade openness and those that analyze the cost of trade openness. Theories developed by Grossman and Helpman (1991) and Barro and Sala-i-Martin (1997) focused on the importance of technological spill over and international transmission as sources of growth for open economics, which means that more open economies are better able to absorb advanced technologies. They argued that if knowledge spill over is the driving force for long term and sustained growth while productivity-enhancing knowledge is mobile across the world, then trade openness can affect growth through technology transmission. Lucas (1993) had also discussed the domestic knowledge spill over and learning by doing aspects. Another set of theories points to complementary aspects of virtuous policies; for example trade policy openness may create incentives for government to adopt less distorted domestic policies and more disciplined types of macroeconomic management. Corden (1974) has identified other potential gains from trade liberalization arising from managerial effort. Introducing the static theories, his analysis focused on the ability to achieve efficient allocation within an open trade regime. Even when factors of production are immobile, when countries specialize according to comparative advantage, higher levels of output can be achieved. On the other hand, there are also a few theories related to the cost of trade openness. Some theories such as stated by Barro and Sala-i-Martin (1995) and Young (1991) suggest that trade openness can reduce growth in long run when a country specializes in areas where technological innovations and learning by doing have limited potential. Another theory focused on the welfare and poverty situation particularly in the underdeveloped countries. However, since most of the cost analysis discussion focused more on the underdeveloped countries we will not include detailed explanation about this analysis.

Empirical studies which focus mainly on analyzing the impact of trade openness and economic growth at country and industry level are very rich. Rodrik (1996, 1998), Greenaway et al. (1997), Wacziarg (2001), Kasahara and Rodrigue (2008), Pavenik and Goldberg (2005), Alexiou (2009)**,** Alshahrani and Alsadiq (2014) among others have contributed to the literature at country level. Meanwhile Edwards (1992, 1998), Weinhold and Rach (1999), Jonsson and Subramian (2001), Harris and Kherfi (2001), Mahadevan (2002a), Chan and Sen (2002), Oyamada (2003), Dutta and Ahmad (2004), Wong (2006), Barua and Chakraborty (2006), Umer and Alam (2013), Asongo et al. (2013), and Mushtaq et al. (2014) among others have added to the literature at industry level.

Each of these studies has chosen at least one or more of the channels that we have chosen for our study. For example a study by Rodrik (1998) shows a negative relationship between the government consumption channel and economic growth. The findings show that larger government expenditure can distort the allocation of resources in the country by transferring the additional resources from the productive sector of the economy to the less efficient government sector. Meanwhile Alexiou (2009) investigates the relationship between economic growth and government spending for seven transition economies in South Eastern Europe (SSE). The results show that government spending on capital formation, development assistance, private investment and trade openness has positive and significant effects on economic growth. Alshahrani and Alsadiq (2014) investigate the effect of different types of government expenditure on Saudi Arabia's economic growth for the period from 1969 to 2010. They found empirical evidence that government expenditure such as public and private domestic investment and healthcare expenditure stimulate growth in the long-run, meanwhile openness to trade and spending in the housing sector and education stimulate growth in the short-run.

Another study by Dutta and Ahmed (2004) on Pakistan's manufacturing sector during the period 1973 to 1995 showed that real capital formation, labor force, and real exports have a significant impact on the industries' output in the short run and the import tariff rate has an impact in the long run. The results also show that trade sector policies which support foreign direct investment inflows into Pakistan, have a long run positive relationship with the industrial sectors' growth. Using a time series data from 1960 to 2011 on industrial sector growth in Pakistan, Umer and Alam (2013) have found a negative long run impact of trade openness on industrial growth. They argue that this condition is consistent with a long experience of severe economic crises such as low real economic growth rate, huge balance of payments deficits arising from deteriorating terms of trade, and many government and politics corruption issues. They propose that moderate and manageable inflation is necessary to improve industrial growth and in order to achieve this, their government need to implement macroeconomic policies that are conducive and supportive for the industries in Pakistan.

As regards to studies on trade liberalization, multi-country studies by Tybout (1992) and Barua and Chakraborty (2006) show that trade liberalization has reduced the costs of production and increased the industries' output and export performances. Similarly, Dutta and Ahmad (2004) have shown that there exists a long run positive and stable relationship between trade liberalization and exports, besides a long run positive relationship between trade liberalization and secondary school enrollment as a proxy for human capital. Chaudhry et al. (2010) and Karimzadeh (2013) find both short run and long run co-integration and causal relationships between trade liberalization and human capital in Pakistan and India, respectively. Their findings show that causality runs from trade liberalization and human capital to economic growth. Contrary to our study, these studies were carried out at country or industry level, while our study would also focus at specific individual industry level.

Among the above mentioned studies, our study will replicate the model proposed in a study by Wacziarg (2001). His study investigated the effect of trade policy on economic growth in a panel of 57 countries from 1970 to 1989. In a depth analysis, the regression was design to look at the association between and trade policy and growth through different channels of economic growth. He categorized six channels of growth namely degree of price distortion, factor accumulation, quality of macroeconomic policies, government size, manufactures export and foreign direct investment. Price distortion and factor accumulation (through physical investment) were modeled to capture the changes in domestic resource allocation and distribution, quality of macroeconomic policies and government size were designed to capture the changes in government policies, and finally manufactures export and foreign direct investment were expected to capture technology transmission or knowledge spill over. The results show a positive impact of openness on economic growth through the channels. Individual results show that trade openness affects growth by raising the ratio of domestic investment to gross domestic products (GDP). The rate of physical capital accumulation explains between 46 percent and 63 percent of the impact of trade policy on economic growth. Foreign direct investment and quality of macroeconomic policies account for 20 percent each of the overall effect of trade openness. On the other hand, the result indicated that there was a weak negative effect between trade policy and economic growth through the size of government.

Empirical studies on Malaysia's trade liberalization includes several studies by Zakariah and Ahmad (1999), Rasiah and Ishak (2001), Mahadevan (2002b), Said et al. (2004), Nair et al. (2006), Madhavan et al. (2007), Chandran and Munusamy (2009), Rahmah et al. (2011) and Jauhari and Khalifah (2014), among others. However most of these studies did not investigate the effect of trade liberalization directly. For example Zakariah and Ahmad (1999) examine the sources of industrial output growth using the factor decomposition method introduced by Chenery (1960). Following Chenery, they used factor decomposition to classify output growth into four sources according to the stages of trade development; import-substitution era, export-expansion era, intermediate-demand era and domestic-demand expansion era. The economy was aggregated from sixty sectors into five namely agriculture, mining, light industry, heavy industry and services. The result shows that growth of output in all sectors since 1978 until 1987 was driven mainly by export-expansion strategies; 65 percent of overall economic growth was due to export expansion strategies; and the contribution of domestic-demand expansion and technological change strategies were less significant at 34.1 percent which was due to domestic-demand expansion and 0.9 percent which was due to intermediate-demand expansion and technological change.

Nair et al. (2006) investigated the relationship between determinants of economic growth such as capital, labor, technical progress and trade openness with manufacturing output. The finding showed that there exists a long-run relationship between Malaysian manufacturing output and some of the determinants. In the short run only labor has a significant impact on manufacturing output. On the other hand in the long run, labor and trade openness have a positive and significant impact on manufacturing output while capital and technical progress have no significant effect on manufacturing output. Previous studies by Gan and Soon (1998) has also found similar results that the greater openness of the Malaysian economy through trade could enhance the productivity growth. Similarly, Chandran and Munusamy (2009) investigated the long-run relationship between trade openness and manufacturing growth at sector level. The results show that there exists a long-run relationship between manufacturing value-added output and capital, labor and openness in the long-run. This means that in the long run Malaysian manufacturing sectors have benefited through trade liberalization. However, only labor is significant in the short run and trade openness does not cause manufacturing growth while the rest of the explanatory variables are insignificant. They concluded that countries can only leverage the benefits of openness when it is treated as a long term instead of a short term affair.

2.3 Imported Inputs Literatures

The endogenous growth literature as discussed by Either (1979), Grossman and Helpman (1991), and Rivera-Batiz and Romer (1991) has provided theoretical arguments for the role of foreign intermediate inputs in enhancing economic growth. Meanwhile, theoretical and empirical works by Lee (1995) Eaton and Kortum, (2001), Goh and Olivier (2002) have also emphasized the specific influence of trade in capital inputs in accelerating economic growth. Grossman and Helpman (1994) pointed out that technological progress is a key factor that enhances long-run economic growth. One of the most common channels which could enhance technological progress - transfer foreign technology and innovations (knowledge spillover) from developed countries to developing countries is through activities in research and development. Importing capital goods is found to be a relevant channel of research and developments spillover across countries. It is generally considered that capital goods produced in advanced economies are more sophisticated than those produced in developing countries, so that trade in capital goods allows fostering productivity growth in the latter through foreign technology transfers. Developing countries that import intermediate inputs and capital equipments which promote higher productivity could derive benefits from knowledge spillovers from developed countries. Preferential policies toward foreign direct investment should be formulated based on the assumption that foreign direct investment generates externalities in the form of technology transfer which include management methods, new products and processes.

Since the 1970s, Malaysia has been relying on more than 60 percent foreign inputs in its manufacturing process especially in the electrical and electronic sub-sector. The dependency has been continuing and increasing since then until now with huge dependency existing in high-technology industries such as petrochemical and automotive among others. To date Malaysian manufacturing industry consists of more than 80 percent foreign entities and it is believed that firms in the industries have been massively outsourcing their inputs. Since the nature of Malaysian manufacturing is mostly to assemble finished goods our study perceived that imports of intermediate and capital goods play an important role in the development of the industries generally and firms specifically. However it is claimed that in most developing countries scarce commercial activities in research and development limit technological progress (Grossman and Helpman, 1991).

Within the endogenous framework, it is also being claimed that importing intermediate inputs increases the probability of survival (Lopez, 2006) and performance (Kasahara and Rodrigue, 2008) at plant-level, and that import competing industries enjoyed productivity gains higher than gains in the non-traded goods sector due to the liberalized trade (Pavenik, 2002). Theoretically, the size of industry and firm also played an important role in determining the growth of industries and firms. The size of each industry and firm reflects the accumulation of previous profits and earlier growth which will directly help in determining the future allocation of both financial and non-financial decisions of an industry or firm. This is very important in determining future growth of the firm and industry. Besides size, other important determinants include amount of sales, which is used to measure the size distribution of industry or firm, and human capital.

Empirical studies investigating the relationship between the use of imported inputs and output growth at industry and firms level for Malaysia are scarce. These studies include studies by Sulaiman (2012) and Sivarajan (2012). Sulaiman (2012) examine the efficiency of intermediate input utilization in resource and non-resource based industries in the Malaysian manufacturing sector. The study employed the input-output matrices derived from an Input-output table which covers the period of 1983 to 2005. The results are; firstly that non-resource based industries such as electrical and electronics industries and the textiles and apparel industries utilize a higher percentage of both imported inputs and domestic inputs compared to the resource based industries. Secondly, resource-based industries which utilize the imported inputs show higher productivity growth than those which utilize the domestic inputs and lastly, the sub-industries that efficiently utilize the imported inputs are more productive than the sub-industries that utilize the domestic inputs. This occurs in both resource and non-resource based industries.

A study to examine the relationship between export performance and the usage of imported inputs and domestic inputs for the manufacturing sub-sectors has been conducted by Sivarajan (2012). The study found that the Malaysian manufacturing sector is the highest importer of intermediate inputs accounting for approximately 82 percent of the country's total imported inputs between 2000 and 2005. Specifically, the results show that there is a significant relationship between the absolute export value and the imported inputs value for the 69 sub-sample industries selected for the study, where the higher the usage of the imported inputs in these industries, the more the share of export. There is an insignificant relationship between the export value and use of domestic inputs. According to the study one possible explanation of the finding was that domestic inputs were used more in the agriculture, fishery and forestry sector: meanwhile the imported inputs were largely used in the manufacturing sector. Regardless of being acknowledged as one of the largest exporters of semi-conductor devices, tubes and circuit board, Malaysia relies heavily on imported intermediate inputs which amounted to RM114.83 billion in 2005.

Economists perceive that in the past two decade trade liberalization has produced steady growth in imports of intermediate and capital goods in developing countries. Empirical studies investigating on the effect of trade liberalization on imported inputs for developed and developing countries include studies by Zeile (1998), Halpren et al. (2006), Amiti and Konings (2007), Kasahara and Rodrigue (2006, 2008), Altomonte et al. (2008), Goldberg et al. (2009) and Ramanarayanan (2011) among others. However, to date there is no study that examines the relationship between these variables for Malaysia especially at industry or firms' level.

Halpren et al. (2006) studied the impact of importing on productivity in a panel of Hungarian firms. Using a model of heterogeneous goods, the results show that imported inputs improve productivity because of two factors; firstly imported inputs are a perfect inputs to be substitutes with the domestic inferior inputs and secondly imported inputs have higher quality as compared to domestic produced inputs. The results show that increasing the fraction of product varieties imported from 0 to 100 percent leads to a productivity gain of 144 percent, where two thirds of this gain can be attributed to the substitution of better imported inputs, while the remainder is due to the higher quality of the imported inputs. Although the study find that imports have a substantial effect on productivity, they conclude that the magnitude of the effect depends on the size of the firm.

Amiti and Konings (2007) stated that cheaper imported inputs can raise the productivity of firms via learning, variety, and quality effects and a fall in input tariffs can lead to a productivity gain for firms that import their inputs. Similarly, according to Goldberg et al. (2009) an important consequence of the input tariff liberalization in India was to relax technological constraints through firms' access to new imported inputs that were unavailable prior to the liberalization. As such, the imported intermediate inputs gained from reducing tariffs on these inputs can raise industry productivity through quality effects and foreign technology embodied in the inputs. In this study the openness to trade measured by tariff and non-tariff barriers, is expected to be positively associated with the volume of intermediate imported inputs used by the industry or firm.

Findings by Kasahara and Rodrigue (2006) indicate that becoming an importer of foreign intermediates improves productivity through better resource allocation and the importing firms accumulate more capital and are less likely to exit the industry than non-importers. However, Zeile (1998) has expressed his concern about the outsourcing of intermediate inputs among the foreign-owned manufacturing where he believed that these foreign-owned manufacturing affiliates may contribute to increase import dependency in the intermediate product sectors. Kasahara and Rodrigue (2008) again investigated the effect of importing intermediate goods on plant performance. Their findings show that by switching from being a non-importer to an importer of foreign intermediates a plant can immediately improve the productivity since the plant can adopt technology from abroad and substantially benefit from foreign research and development. The result also shows some evidence of a positive dynamic effect from the use of imported materials.

Altomonte et al. (2008) investigated the impact of import penetration and trade margins on productivity using a sample of 35,000 Italian firms operating between 1996 and 2003. The study identified import penetration in two classifications of industries: firstly the import penetration in the industry itself and secondly the import penetration in the up-stream industries. They concluded three findings; firstly import penetration positively affects productivity; with an effect which is three times larger in up-stream industries as compared to the same industry. Secondly both foreign firms and domestic firms participating in international networks are on average more productive than other firms and thirdly import penetration alone does not explain much of the individual variance in total factor productivity levels which are also determined by other factors not included in the study. Their study concluded that the firms participating in international networks are on average more productive than the non-participating firms. Import penetration of inputs positively matters for productivity growth and is larger in firms operating in the up-stream industries compared to firms in the same industries. Another study was conducted by Goldberg et al. (2009) concerning the static gains from trade through access to new imported inputs at firm level in India's economy. The findings show that accounting for new imported varieties lowers import prices for intermediate goods on average by an additional 4.7 percent per year over conventional gains through lower prices of existing imports.

Ramanarayanan (2011) has developed a model of trade in intermediate goods to help different Chilean manufacturing firms to decide on how much of their inputs to import. The role of the model was to analyze the aggregate response of trade flows to shocks that change the price of import inputs as relative to domestic inputs. The model was able to generate cross-sectional dispersion in import share and firms' size depending on the parameters and the cost-benefits of importing. The model also captured the heterogeneity in the use of intermediate imported inputs where both adjustments of import shares within firms and changes in the relative size of firms with different import share had contributed to the aggregate trade growth. The study concluded that decreases in the imported input price make importing plants buy a larger share of imported inputs to increase their production and firms still experience increasing cost due to increases in the volume of goods imported. More efficient firms which usually are larger and more productive have chosen to import a higher share of inputs, while the least efficient choose not to import at all. As firms adopt better technologies they become more stringent in their input purchases and may prod their suppliers to also adopt better technologies. The cost of advanced-technology inputs decrease, potentially leading other firms to also adopt better technologies.

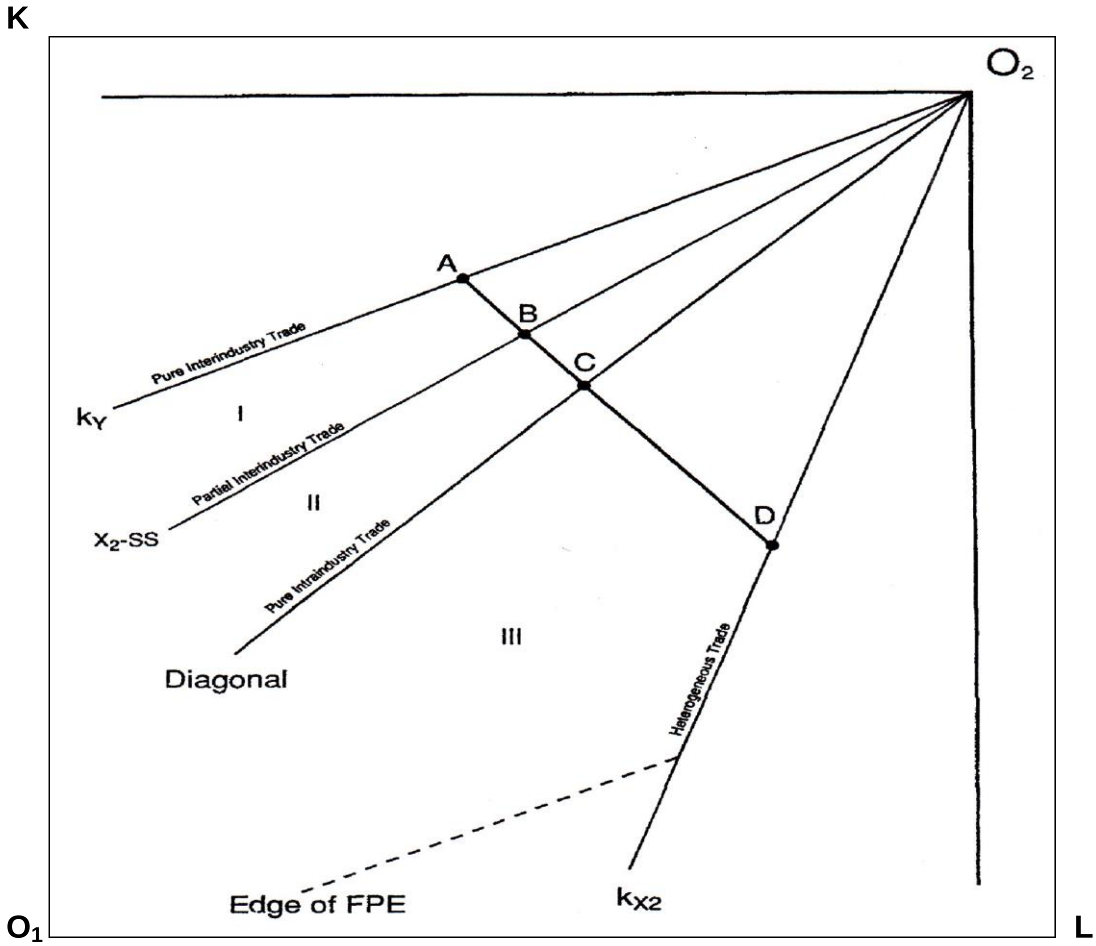
2.4 Intra Industry Trade Literatures

For many years, international differences in relative factor endowments were the basis of the dominant positive theory of international trade, and the simple two-good, two-factor, two-country Heckscher–Ohlin model served as the framework of the basic theory. This model, involving perfect competition and constant returns to scale, was elegant in its technical simplicity, yet adaptable to a broad range of normative and positive questions. However as the international trading system becomes more complex, new theories have been developed to explain trade patterns between countries. Linder (1961) emphasized the role and importance of distinct products in determining the volume of trade between similar countries, but the theoretical studies and experimental researches about intra industry trade actually began with the research done by Grubel and Lloyd (1975). They provided an initial empirical study on the importance of intra industry trade and how to measure it.

Solid theoretical foundations for explaining intra industry trade came later in the 1980s with the new trade literature which was based on a monopolistic competition framework. In the 1980s researchers were motivated by the large volume of trade in similar products (intra-industry trade) between countries with similar endowments, which are against the predictions of the Heckscher–Ohlin theory. Elements of increasing returns to scale, imperfect competition, and product differentiation were added in order to generate predictions more in accordance with stylized facts. The economists perceived that it was possible to place this theory against the basic Heckscher–Ohlin framework hence generating a pattern of both intra-industry and inter-industry trade that depended on differences in relative factor endowments and in country sizes. There is also a massive literature which combines various aspects of international trade theories hence providing a more unified picture of the reasons for international trade. For instance, Helpman and Krugman (1985) combine Heckscher-Ohlin factor endowments with Spence-Dixit-Stiglitz imperfect competition to show the pattern of trade that emerges when both traditional and new trade theories are combined. Meanwhile, Davis (1995) combines Heckscher-Ohlin factor endowments with Ricardian comparative advantage to show how intra -industry trade can arise in the absence of imperfect competition. Bernard et al. (2007b) combine a Melitz (2003) model of monopolistic competition with heterogeneous firms with Heckscher-Ohlin factor endowments to show how firm heterogeneity interacts with country characteristics in international trade.

One of the explanations of intra-industry trade related to Heckscher-Ohlin theory was emphasized by Davis (1995) who developed a model which incorporated the Ricardo trade theory in the Heckscher-Ohlin framework. The model explains the pattern of trade consisting of inter-industry and intra-industry as depicted in Chart 2.1 below.

Chart 2.1: The Pattern of Trade in the Heckscher-Ohlin-Ricardo Model



where K denotes capital and L denotes labor. According to the model, at point A, a country produces and exports only good Y, but imports goods X_1 and X_2. This is the case of pure inter-industry trade. Moving from point A to B, this country which attains self-sufficiency in production of X_2 begins to produce some X_2 but not yet enough for domestic consumption, still exports good Y for import of X_1 and X_2. Here there is no intra-industry trade. Movement from point B to C indicates that the country which is labor-abundant produces more of X_2 than it consumes and so begins to export it. This occurs although this country has no (absolute) technical advantage in production of X_2. At point C, both the country and its trading partner is self-sufficient in good Y. However, this country must import good X_1, which it pays for with the exports of X_2. Here when factor endowment ratios are identical, only pure intra-industry trade occurs. As the economy moves from point C to D, the country begins to import Y as well as X_1 and pays for them with exports of X_2. At point D, the country produces only X_2, which it trades for its entire consumption of both Y and X_1.

Similarity in the size of economies between trading countries indicates a similar ability of those countries to manufacture and trade differentiated products produced with economies of scale (Helpman, 1981). Therefore, they are likely to trade with each other when their size of economy tends to be similar. As such, this will increase trade for products within similar industries. This two-way trade in similar goods normally takes place in industries supplying consumer goods, producer goods, components; high and low technology goods, natural resource intensive products and labor intensive assembled products. On the other hand, Helpman and Krugman (1985) argued that the inter-sectoral pattern of trade is determined by cross-country differences in relative factor endowments, but there will also be intra industry trade when countries do not differ by too much in their composition of factor endowments. They have also developed a theoretical model to show that the more two countries are similar in the composition of factor endowments, the larger the share of intra-industry trade and the smaller the share of inter-industry trade.

Chemsripong et al. (2005) interpret similarity in income per capita as similarity in the capital-labor endowment ratio. The more countries differ in relative factor endowments, the more they differ in industrial structure and hence the smaller the share of intra-industry trade. Countries with similar relative amounts of endowments (skilled labor, technology and physical capital) engage in a larger share of intra-industry than the inter-industry trade. The inter-industry theory of trade advocated by Heckscher-Ohlin failed to explain the key features of international trade characterized by large and quickly growing trade between similar countries in similar products. Increasing-return industries will tend to concentrate production within large markets and will shift the country's industrial structure towards the production of increasing-return- type goods and export these goods.

From the demand perspective, similarity in economic size can also represent similarity in demand structures i.e. customers' taste and preferences (Linder, 1961; Shahbaz and Leitao, 2010). According to the authors similarity in size of economy (shown by income per capita) indicates similarity in demand structures whereas a consumer in a high per capita income country will demand more complex and differentiated products than a consumer in a lower per capita income country who usually demands more standardized products. Therefore, when the similarity between the incomes is greater, the potential share of intra-industry trade tends to be larger and the share of inter-industry trade tends to be smaller. Ekanayake (2001) pointed out that a larger economic size reflects a greater demand for foreign differentiated goods and that economies of scale (in a monopolistic competition structure) imply that more production at the industry level causes average cost to decrease and each firm in the industry can increase the prices somewhat above those on competing products due to product differentiation.

The issue of whether foreign direct investment (FDI) has a significant relationship with intra-industry trade (IIT) has attracted economists' attention but there has been little theoretical analysis being done to justify the linkage between these variables. Since the 1980s, the presence of multinational enterprises (MNEs) has significantly influenced the international trade. Since multinational enterprises are intrinsically connected with foreign direct investment, researchers have chosen to examine the link between the investment of multinational enterprises and intra-firm trade with the assumption that intra-firm trade will show the relationship between foreign direct investment and intra-industry trade. Generally, there are two schools of thought on how foreign direct investment might cause intra-industry trade. The first theory perceives that most goods produced by multinational enterprises (MNEs) are differentiated; firms engage in trade producing horizontally or vertically differentiated goods to meet different incomes or tastes. The second theory posits that most intra-industry trade is intra-firm trade from MNEs, who locate different stages of the production process in different countries.

Similar to trade, there are two distinct patterns of FDI. Firstly there is the vertical or inter-industry FDI which exploits industry-wide comparative advantages and is often found in FDI from developed to developing countries. Secondly is the horizontal or intra-industry FDI which focuses on specific comparative advantages within given industries in the developed countries. According to the standard theory of FDI, multinational enterprises tend to conduct FDI of the ‘vertical type’ when there is a huge gap in prices of factors of production between their home and the host country. Meanwhile, according to Markusen (2002) multinational enterprises tend to conduct FDI of the ‘horizontal type’ when the production of products and services in the foreign countries is roughly similar to those produced by the MNE for its home market.

In 1981 Dunning proposed a framework known as ‘the OLI paradigm’ that perceives foreign direct investment in trading capacity in the case of most goods produced by multinational enterprises (MNEs) which are differentiated. The MNEs tend to engage in trade producing horizontally or vertically differentiated goods to meet different incomes or tastes of the recipient market (Dunning, 2000). According to this framework foreign direct investment exists under three conditions. Firstly, the firm must enjoy certain ownership advantages in a recipient market and have a competitive advantage over local producers. This advantage may take the form of technical know-how or patent protection. Secondly, the firm must have certain location advantages in production. Location advantages include access to relatively cheap labor and natural resources, and the ability to avoid import restrictions. Lastly, the firm must have the opportunity to exploit ownership and gain location advantages through internalization. These advantages normally exist in terms of the ability to respond to changes in tastes of the recipient market. The availability of relatively cheap labor and natural resources in the recipient firms should reduce the MNEs' costs and gives their subsidiaries access to export markets, creating international intra-firm and intra-industry trade and resource relocation.

Similarly, Krugman and Helpman (1985) have also developed a model to explain the impact of FDI on the intra-industry trade. They found that the emergence of multinational corporations changes the link between differences in relative factor endowments and the share of intra-industry trade. For example when the difference in composition of factor endowments becomes large enough so as to bring about the emergence of multinational corporations the association between the factor dispersion and the share of intra-industry trade turns positive, as long as the capital-rich country is a net exporter of manufactures. On the other hand, when the difference in composition of factor endowments becomes large enough so that the capital-rich country begins to be a net importer of manufactures, the negative association between the factor dispersion and the share of intra-industry trade is restored. Their finding also shows that the volume of intra-industry trade will depend on how narrowly one defines product categories. If in the industrial classification finished products are classified to be different from the intermediate products, then only two-way trade in finished products contributes to the volume of intra-industry trade.

In the international trade literature, the gravity framework has provided convincing rationales for the negative relationship between distance and the volume of trade. Economists such as Grubel and Lloyd (1975), Krugman (1979), Helpman and Krugman (1985), Balassa (1986a), Balassa and Bauwens (1987), Stone and Lee

(1995) and Bergstrand and Egger (2006) explained this relationship from a financial approach while Clark and Stanley (1999) explained this relationship from the non-financial perspectives. Krugman (1979) developed a model using Chamberlinian monopolistic competition which demonstrates that intra-industry trade occurs between identical economies or countries with geographical proximity. According to Krugman (1979), Grubel and Lloyd (1975) and Helpman and Krugman (1985) distance between trading partners serves as a proxy for costs of trade necessary for trading differentiated products and greater distances impose larger transaction costs which might include insurance, transportation, shipping-transport technology and information costs which could reduce the intensity of the trade.

Balassa (1986a) stated that geographical closeness might be a measurement of psychological and cultural similarities which have the possibilities of creating similar consumption patterns and increasing trade in differentiated products (intra-industry trade products) which can reduce costs in trading countries through economies of scale. Transport costs can have important consequences in the presence of economies of scale and countries which have increasing-returns industries will usually engage in a larger share of intra-industry than the other side of trade. Stone and Lee (1995) pointed out that physical distance can also act as a natural trade barrier that, ceteris paribus, deters trade proportionately more for closely substitutable products (intra-industry trade products) than for standardized products (inter-industry trade products) due to differences in consumer incomes and differences in costs and quality of natural and financial resources, infrastructure and information technologies utilized to produce them. Meanwhile, Clark and Stanley (1999) conclude that distance can also reflect other factors such as seasonal trade, border trade, cultural and language differences which will also deter proportionately substitutable non-standardized products more than the standardized products.

As mentioned on page 187, Grubel and Lloyd (1975) have proposed an index to measure the share of intra-industry trade in total trade. The index is:

$$IIT_{ij} = [\ 1 - \ \Sigma|X_{ij} – M_{ij}| \ / \ \Sigma(X_{ij} + M_{ij})] \qquad (1)$$

where the subscript i denotes commodities within industry i and the subscript j denotes a country; X denotes exports and M denotes imports of the related commodity in the industry and country, respectively. The authors have pointed out that the measurement of intra-industry using this index at aggregate level will be affected by the total trade imbalance of a country. The greater the share of net trade, the smaller the share of intra-industry trade in total trade would be. Therefore the Grubel-Lloyd index tends to becomes smaller as the size of the trade imbalance increases. Hence, they suggested that their index may be adjusted for the impact of overall imbalance by expressing intra-industry trade as a proportion of total trade minus the trade imbalance. Rajan (1996) shown that the Grubel-Lloyd index fails to reflect the actual level of intra-industry trade in the presence of trade imbalance. Meanwhile, Clark and Stanley (1999) pointed out that the estimated coefficient in the intra-industry trade regression equation will be biased if the trade imbalance is correlated with the explanatory variables. Hence, the size of the trade imbalance with trading partners is included in the model in order to control for any possible bias in estimating the determinants of intra-industry trade.

Empirical studies of country-specific characteristics as determinants of intra-industry trade are massive. These studies are conducted either at a bilateral or multilateral level for developed and developing countries. Researchers such as Helpman and Krugman (1985), Hummels and Levinsohn (1995), Lee and Lee (1993), Stone and Lee (1995), Hu and Ma (1999), Balassa (1986a; 1986b), Balassa and Bauwens (1987), Aquino (1978), Shahbaz and Leitao (2010), Matthew (1998), Sharma (1999), Chemsripong et al. (2005), Sunde et al. (2009), Faustino and Leitao (2007) and Ekanayake (2001), among others have contributed significant findings and arguments to the growing intra-industry trade empirical literatures. Besides country-specific characteristics, other studies such as those by Turkcan (2005), Clark and Stanley (1999), Martin and Blanes (1999), have also included the industry-specific determinants of intra-industry trade in their analysis.

Although to date there is no study that analyzed the determinants for Malaysia intra industry trade determinants specifically, there are studies which have included Malaysia as a group of countries in the trade analysis. These include researches done by Min (1992), Thorpe (1993), and Duc (1994) as noted in Chemsripong et al. (2005). Min (1992) examined the determinants of bilateral trade in manufactures between Asian developing countries namely China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand and developed countries namely the United Kingdom and the United States. This study concluded that key factors that influenced intra-industry trade between these countries were the country characteristics, such as income per capita and openness of the economy. Meanwhile Thorpe (1993) in Chemsripong et al. (2005) has analyzed the determinants of intra-industry trade of three ASEAN nations, namely Singapore, Malaysia and Philippines, and their trading partners over the period 1970 to1989. The result shows that, although Singapore played a key role in intra-industry trade among member countries, due partly to its position as entry-port and as the most developed country within the group, the levels of bilateral trade between countries appear to have risen not only with one another, but also with countries outside the region. Another study quoted by Chemsripong et al. (2005), is by Duc (1994) which investigated the determinants of intra-industry trade between ten Asia-Pacific region countries namely China, Hong Kong, Indonesia, Japan, Malaysia, Philippines, Taiwan, Singapore, Korea, Thailand and the United States from 1980 until 1990. The result shows that country-specific determinants such as capital endowment and economic size are important determinants of bilateral intra-industry trade among these countries.

Other groups of studies by Menon and Dixon (1996), Khalifah (1996), Brulhart and Thorpe (1999) and Arip et al. (2011) have examining the trend and pattern of intra-industry trade for a group of countries including Malaysia. Menon and Dixon (1996) examined the extent of intra-industry trade among countries in the Association of Southeast Asian Nations (ASEAN) free trade area. Using data for manufacturing sectors at 3-digit level standard industrial trade classification (SITC 5 to 8) which covers 130 industries in Singapore, Malaysia, Thailand, Philippines and Indonesia, the result shows that more than 75 percent of the growth in Thailand's intra-ASEAN trade between 1986 and 1991 was due to intra-industry trade growth, followed by Malaysia and Singapore with more than 60 percent, respectively. For Indonesia and the Philippines, intra-industry trade growth respectively accounted for almost half and one third of the growth in intra-ASEAN trade. This study concludes that not only did intra-industry trade record rapid increases amongst ASEAN countries, but it also has become increasingly significant within these countries compared to developed countries.

Khalifah (1996) also investigates the extent of intra-industry trade in the manufacturing sector among the ASEAN countries using the Grubel-Lloyd index. The index calculated by the Grubel-Lloyd formula gives the share of intra-industry trade to total trade. For the ASEAN manufacturing sector as a whole, the index has fluctuated between 52.6 percent and 55.65 percent. Singapore had the highest index with an average index of 72 percent, followed by Malaysia (57 percent), Thailand (37 per cent) and Indonesia (13.2 percent). Brulhart and Thorpe (1999) investigate the structure of East Asian trade flows over the high-growth period of 1970 to 1996. The results found that despite the different development levels of the four countries, namely Korea, Malaysia, Indonesia and Philippines, the marginal intra-industry trade[6] for Malaysia had grown steadily over the period of study and the test for smooth-adjustment hypothesis shows that high or changing marginal intra-industry trade did not influence the changes in employment of the Malaysian labor force.

Arip et al. (2011) using the intra-industry trade index investigates the bilateral trade pattern between Japan, Malaysia and China. The results show that there exist overlapping exports by Malaysia and China to Japan and the value of these exports has increased over time. The increasing trend appears to be an indication of increasing competition between Malaysia and China's products in the Japanese market. However, the product similarity between Malaysia and China exports actually comprise mainly vertically differentiated products which mean that products from Malaysia and China actually capture different segments of the Japanese market. The results also show that China is rapidly increasing its export share in the horizontally differentiated products or similar market segments. The study concluded that trade between Japan and China does not affect trade between Japan and Malaysia since each country has targeted different segment of markets. Besides, the nature of intra industry trade between both Japan and China and Japan and Malaysia is largely determined by relative differences in terms of geographical factors, which in turn are influenced by climate, culture, religion, and other non-economic factors.

Meanwhile studies by Ariff (1991), Khalifah (2000), Bruhart and Thorpe (2000) and Abu Bakar and Ismail (2013) have analyzed the structure of intra-industry trade for Malaysia solely. Ariff (1991) estimated the intra-industry trade index at the 3-digit SITC level for each of Malaysia's major trading partners with respect to manufactures over the period from 1970 until 1987. The calculated indices show a significantly increasing trend in Malaysia's intra-industry trade with all its major trading partners. He concluded that intra-industry trade was unimportant with respect to Malaysia's trade with Japan since there wasn't much of it although there were signs that the overall trade between both countries was changing (Japan sourcing more in Malaysia and Malaysia importing more manufactured goods) especially in the aftermath of the yen appreciation during that particular time. Khalifah (2000) evaluates the changing structure of trade in the Malaysian manufacturing sector from 1990 to 1997 using the Grubel-Lloyd index. The results show that over the period studied, among other sub-sectors that have been investigated, the intra industry trade (Grubel-Lloyd index) in the machinery and equipments sub-sector had recorded the highest increase from 42.94 percent in 1990 to 58.15 percent of total trade in 1997, followed by the electrical and electronic sub-sector which increased from 28 percent in 1990 to 45 percent of total trade in 1997.

Brulhart and Thorpe (2000) re-investigated the association between the intra-industry trade and marginal intra-industry trade with labor force structural changes in Malaysia solely between 1970 and 1994. The empirical results showed that both intra-industry trade and marginal intra-industry trade exhibit increasing trends during the period analyzed. There was a steep and continuous increase in Malaysia's trade orientation where total trade as a percentage of Malaysian GDP rose from 73.4 percent in 1970 to 160.7 percent in 1994. The intra-industry trade for Malaysia had grown steadily over the period of study where the aggregate Grubel-Lloyd index rose from 0.19 to 0.54 between 1970 and 1994. He concluded that Malaysian trade expansions have gone hand-in-hand with an increase in the intra-industry trade. Besides, the measurement of marginal intra-industry trade also showed a steady increase over the sample period observed from 0.31 to 0.51 between 1970 and 1994. The continuous rise in intra-industry trade and marginal intra-industry trade is also apparent when they analyzed trade in manufactured goods (SITC 5 to 8). The intra-industry trade and the marginal intra-industry trade index rose from 0.13 to 0.59 and from 0.47 to 0.57, respectively.

Abu Bakar and Ismail (2013) examine the trends and patterns of intra-industry trade for Malaysia from 1990 to 2010. The results show that during the period analyzed, the trends and patterns of Malaysia's manufacturing sector had gradually change from traditional inter-industry to intra-industry trade. This is shown by the changes in the average Grubel and Lloyd index which had been gradually increasing from 0.27 in 1990 to 0.51 in 2007 before a slight decrease to 0.46 in 2010. Intermediate and unfinished products of manufactured goods, machinery and transport equipment which recorded the highest score of the index dominated most of the intra industry trade share. Meanwhile finished products mainly based from wood, rubber, fabric and glass dominated most of the non-intra industry trade of manufactured goods. They concluded that the main factors which contributed to the changes in trends and patterns in Malaysia's intra industry trade over the last 2 decades included the implementation of import substitution and industrialization policies by the government, increased international fragmentation of production, production networks, the creation of the ASEAN Free Trade Area (AFTA) and other regional trade agreements that influenced the manufacturing activities.

2.5 Conclusion

This chapter has systematically reviewed the literature on growth channels, imported inputs and intra industry trade. There is an extensive theoretical and empirical literature on the determinants or channels of growth, the imported inputs and the country-specific determinants of intra-industry trade for both developed and developing countries. With regards to literature reviewed for channels of industrial growth, it was found that there is a gap of study on the determinants of industries' growth for Malaysia especially at the individual industry level. To date, most studies conducted concentrate on analysis at aggregate level. There are few empirical studies that look into this area particularly for Malaysian manufacturing sector, however no studies have solely examine the export oriented sub-industries. In fact, for Malaysia several methodologies have been used in determining the factors contributing to economic growth as a whole, but few have been focused on identifying factors which determine the growth of specific industries. As such, through this study we hope to add another complementary literature of industrial growth channels to the existing empirical literature.

Similarly, the review of literature on imported inputs shows that many studies have been conducted to determine the role of importing inputs to accelerate the growth of the industries and firms. However, based on the literature reviewed, it was found that there is a gap in study particularly for Malaysia's manufacturing sector. As to date, there is no empirical analysis examining the relationship between the use of imported inputs and growth of industries and firms, especially by their types of ownership. Again, no studies have solely examined this issue related to the export oriented sub-industries, although it is claimed that most of the inputs imported are channeled into these industries. Hence, the main contribution expected from this study is also to add another complementary empirical literature to the existing literature related to the importance of imported inputs.

With regards to intra industry trade literatures, the review has focused mainly on the country-specific characteristics. Based on the literature reviewed, again, to date, none of the empirical analysis on analyzing determinants for intra industry trade within Malaysian manufacturing sector has been found. We have also found a lack of empirical studies in examining this issue related to the export oriented sub-industries in the Malaysian manufacturing sector. So far, the analysis has focused on examining the trends and patterns of intra industry trade either for Malaysia solely or by grouping it with other countries. As such, our study perceived that our empirical findings could also add a complementary empirical literature to the existing literatures of intra industry trade. Having reviewed the literature on growth channels, imported inputs and intra-industry trade of the manufacturing sector above, an explanation of the Malaysian economy is provided and discussed in the next chapter.

CHAPTER THREE

MALAYSIAN ECONOMY

3.1 Introduction

Many have argued about the 'Malaysian Miracle' which was during the prosperous growth of the economy at approximately 8 percent started from the middle 1980s until middle 1990s, yet have remained silent about the condition termed as the 'Malaysian Mirage' which was related to the economic turmoil during the Asian Financial Crisis in 1997-98. It is important to further clarify the economic condition of Malaysia by analyzing and evaluating the economy spheres especially in terms of its macroeconomic perspectives. Therefore it is essential to understand the whole picture of the Malaysian economy to ensure distinctive justifications of its growth and development stages. Besides, a detail discussion about the manufacturing sector should also be presented to give an in-depth understanding about the significant role played by this sector in accelerating the growth of the economy.

This chapter is arranged in five sections. The first section presents the background of the Malaysian economy which consist the explanation on selected economic indicators. The second section discussed the economic framework including the economic structure and the development plans. The third section discusses the development of industrialization starting with the initial development process which includes the role and contribution of the manufacturing sector in generating prosperous economic growth followed by discussion on the instruments which were developed by the government to support the industrial policy implementation and the policies which govern the manufacturing sector. The fourth section describes the performance of the manufacturing sector and finally, the last section explained selected issues which are related to the objectives of this study.

3.2 Malaysian Economy Background

Malaysia is located in the heart of Southeast Asia which is said to be one of the world's fastest growing regions. The strategic location has made Malaysia an attractive centre for trade, investment and tourism. Although Malaysia's population is made up of different races with a diverse cultural background, they live in relative harmony. Malaysia has also enjoyed a long period of democracy and stability since independence, and it retains important political and economic links both within and outside the Asia-Pacific region. With such consistencies, investors are attracted to Malaysia, and thus Malaysia has flourished.

Malaysia was initially well endowed with natural resources. At independence, Malaysia inherited an economy dominated by two main commodities; rubber and tin. The activities of cultivation of natural rubber and mining and processing of tin have shaped the early part of the country's economic development. As a result in the late 1950s and early 1960s, Malaysian has become the world's largest producer and supplier of rubber and tin. Throughout these periods, economic growth remained highly dependent on the export of the above primary commodities which was largely owned by the British companies. In the late 1960s, the government put huge emphasis on the production of oil palm and petroleum due to decrease in rubber price worldwide and depleted reserves of tin, therefore the composition of the country's primary commodities changed. Malaysia since then has become one of the main exporters for palm oil and petroleum while export for rubber and tin has gradually decreased. The share of agricultural output decreased from 40 percent of the gross domestic product in the 1950s to 27 percent of the gross domestic product in the 1970s.

Emphasis on industrialization activities started to develop in the middle of 1970s with the main production and export of electrical and electronic products, besides textiles and garments. From the early 1980s through to the mid-1990s, the economy experienced a period of broad diversification and sustained rapid growth averaging almost 8 per cent annually. In the 1980s, the industrialization had focused on heavy industry development which included the project for a national car known as PROTON, establishing plants and factories for motorcycle engines, iron and steel mills and cement, besides approved projects for petrol refining and petrochemicals, pulp and paper mills. In the 1990s, the manufacturing strategies were focused mainly on the integration of manufacturing operations through the value chain to enhance industrial linkages besides increasing industries productivity and competitiveness. To develop a more structured industry group the approach was shifted from an industry-based approach to a cluster-based approach. During these stages, the industries gradually came to be owned by Malaysian companies.

Since the big push on industrialization started in the 1980s, Malaysia had successfully developed from a commodity-based economy to one focused on manufacturing. Manufacturing grew from 19.4 percent of the gross domestic product in 1970 to 35 percent in the 2015, while agriculture and mining, which together had accounted for 37.2 percent of the gross domestic products in 1970, dropped to 8.3 percent in 2015 (Economic Report, 2015/2016). Since the 1980s Malaysia has become one of the world's largest exporters of semiconductor devices, electrical goods and appliances, and since then the government has made massive plans to make Malaysia a leading producer and developer of high-tech products, including software. Starting from the 1970s, the foreign direct investment and manufactured exports (especially in high technology products such as machinery and equipment products) have played an important role in promoting the growth of the economy, with the latter rose from 5 percent of total exports in the 1970s to above 60 percent in the late 1990s. Capital formation had also increased drastically in the late 1980s after heavy industrialization emphasized, resulted in high growth rate of domestic and foreign private investment from an average of 17 percent of the gross domestic product in the 1960s to 29 percent in the 1980s. Starting from 2000 the growth of the economy has been driven by the services sector such as growth from the education and health services, leisure and hospitality and professional and business services which accounted for approximately 56 percent of the gross domestic product in 2015**.** The structural changes of the Malaysian economy as discussed above are depict by the changes in the composition of gross domestic product (GDP) from 1957 to 2015 as shown in Table 3.1 below.

Table 3.1: Composition of Gross Domestic Product by Sector (1957-2015)

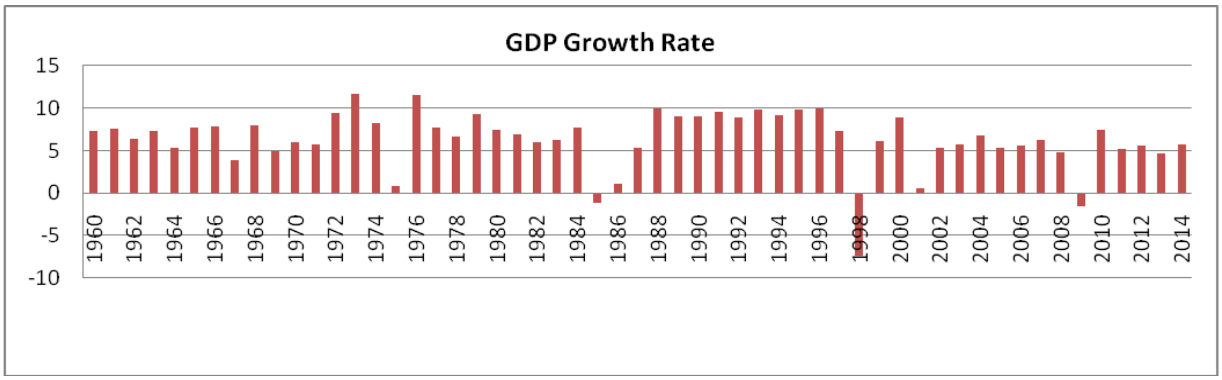
Year	Primary Sector (% of share)	Secondary Sector (% of share)	Tertiary Sector (% of share)
1957	49.8	9.2	41
1960	43.7	14.5	41.8
1965	40.5	14.7	44.8
1970	37.2	19.4	43.4
1975	32.3	21.7	46.0
1980	32.8	26.2	41.0
1985	31.3	24.1	44.6
1990	28.3	30.5	41.2
1995	20.9	34.8	44.3
2000	15.3	35.5	49.2
2005	12.5	39.1	48.4
2010	13.7	34.8	51.5
2015	8.9	35.0	56.1

Source: Malaysian Economic Report (1957-2015)

Generally, the above table shows that the gross domestic products composition has experienced three different stages which were from highly contributed by the agriculture sector in the 1950s until 1970s to industrialization during the 1980s to 1990s and finally the remarkable contribution of the services sector from the 2000s until the present.

Gross domestic products is an important measurement for economic growth besides other variables such as the inflation rate, unemployment rate, development of infrastructure, growth of financial system, quality of life as well as the political stability of a country. Malaysia's gross domestic products had experienced significant growth since its independence until present although it was marked by few external and internal crises. Chart 3.1 below show the trend for Malaysian gross domestic product from 1960 to 2014.

Chart 3.1: Gross Domestic Product Annual Growth Rate (1960-2014)



Source: World Development Indicator (1960-2014)

Since independence, the Malaysian economy has grown at a relatively high rate, averaging about 6 percent per annum in the 1960s and improving to 6.8 percent in the 1970s. On average between 1971 and 1980, Malaysian gross domestic product (GDP) grew at a rate of 6.7 percent per annum. In the first half of the 1980s, growth was still at a reasonable annual rate of 6.6 percent but it was marred by two years of recession from 1985 to1986[7] when the economy contracted. In the period of recovery from 1988 to 1996, the government had embarked on a liberalization and deregulation approach to revive the economy, in addition to downsizing its activities and introducing fiscal austerity. The economy had rebounded after the 1988 to the point where it had faced a tight labor market, upward pressure on prices and current account deficits (Ariff, 1998; Tham, 1997;

Lee, 1996). Before the ASEAN financial crisis, Malaysia's economy had recovered a very rapid growth rate of average 8 to 9 percent per annum between the late 1980s and1996. However, during the crisis period (1997-1998), the growth rate was recorded at average of 3 percent per annum. The recovery started in 2002 but still lost the momentum of previous growth and the growth rate from 2001 to 2008 averaged 4 to 5 percent per annum. Malaysia recorded a negative growth rate of 1.7 percent in 2009, however starting from 2010 until the present; Malaysia had recovered and grew on average at 5 to 6 percent per annum.

Malaysia was able to sustain its prolonged current account deficits because its merchandise export sector was performing very well, with an average annual growth rate of about 22 percent during 1987-1995. Due to this performance, foreign investors were very confident of the Malaysian economic growth potential and they were prepared to continue their investment. As a result, Malaysia enjoyed a large flow of both short and long term capital inflow that helped to sustain the balance of payments. Underpinning the growth was prevalent price stability, where the rate of increase for the consumer price index had hardly ever exceeded 7 percent except for 1973 and 1974 when it reached double digit figures. In per capita terms, the performance was equally good; Gross National Product (GNP) per capita (at constant 2005 prices) rose from USD334 in 1970 to USD4, 447 in 1996.

According to the Tenth Malaysia Plan (2010-2015) real gross domestic product (GDP) growth during the Ninth Malaysia Plan was on average 4.2 percent per annum, driven largely by domestic demand which grew by an average of 7.7 percent per annum. The total factor productivity contribution to growth had also increased to 34.7 percent compared to 29 percent during the Eighth Malaysia Plan (2001-2005). This was attributed to the initiatives undertaken by the public and the private sectors to shift the economy towards higher value-added activities through innovation, high technology and human capital development via higher investment in information and communication technology as well as training and retraining of employees. However, between 2006 and 2010, the labor force increased on average 1.7 percent per annum and only 0.9 million jobs were created so that the unemployment rate slightly increased from 3.5 percent per annum in 2005 to an average of 3.7 percent per annum during 2006 to 2010.

During the Ninth Malaysia Plan (2006-2010) the recession in major export destinations severely affected the nation's external performance. The export of electrical and electronic products which accounted for 59 percent of total manufactured export, declined by 0.1 percent per annum. Imports also grew at a slower pace of an average of 2.8 percent per annum compared to an average of 6.8 percent per annum during the Eighth Malaysia Plan (2001-2005). Despite the sharp contraction in external demand, Malaysia's external position remained strong supported by a sizeable trade surplus and higher tourism receipts. The current account continued to record a surplus of 14.6 percent per annum of the gross national product (GNI) in 2010 compared to 15.8 percent per annum in 2005. However, starting from 2011, the current account has eased on approximately 5.8 percent per annum with the lowest 2.3 percent recorded for the third quarter of 2014. The tourism industry in 2014, was negatively marked by the two incidents of Malaysian Airline System (MAS); the missing of MH370 and the crash of MH17 airplanes.

Perhaps one unique feature of the Malaysian development process is its ability to manage economic growth in a multiracial society. In such a situation, growth must be shared between the various ethnic groups to maintain harmony and political stability, an essential ingredient for growth. As such, the government have started it first 20 years' economic policy namely the New Economic Policy (NEP)[8] formulated for the period from 1970 until 1990 followed by its successor, the National

Development Plan (NDP)[9] formulated for the period from 1991 until 2000. Both policies have pursued the same objective in order to maintain the harmony and political stability. These main objectives include the eradication of poverty and the restructuring of the economic regardless of the ethnic composition.

3.3 Malaysian Economic Framework

During the past decades, the Malaysian government has implemented a series of planning horizons, ranging from short-term to long-term development plans. Among those were firstly the long-term planning which includes the First Outline Perspective Plan (OPP1:1971-1990), the Second Outline Perspective Plan (OPP2:1991-2000), the Third Outline Perspective Plan (OPP3:2001-2010) and the Vision 2020 (1991-2020). Secondly the medium-term planning such as the five-year development plans which includes the First Malaysia Plan (1966-1970) until the Tenth Malaysia Plan (2010-2015) and also the mid-term review (MTR) of the five-year plans; which was carried out in the middle of the five-year cycles. The last series of the planning horizon is the short-term planning such as the annual budget.

The first outline perspective plan (OPP1) covered a period of 20 years and set out the broad socio-economic framework within which the objectives of another policy known as the New Economic Policy (NEP: 1970-1990)[10] were to be achieved. NEP was implemented after the racial riots of 1969 to redress poverty and social inequality. This period also covered four major medium-term five-year development plans, namely the Second Malaysia Plan (1971-1975), the Third Malaysia Plan (1976-1980), the Fourth Malaysia Plan (1981-1985) and the Fifth Malaysia Plan (1986-1990). The Second Outline Perspective Plan (OPP2) covered another 10-year period policy implemented by the government just after the New Economic Policy came to an end in 1990. This policy known as the National Development Policy (NDP)[11] ran from 1991 to 2000 and continued the initial objectives of the

NEP as neither of these had been achieved. The OPP2 also covered two major medium term plans during this period namely the Sixth Malaysia Plan (1991-1995) and Seventh Malaysia Plan (1996-2000).

The new century for Malaysia began with the launch of the National Vision Policy (NVP)[12] running from 2001 to 2010. This period had also covered two Malaysian Plans namely the Eight and the Ninth Malaysia Plan. NVP incorporated key strategies of its predecessor policies, the NEP and the NDP, while encapsulating new policy dimensions. These dimensions included developing Malaysia into a knowledge based society by 2010, besides generating endogenously-driven growth and achieving at least a 30 percent share of total corporate equity ownership for Malaysia's original indigenous people known as the '*Bumiputra*[13]'. In line with this objective, the Third Outline Perspective Plan (OPP3) was introduced to continue the Government's policies on poverty eradication and equitable wealth distribution, with greater emphasis on the distributional policy to achieve effective '*Bumiputra*' participation. At the same time, the 15-year period of the Third Industrial Master Plan (IMP3) from 2006 until 2020 was implemented to strengthen the development of the manufacturing sector with the focus on producing higher value-added products using the latest technologies.

Vision 2020 (1991-2020) was declared in 1991 and envisaged Malaysia becoming a developed nation by 2020, focusing on building a resilient, competitive and fully industrialized country by 2020. The challenge is to strike the right balance to restore socio-economic equilibrium. Thus, strengthening national unity obviously is the priority because it is widely known that polarization can cause economic and business uncertainty, and lead to dismissal of the socio-economic problem by the community. Objectives of Vision 2020 include the unity of Malaysia's multi-ethnic community, a just and caring society, a mature democratic society, sustainable development, and a full competitive, dynamic, robust, resilient and entrepreneurial economy. As such, the following strategies such as export-led growth, high-technology industries, knowledge-intensive services, internationalization and accelerated industrialization strategies were formulated.

Beside the policies that have been discussed above there were also other policies implemented between the middle of 1980s and now. These policies include firstly the three series of the National Agriculture Policy (NAP)[14], secondly the three series of the Industrial Master Plan (IMP)[15], thirdly the Look East Policy[16], fourthly the 70 Million Population Policy[17], fifthly the Malaysian Incorporated Policy[18]; sixthly the Privatization Policy[19] and currently the New Economic Model (NEM)[20].

3.4 Industrialization in Malaysia

3.4.1 Industrialization Development Phases

The implementation of Malaysian industrial policies and trade policies had been complementary long before the country reached its independent state in 1957. Industrial policy instruments have been primarily fiscal incentives such as tax benefits and subsidized infrastructure investments, while trade policy has mostly worked through tariffs and exchange rates. Quantitative restrictions and import licenses have been used sparingly. The trade policy was designed to complement and assist the objective of industrialization at each phase. The initial policy was to continue the colonial policy stance (open-door policy) relating to trade and industry from the era of dependence until the end of the 1960s. The implementation of these policies had played an important role in transforming Malaysia's economy from primary sector-driven into manufacturing sector-driven two decades after the independence. From independence until the present, Malaysia has adopted two industrialization strategies namely the Import Substitution Industrialization (ISI) strategy and the Export-Oriented Industrialization (EOI) strategy. This industrial strategy can be classified into six phases and these phases are not mutually exclusive and overlap one another. The strategy, policies and objectives of each phase are summarized in Table 3.2 below.

Table 3.2: Phases of Industrial Development in Malaysia

Phases	Industrial Strategy	Policy	Objectives	Instruments
Phase I	Pre-Independence (Before 1957)	None specific policy	to increase the production of primary commodities	Trade was under MNC subsidiaries of the British Empire
Phase II	First Phase of Import Substitution Industrialization (ISI) Strategy (1957-1967)	Pioneer Industries Ordinance Act 1958	to encourage investment in an industrial base to diversify the economy, reduce imports and generate employment	Tax exemption, tariff protection, provision of infrastructural facilities, setting up of industrial zones and the provision of cheap credit
Phase III	First Phase of Export Oriented Industrialization (EOI) strategy (1968-1980)	Investment Incentives Act 1968 Industrialization Coordination Act 1975 Free Trade Zone Act 1971	to diversify the manufacturing sector, create linkages and employment to promote both domestic and foreign direct investment emphasis on electronics and electrical and textiles industries for export	Investment credits, tariff exemption on raw materials, tax concessions and exemption for exports, the granting of import licenses, preferential treatment for import permits, development of social infrastructure and full foreign ownership for firms producing for export
Phase IV	Second Phase of Import Substitution Industrialization (ISI) Strategy (1981 onwards)	Heavy Industrial Policy 1981 Look East Policy 1981	to nurture greater linkages in the manufacturing industry through local small and medium-scale industries to reduce imports of intermediate and capital goods to promote greater technological development through R&D Domestic-oriented market	Tariff protection on selective heavy industries like the machinery, automotive and steel, price control, mandatory import licensing, duty exemptions, granting of tax incentives, and direct grants to promote R&D capacity like the Industry R&D Grant Scheme
Phase V	Second Phase of Export Oriented Industrial (EOI) Strategy (1986 onwards)	IMP1 (1986-1995) IMP2 (1996-2005) IMP3 (2006-2020)	to further liberalization and continued promotion of EOI to increase manufacturing linkages and competitiveness resources-based industries and encouragement for exports industrial upgrading through enhanced technological development	Continued to grant investment incentives but targeted at high value-added, and high technology industries, particularly in the electrical & electronic sub-sector Extension of tax incentives, grants and subsidies for R&D, the creation of new high-tech institutions targeted for specific industrial sectors, boosting research capacities in public institutions through greater budgetary

				allocations on science and technology
Phase VI	Knowledge economy (late 1990s onwards)	Multimedia Super Corridor (MSC)	to move to higher skilled knowledge-intensive economy industrial upgrading through enhanced technological development	Establish network of vocational and technical institutes that have substantial capabilities in imparting engineering, communication, managerial and financial control skills to both existing and would-be workforce Set up of industry-relevant skills development universities and institutes by government and foreign institutions from Japan, United Kingdom, France and Germany.

Source: adopted and modified from MITI (1996) report and Ghee and Woon (1994)

Malaysia adopted the first phase of import substitution strategy from the late 1950s however this phase lasted for a short period until the late 1960s. The government's major attention to the growth of industry and protection was stated in the First Malaysia Plan (1966-1970):

> "In recognition of the problems of infant industries and those which arise from the limited industrial experience of the country, major attention will be given to the imposition of protective tariff. The government, however, is intent on ensuring that no more protection than is necessary will be accorded, for the cost of industrialization to the domestic consumer must be minimized. The government is also intent that tariff protection will not be afforded for period longer than are absolutely necessary. The growth of the industrial sector in the long run will demand that eventually production be extended to supply not only the domestic market but also markets overseas. This makes it essential that domestic enterprise be constantly prodded to increase efficiency so that there will be progressive reductions in productions costs".

The primary objective of the first phase of import substitution industrialization (ISI) strategy (1957-1967) was to encourage investment in an industrial base; therefore during its implementation import substitution was applied only to selected industries or activities. Hence, there was no special preference towards formation of domestic companies, and many of the companies set up during this phase were owned by the former colonial power. Most industries that were established during this phase produced final consumer goods, due to lack of domestic technological capability. During this phase, the largest industries in terms of output and employment share were food and beverages and wood products. These industries had become an important part of the manufacturing sector's growth.

The most important industrial policy instrument during this phase was fiscal incentives. Under fiscal incentives, companies were exempt from income tax and any losses could be carried forward to be set off against future income. On average the nominal rate of protection (NRP) during the first phase of import substitution strategy was only 10 percent, while the effective rate of protection (ERP) was 21 percent (Mahani, 1998). One of the drawbacks at that particular phase was that not much indigenous industrial capability was built up and little technology was transferred. This was quite logical because the industries formed were operating at a low level of technology.

According to Athukorala and Menon (1996) the first tariffs imposed in Malaysia in the 1960s served mainly for revenue purposes and to protect the industries in which British Commonwealth countries had an interest and compared to other countries, the level of tariff protection has remained low**.** The serious steps to maintain low level of tariff protection starting in the 1960s by the government was in conjunction with the implementation of the import substitution (ISI) strategy. According to their analysis, in 1965 the average level of protection could be classified as modest and several manufacturing industries had no protection at all.

During the second phase of import substitution industrialization (ISI) strategy (1980-1985), exemption from import duties on raw materials and machinery was quite widely used for both import substituting and exporting industries. However, heavy import duties were levied on final goods. Full exemption from import duties was given to domestic companies, on the basics that without these exemptions, they could not compete against the other importing companies. For exporting industries, exemption would still be given, on the conditions that the imported inputs had to be used because of the quality of local ones was inferior, or their price was higher.

Under this phase, the support for export-oriented industrialization was carried on with a moderate rate of protection. According to Mahani (1998) the proportion of protected items or products which carried a tariff rate of 5 percent or less (these include products such as paper, coal, and metals among others) had increased to 50 percent of total products by 1982 compared to 46 percent in 1979. Meanwhile, the proportion of protected products with high tariff rates of 50 percent and above (these included wheat, and livestock among others) fell from 16 percent of total products to 13 percent during the same period. Since most of the companies had started to operate in the earlier era (first phase) of export–oriented industrialization policy, the liberalization process was carried out gradually to give these companies time to adjust to the second import substitution era. These export-oriented companies were aided through a combination of measures such as duty exemptions and export promotion incentives.

Classification of protection according to product groups shows that consumer durables were the least protected in 1963 but had become highly protected by 1978. Effective protection for industries producing intermediate products with a low level of processing was consistently far less than for industries doing so with a higher level of processing. These changes are indicative of the transformation from production (and protection) of consumer goods to heavy manufacturing industries and consumer durables. The pattern of the nominal rate of protection and effective rate of protection as discussed above had lasted longer than the first import substitution period from 1957 to 1968, and also existed even in the export-oriented industrialization phase.

By and large, moderate tariff protection was the key instrument used to encourage new investment in manufacturing. At that time, the industrialization strategy was largely a promotional effort, geared to the provision of an investment climate favorable to private enterprise. Malaysia's efforts to industrialize its economy, especially towards export oriented industrialization, led to the rapid growth in both manufacturing and export sectors from 1972 to 1995. Another instrument implemented hand in hand with the investment incentives was subsidized infrastructure provided by the governments of the states. Special industrial locations were prepared with road and rail access, water and electricity connections and companies situated in these locations paid subsidized rentals and charges for these facilities.

Industrialization through import substitution was the major emphasis of the development strategy. Malaysian government eschewed ‘forced’ industrialization through direct import restriction. In the earlier stage of industrialization, the degree of import restriction or quota was based either on the industry’s expected production capacity or the previous year’s imports. If restriction was the method chosen, imports were usually set at 60 to 70 percent of the previous year’s imports. After the introduction of a more open trade policy, there was a move away from quantitative restriction as a form of protection. In 1973, for example, 135 items from the tariff line (4.2 percent of the total) were subjected to quantitative restrictions. By 1980, quantitative restrictions applied only to 12 items of the total tariff line. Presently, quantitative restrictions and import licenses are in force only in some heavy industries such as automotive industries and selected agricultural products such as poultry and textiles industries. Import permits are only needed for the import of completely built vehicles.

The first phase of export-oriented industrialization started in the late 1960s as a solution to some of the constraints of first phase of import substitution and in response to the flow of capital from industrialized countries. Although the economic growth rates generated in the previous phase were reasonably high, there were signs that such growth might not be sustainable where the domestic market was too small to continuously support such growth rates and existing industries showed no sign of venturing into export markets. On the other hand, Malaysia, with abundant low cost labor, offered an ideal location for those who sought to relocate their export-oriented, labor-intensive operations.

During this phase, two separate sets of plans were developed, one for resource-based and the other for non-resource based industries. The approach to resource-based industries involved an upgrading of the old agriculture activity (rubber) as well as the encouragement of new cash crops and primary commodities (palm oil, cocoa and wood products). This came in the form of government support for technological improvement and market promotion. The non-resource-based industries involved foreign capital with much less linkage to the domestic economy. Efforts to attract foreign investment and policies to promote export were extensively directed towards non-resource-based industries. The non- resource based industries were concentrated in two sectors, namely electrical and electronics, and textile and wearing apparel which consequently were far more important to the government development policy than the resource-based industries.

As the inflow of foreign direct investment in the late 1960s was massive, the government saw its importance in shaping and developing the industrial base via the technology (embodied in machinery and production processes) and technical expertise that was brought in. Hence, the government had implemented an aggressive export promotion policy to attract foreign direct investment through a comprehensive set of incentives, provision of good infrastructures and creation of conducive investment environments and relaxation of equity ownership[21] requirements.

Several acts such as the Investment Incentives Act (1968) and the Free Trade Zone Act (1971) were introduced by the government during this phase. The push for export-oriented industrialization started with the Investment Incentives Act (1968) which offered the pioneer status and investment tax allowance incentives and export incentives, their amount being based on volume exported. The Free Trade Zone Act was introduced in 1971 to complement the designated Free Trade Zone (FTZ) area introduced by the government. Industries within this zone could import their inputs free of duties and output could be exported without taxes. Beside the introduction of the free trade area, the government also expanded the infrastructure at ports, airports, telecommunication and electricity supply to complement the growth in investment and business facilities.

During this particular phase also, the government had shown their interest in a protection plan for the industries. This was then quoted by John H. Power (1971):

> "The margin of protection granted will in no case be greater than that which will obtain for the local manufacturer the market for goods which can be economically produced in the Federation within a reasonable period. The government will not grant exemption or protection to an extent which would permit the marketing of goods of inferior quality or at excessive prices in comparison with imported goods. It will not grant tariff concessions to industry to an extent which would materially affect public revenue".

The next phase of industrial development was formed by the implementation of the second phase of import substitution industrialization (ISI) strategy. This took the form of a heavy industrialization policy introduced in the early 1980s, with public sector investment to establish an institution known as Heavy Industries Corporation of Malaysia (HICOM). The objectives of heavy industry development were to reduce imports of capital and intermediate goods, generate supporting industries to promote backward and forward linkages and to encourage greater inter-industry linkages in the manufacturing sector. The heavy industrialization[22] policy was a crucial instrument for the government to fulfill the New Economic Policy (NEP) objective; to restructure the economy. However, the heavy industrialization program was sustainable for only a short period of time. By 1985 many companies faced financial difficulties and some had to receive new capital or be re-organized. The government has identified several factors contributing to the drawback of the policy, such as low competitiveness and limited domestic market. Besides these factors the industries were also handicapped by the deep economic recession experienced by Malaysia during 1985 and 1986.

In 1986, as a response to the 1985 recession the government decided to pursue with the second phase of Export Oriented Industrialization (EOI) strategy which consisted of liberalization of the economy and a push for more technology content. Under the liberalization approach, the source of growth was shifted from the public to the private sector while the government continued to promote a good business environment. A key liberalization instrument was the privatization of public sector companies allowing companies to respond to market conditions. With the country's strong commitment towards liberalization, the government launched the first Industrial Master Plan (IMP1) from 1986 until 1995, which emphasized outward-oriented industries, followed by the second Industrial Master Plan - IMP2 (1996 - 2005). At present, the economy is progressing with the third Industrial Master Plan - IMP3 (2006 – 2020).

Malaysia's various commitments to multilateral and regional trading arrangements have taken trade policy along the liberalization route. Tariffs had become the key instruments in the trade policy since trade liberalization reforms started in the 1980s while the role of the exchange rate became more important after 1987. To a large extent, the massive flow of foreign direct investment into Malaysia and its fast export growth after 1987 could be attributed to the competitive Malaysian Ringgit exchange rate. The role of the exchange rate in trade performance was not strong in the earlier export promotion phase between 1970 and the middle of the1980s, but from 1987 onwards, during the period of high export growth, the government was committed to maintain a low exchange rate to ensure export competitiveness. The central bank intervention started in 1987 in response to the large foreign exchange flows and improvement in the terms of trade.

Commitments to the General Agreement on Tariff and Trade (GATT) Uruguay Round, the ASEAN Free Trade Area (AFTA) and Asia Pacific Economic Cooperation (APEC) gave further urgency to the trade policies of liberalization. Under AFTA, liberalization was substantial and more immediate but the GATT commitments were more comprehensive and extensive. APEC's obligations allow greater policy management flexibility as the implementation is on a voluntary basis with minimal institutionalization.

3.4.2 Industrial Policy Instruments

The industrialization strategy has been adopted since 1957. The first measure taken to accelerate industrial development was through tax incentives. Domestic financing was identified as one of the major constraints inhibiting industrialization. The other measures such as promoting import substituting industrialization, tariff and non-tariff protection of the domestic market were deemed the most crucial. Despite these measures, Malaysia could still be considered to have followed a relatively liberal free trade economic strategy in its quest for industrial development through import substitution.

Generally, Malaysian policy instruments can be classified under tariff, non-tariff and other barriers. Policy instruments[23] such as import and export duties, import duty exemptions and duty drawback are classified as the tariff barriers. Meanwhile, policy instruments such as export and import restrictions, quotas, price controls, government purchasing preferences, local content regulations, anti-dumping duties, countervailing duties and export licensing are classified as the non-tariff barriers. Policy instruments such as sales tax and excise tax are classified under the heading of other barriers. Among these policies, import and export duties, excise tax, sales tax, import restrictions, and price controls are the major policy instruments used to protect import-competing industries in Malaysia.

Export duties are generally imposed on Malaysia's main exported[24] commodities normally agriculture and mineral products such as crude petroleum and palm oil for, revenue purposes. Import duties consist of either a percentage of the c.i.f value (ad valorem) or a fixed amount per unit of good (specific rate) or a combination of the two[25]. Nevertheless, in line with trade liberalization, import duties on a wide range of raw materials, components and machinery have been abolished, reduced or exempted. Sales tax[26] as practiced in Malaysia is a single stage tax imposed on certain imported and locally manufactured goods, either at the time of importation or at the time the goods are sold or disposed of by the manufacturer. Manufacturers[27] of taxable goods are required to be licensed under the Sales Tax Act 1972. Companies with Licensed Manufacturing Warehouse (LMW) status are exempted from this licensing requirement; so are companies with a sales turnover of less than RM100, 000 although they have to apply for a certificate of exemption from licensing.

Another instrument of taxation is excise duty[28]. Excise duties are levied on products manufactured in Malaysia, either output or inputs, such as cigarettes, tobacco products, alcoholic beverages, playing cards, mah-jong tiles, and motor vehicles. Service tax applies to certain prescribed goods and services in Malaysia including food, drinks and tobacco; provision of premises for conventions and meetings, as well as for cultural and fashion shows; health services and provision of accommodation and food by private hospitals. It also applies to professional and consultancy services provided by individuals or companies such as accountants, advocates and solicitors, engineers, architects, surveyors, advertising agencies, telecommunication services companies and management services among others.

Import restriction is another tool of protection. It may take the form of quotas or a total ban on imports. The Customs (Prohibition of Imports) Order 1988 provided 4 categories of import restriction. Firstly, under the First Schedule, goods mainly from Israel, primarily led by political and moral considerations, are totally banned for import. Secondly, under the Second Schedule, the listed goods are subject to controlled entry for mainly non-protective purposes such as currency, armaments and others. These goods are subject to the issue of a permit by the relevant department or authorities. Thirdly, under the Third Schedule, goods listed are mainly for the purpose of protecting local industries. Lastly, the Fourth Schedule includes certain goods which fail to meet specific technical requirements mainly for customer protection, such as labeling and standards. However, in practice there is some overlap in objectives between the Second and Third Schedule. The First and the Fourth Schedule are clearly non-protective, while the Second and the Third Schedule each contain goods which are restricted for protective reasons. Goods such as sugar, flour, pyrites, motor vehicle production and motorcycle production are under import restriction, which is monitored through the Control of Supplies Act or under several local content programs.

Price control or supervision also acts as a protective device indirectly. Price control is exercised by imposing price conditions on manufacturers through a range of approvals administered by the Malaysian Ministry of Trade and Industry as well as under the Control of Supplies Act 1987[29]. Generally, there are two categories of good subject to price supervision. Firstly, it includes specific goods under the Control of Supplies Act (1987) which have been classified under the Good

Schedule. Goods listed under the Good Schedule are mainly considered to be essential and are under the supervision of the Domestic Division of the Ministry of Trade. Secondly, specific goods which have been given tariff protection or non-tariff protection from imports.

Malaysia had revised its anti-dumping and countervailing legislation in 1999 with a view to bringing it into conformity with the World Trade Organization (WTO) agreement on Subsidies and Countervailing Measures. However, unlike many other WTO member countries, Malaysia has not relied heavily on contingent measures for controlling imports. For example, during 1997-2001 Malaysia initiated only five anti-dumping investigations; of which three were provisional measures. Malaysia also has not restored to other trade remedies, such as safeguarding legislation.

3.4.3 Other Related Policies

3.4.3.1 Investment Policy

Malaysia's investment policy was designed to serve the country's industrial promotion and development policy. The authority involved with investment regulation and promotion is the Malaysia Industrial Development Authority (MIDA), which presides under the Ministry of Industry and Trade (MITI). Investment incentives in the middle eighties were based on the investment project according to products and assembly activity. Since then the investment incentives have been formulated to be more selective and changed dependent on the priority sectors specified in subsequent industrial plans. The main tax incentives for companies investing in the manufacturing sector are the Pioneer Status and the Investment Tax Allowance which is shown is Table 3.3 below.

Table 3.3: Main Investment Incentives in the Manufacturing Sector

Tax Incentives	Tax Concessions
Pioneer Status	**All manufacturing companies (include general companies, high technology companies and Small Scale companies)** Exemption of income tax (for high technology companies and companies in an approved Industrial Linkages Scheme) for five years, thereafter a 30 percent corporate tax, an added incentive for states such as Sabah, Sarawak, Labuan and designated Eastern Corridor of Peninsula Malaysia, a 5 percent corporate tax. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company **Machinery and Equipment and Automotive Companies** Exemption of 100 percent income tax of the statutory income for a period of 10 years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company
Investment Tax Allowance	**General Companies** An allowance of 60 percent (80 percent for states such as Sabah, Sarawak, Labuan and designated Eastern Corridor of Peninsular Malaysia) on the qualifying capital expenditure incurred during the first five years. The allowance can be utilized to offset against the 70 percent (85 percent for Sabah, Sarawak, Labuan and designated Eastern Corridor of Peninsula Malaysia) of statutory income in the year of assessment. Any unutilized allowance can be carried forward to the following year until the amount has been used up. Different incentives given to companies specializing in R&D activities, an allowance of 100 percent for R&D, Contract R&D and Technical/Vocational Training Companies (50 percent for in house R&D companies) in respect of qualifying capital expenditure incurred during the first ten years. The allowance can be utilized to offset against the 70 percent of the statutory income in the year of assessment. Any unutilized allowance can be carried forward to the following year until the amount has been used up. **High Technology Companies, Machinery and Equipment Companies and Automotive companies** An allowance of 100 percent on the qualifying capital expenditure incurred within five years from the date the first

	qualifying capital expenditure is incurred. This allowance can be offset against 100% of the statutory income for each year of assessment. Any unutilized allowances can be carried forward to subsequent years until fully utilized. **Small scale Companies** An allowance of 60 percent (80 percent for Sabah, Sarawak, Labuan and designated Eastern Corridor of Peninsular Malaysia) on the qualifying capital expenditure incurred within five years. This allowance can be offset against 100% of the statutory income for each year of assessment. Any unutilized allowances can be carried forward to subsequent years until fully utilized.

Source: Malaysian Investment Development Authority (2015)

Other types of incentives include Reinvestment Allowance, Incentives for Research and Development, Incentives for Industrial Building System and Group Relief. These incentives are listed in Appendix 3.1. Up to the present, Malaysia has offered 16 incentive schemes designed specifically for various sub-industries; which include manufacturing, tourism, agriculture, services, shipping and transport, manufacturing-related services, multi-media super-corridor and knowledge-based industry, environmental management, research and development, training, operational headquarters, regional distribution centres, international procurement centres, representative offices and regional offices.

3.4.3.2 Competition Policy

Malaysia was ranked among the top ten most competitive Asian economies in the Global Competitiveness Report, 2014-2015. It retained this position since the acknowledgement made in the Global Competitiveness Report, 2009-2010. The country has been characterized by high quality infrastructure, good market efficiency, good financial market development, strong business sophistication and innovative potential. Competitiveness[30] has traditionally been measured by cost of production. Modern competitiveness is measured more by the capacity to add value to economic products, services and processes. This includes environmental aspects when market access depends on the environmental protection. As such many firms were able to overcome the challenges of the economic downturn in their quest to increase productivity and competitiveness through various efficiency and innovative measures. Such measures involved adopting effective marketing strategies, developing new products and strong brands to build customer loyalty and preferences for their products and services as well as implementing productivity gains and innovation processes for more value creation.

To maintain its competitive edge and become a high income economy by 2020, there is a need for Malaysia to further drive its economy through higher productivity and innovation. The initial approach of growth through capital accumulation and sectoral transformation has become inadequate. Future growth must come from higher total factor productivity (TFP), nurtured by more innovative processes supported by continuing strong private investment.

Competitiveness can be identified at firm level, industry level and national level. Competitiveness is vital if the firms are to take advantage of the opportunities opened up by international trade. Competitiveness in industries which are related to international trade and foreign direct investment can therefore provide substantial leverage for economic growth. Competitiveness at national level is vital if a nation is to meet challenges posed by the international economy such as lower costs of transportation and communication, reduced trade barriers and the spread of technology, all of which have fused to sharpen international competition. As such this competition has put unprecedented pressure on all national economic factors including management, labor and government. Before 2010, Malaysia had not implemented a national competition policy in general. Competition policy has not been taken seriously as an alternative to regulation even though there were some early efforts in the 1990s to introduce competition policy elements in sectoral regulations following the regulatory reforms that accompanied the privatization program. However this was limited since only two sectors made any legal provisions in the area, namely the energy and communications sectors.

Malaysia's current competition policy was approved by the Cabinet in October 2005. The policy includes all government measures which promote effective competition processes in the economy. These measures concern innovation, government procurement, trade liberalization, deregulation and privatization, consumer protection and industry development. The Competition Act 2010 and Competition Commission Act 2010 were gazette in June 2010 and came into force in 2012. The Competition Act 2010 is essentially a first comprehensive national competition law which provides a regulatory framework against market manipulation and cartel practices that may affect market efficiency and dynamism in healthy competition. The enforcement of this law represents a major step forward a competition policy in Malaysia. Meanwhile the establishment of the Competition Commission has been successful in enforcing its activities especially in price fixing cases involving trade associations. The examples of competition related issues are listed in table 3.4 below.

Table 3.4 Government Policies and Competition Related Issues

Government Policies	**Examples**
Innovation and intellectual property	Compulsory licensing and parallel importing
Government Procurement	Bid-riggings in tender
Trade Liberalization	Cross-border cartels
Deregulation and Privatization	Access to essential facilities
Consumer protection	Unfair trade practices
Industry development	Abuse of dominance by 'national champions'

Source: Nawawi (2011)

The impact of competition policy on innovation actually depends upon the complex relationship between competition and innovation. The 'Schumpeterian' view is that firms will only innovate if they are able to recoup the cost of innovation by capturing monopoly rents. Indeed, this is the goal of patent protection; patents create temporary monopolies that allow innovating firms to exploit their ideas without having to compete with competitors who would be able to expropriate their ideas[31]. To the extent that firms with market power have more stable and larger cash flow, they will find it easier to invest in new products and processes. There are also arguments that competition is vital for innovation (World Bank, 2005[32]). This view stressed that competition is likely to encourage innovation. If firms in competitive industries fail to introduce new products or new technologies that reduce costs, nimbler competitors will force them out of the market. In contrast, firms with market power, particularly those protected by government laws or regulations that make entry difficult and those that can protect their position by engaging in anticompetitive behavior, might not face the same risk if they fail to innovate.

Many of the new products and processes introduced by firms will be new to the firm rather than to the market. Because so few patents are issued to Central Asia, few of the products and processes introduced by the small and medium-sized enterprise will be protected by patent. Empirical study shows that firms that felt greater pressure, especially from foreign firms, to innovate were more likely to introduce new products and production processes than firms that felt less pressure (Carlin et al., 2004: World Bank, 2005) However, firms that faced greater price competition are less likely to innovate than other firms. The main objective of Malaysian government procurement is to support programs by obtaining value for money through acquisition of works, supplies and services. Its implementation is based on the following policies; to stimulates growth of local industries through maximum utilization of local materials and resources, to encourage and support the evolvement of '*Bumiputera'* entrepreneurs consistent with the nation's aspirations to create a '*Bumiputera'* Commercial and Industrial Community (BCIC), to increase and enhance capabilities of local institutions and industries via transfer of technology and expertise, to stimulate and promote service-oriented local industries such as freight and insurance and to achieve other socioeconomic and development objectives.

Consumer protection or consumers' welfare is another key aspect of the policy which has been enhanced by prohibiting anti-competitive business conducts. The Competition Act 2010 and the Consumer Protection Act 1999 are the two main pillars of consumer protection law in Malaysia. Usually, the competition law contains legal provisions that prohibit firms from using business practices that can potentially reduce competition and harm consumers' welfare. The law also prohibits cartel behavior or collusion in the form of price-fixing, output restriction and bid-rigging, vertical agreements between wholesaler (upstream) and retailer (downstream) firms that are harmful to the competition, abuse of dominance (monopolization) involving unilateral action by a dominant firm that is harmful to competition, and requires government approval for horizontal and vertical mergers that exceed a stipulated post-merger size threshold.

One of the main cautions in implementing a national competition policy pertains to the extensive use of industrial policy in Malaysia. Many of the past and present successes of the economy have been credited to a series of industrial policies since the 1960s. Competition policy may come into conflict with some of the important existing industrial policies and also the socioeconomic policies such as selective import substitution, bank consolidation and wealth redistribution policies and the '*Bumiputera*' policy. Accommodating all these policies, with their varying objectives, exemptions and authorizations, is likely to be an important element in Malaysia's proposed competition policy and law. In this regard, the government will need to be mindful that too many exemptions may weaken competition regulation and make it vulnerable to regulatory capture. Given the extent of resistance to the implementation of a national competition policy, some compromise in the content of the policy may need to be made. The government may have to reverse the devolution of competition regulation to sectoral regulators; an example of such a case is merger controls and in particular whether pre-notification of proposed mergers would be necessary. The benefits of Malaysia's industrial policy as well as the policy reforms in regulation and trade have been compromised by the lack of a formal institution to address competition related issues. However, to date, the implementation of such a policy remains elusive, due to bureaucratic and possibly, political resistance. Much of this resistance comes from the perceived conflict between competition policy and the existing industrial policies in Malaysia.

3.5 Performance of the Manufacturing Sector

Since its independence in 1957, the Malaysian government realized the important of promoting the manufacturing sector aiming to diversify the agriculture-based economy and also to generate employment opportunities. As such, an incentive was introduced in 1958 known as the Pioneer Industrial Ordinance to provide fiscal incentives for industrial investment, followed by a broader Investment Incentives Act a decade later. Besides these incentives, institutions that were initially established to assist and promote the growth of the manufacturing sector include the Malaysia Industrial Development Finance (MIDF) which was set up in 1960 and the Malaysia Industrial Development Authority (MIDA) which was established in 1965. Both institutions provide industries information, financial assistance, investment facilities and other opportunities in the manufacturing sector for investors. However, massive efforts to diversify the agriculture-based economy hence promote the manufacturing industries did not begin until the 1970s, which also marked initial investment made by the Malaysian government in the industries. It was in 1975, an Industrial Coordination Act was introduced to accelerate the pace of industrialization and also to achieve objectives set up in the New Economic Policy implemented by the government.

The achievement of the manufacturing sector was marked by the rapid growth of the sector. During 1960s and 1970s, the average annual growth rate of the sector was approximately 12 percent of the GDP growth, which was consistently higher than the other sectors such as agriculture, mining and forestry. Besides, total value added of the sector during these years had grew from RM204 million to more than RM2,060 million which represent an average annual growth rate of 20 percent of the GDP. This substantial achievement was particularly due to factors such as sustained political and price stability, a buoyant balance of payments, a favorable investment climate, abundant natural resources and well educated labor forced.

The first Industrial Master Plan (IMP1) was launched in 1985 for the ten years up to 1995. IMP1 embodied measures to attract investment and accelerate exports. The Plan was an indicative one which identified twelve industries, (seven resource-based and five non-resource-based), to be developed with the ultimate aim of diversifying the manufacturing sector. Shortly after the First Industrial Master Plan began, the Promotion of Investment Act (PIA) was introduced in 1986 to replace the Investment Incentives Act, 1968. The promotion act offered a much wider range of incentives, available to more industries and promoted through many parameters which include investment and reinvestment exports, capital expenditure, industrial location and equity requirement.

The manufacturing sector performed exceedingly well during the period of the IMP1, and exceeded the sectoral performance target which was initially set out in the plan. The target and actual performance of the manufacturing factor during this phase are shown in Table 3.5 below.

Table 3.5: Growth of the Manufacturing Sector during First Industrial Master Plan (1986-1995)

Indicators	Target*	Actual*
Gross Domestic Product (GDP)	6.4	7.8
Manufacturing value added	8.8	13.5
Share of manufacturing value added to GDP (1995)	23.9	33.1
Manufacturing exports	9.4	28.6
Manufacturing employment	6.8	8.9
Manufacturing employment (‘000 workers) (1995)	1 464.0	2 051.0

Source: The Second Industrial Master Plan Report, 1996-2005,
Ministry of International Trade and Industry, 1996
* Value in per cent per annum

The most encouraging fact was the export growth rate recorded as 28.6 percent, which was about three times the targeted rate at 9.4 percent per annum. Malaysian Institute of Economics Research (MIER 1995) reported in its ‘Human Resources Development Component Report’ that the increase in the employment rate during the period from 1990 to 1994 under the first industrial master plan (IMP1) was largely derived from the manufacturing sector when the Manufacturing sector charted the highest growth rates with an average 8 to 9 percent per annum, and the employment rate in the manufacturing sector grew by more than 10 percent per annum. The growth in employment rate in manufacturing had surpassed other sectors such as agriculture, forestry, and fishing.

The transformation of the manufacturing sector prior to 1996, from labor-intensive to technology-intensive, was governed by several factors: firstly the Malaysian infant technology base, secondly inadequate supply of skilled labor and finally commitment to new markets opening under regional trading arrangements and multilateral trading system commitments. In order to sustain high growth, the manufacturing sector has to be internationally competitive. Therefore, to respond to these challenges, in late 1996, the government launched the Second Industrial Master Plan (IMP2). Table 3.6 below shows the growth of gross domestic product, share of manufacturing value added in gross domestic products and employment rate during the second plan period.

Table 3.6: Growth of the Manufacturing Sector during Second Industrial Master Plan (1996-2005)

Indicator	Target *	Actual*
Gross Domestic Product	7.9	4.6
Manufacturing growth	9.5	6.2
Share of manufacturing value added to GDP (2005)	38.4	31.4
Total Manufactured exports	NA	11.2
Manufacturing employment	NA	4.4
Manufacturing employment ('000 workers) (2005)	NA	3 132.1

Source: The Third Industrial Master Plan Report, 2006-2020
Ministry of International Trade and Industry
* Value in per cent per annum

This master plan (IMP2) was formulated and implemented by the government for the period from 1996 to 2005. The plan contributed to further development of the sector, by strengthening industrial linkages, increasing value-added activities and enhancing productivity mainly through the industrial cluster[33] approach. Under this approach, eight industry clusters or groups are identified as growth-enhancing sectors. These clusters are electrical and electronic, textiles and apparel, chemical, agro-based products, transportation, machinery, materials products and resources-based such as wood, rubber and palm oil industries. Electrical and electronic industries for example are a cluster in a state called Penang, information and communication technology and machinery industries are a cluster in the centre of the Peninsular Island called the 'Klang Valley' meanwhile palm oil industries are a cluster in a state called Sabah. Other sub-clusters for industries such as automotive, petrochemicals, furniture, providers of maintenance, repair and overhaul services in the aerospace industry, marine and also the shipbuilding industry were developed gradually.

The cluster-based approach emphasized the growth of the manufacturing sector, together with the growth of supporting industries, which incorporated the services sector. The development of these clusters was mainly driven by market forces but also by government support and facilitation. The electrical and electronic industries for example, had the essential features of a semiconductor cluster. Within the cluster, apart from one principal industry, other supporting activities had also been established. These activities included suppliers of electronic components and providers of supporting business services. Initiatives were also undertaken to link the clusters to the global supply chain, through the implementation of a system known as the RosettaNet[34] Standard messaging system which was launched in 2002. The system acts as a medium and provides standard processes for the sharing of business information between the participating companies to create and implement industry-wide e-business standards application. Through the system, Malaysian suppliers are able to link to companies in the global electrical and electronic supply chain.

During the implementation of Second Industrial Master Plan, the manufacturing sector continued to be a major growth sector, expanding by 6.2 percent per annum, although by less than the target set at 9.5 percent per annum. The share of the sector in the gross domestic product increased from 29.1 percent in 1996 to 31.4 percent in 2005 instead of 38.4 percent targeted. The performance of the manufacturing sector was satisfactory, although the Asian financial crisis in 1998 resulted in a contraction of the manufacturing output by 13.4 percent and the sector was also affected by the cyclical downturn in the electronics sub-sector, as well as the global economic slowdown. The expansion of the manufacturing sector during the second industrial master plan had resulted in significant job creations. The sector was the second largest source of employment. Employment in the manufacturing sector registered on average annual growth of 4.4 percent per annum during the period, increasing from 2.2 million workers in 1996 to 3.1 million workers in 2005. The share of the employment in the manufacturing sector to the total employment increased from 26.2 percent in 1996 to 28.7 percent in 2005. Employment creation has become another critical aspect during the implementation of industrial master plans for Malaysia. Table 3.7 below shows the employment by economic classification from 1996 to 2005.

Table 3.7: Employment in the Manufacturing Sector (1996-2005)

Industry	1996		2000		2005	
	('000 persons)	Share (%)	('000 persons)	Share (%)	('000 persons)	Share (%)
Total employment	2203.9	100.0	2565.8	100.0	3132.1	100.0
Non-resource based	1227.6	55.7	1317.6	51.4	1628.3	52.0
Electrical and electronic	626.6	28.4	645.3	25.2	840.8	26.8
Products	177.3	8.0	193.8	7.6	282.8	9.0
Basic Metal and metal	208.7	9.5	215.8	8.4	214.8	6.9
Products	130.5	5.9	161.4	6.3	162.6	5.2
Textiles and Apparel	84.5	3.8	41.9	3.9	127.4	4.1
Machinery and equipment						
Transport Equipment						
Resource based	922.8	41.9	1186.6	46.2	1423.7	45.4
Wood products, including furniture	236.3	10.7	352.7	13.7	373.8	11.9
Chemical, fertilizer, plastics and petroleum products	184.6	8.4	238.1	9.3	327.0	10.4
Food processing, beverages and tobacco	196.7	8.9	237.7	9.3	298.9	9.5
Rubber processing and	124.0	5.6	132.0	5.1	171.5	5.5
products	95.9	4.4	121.6	4.7	137.7	4.4
Paper and paper products,						
printing and publishing	85.3	3.9	104.5	4.1	114.9	3.7
Non-metallic mineral products	53.5	2.4	61.6	2.4	80.0	2.6
Other manufactures						

Source: Ministry of International Trade and Industry Annual Report (1996-2005)

The highest employment share in the manufacturing sector during 1996 was in the electrical and electronic industries, followed by the wood and textiles industries. Meanwhile in 2005, electrical and electronic and wood industries remained the first and second largest industries in terms of the share of employment in manufacturing sector, followed by chemical industries in third place.

Between 1996 and 2005 the greatest contributor to the growth of productivity in the manufacturing sector was the telecommunication cable and wires sub-sector with more than 150 per cent, followed by the domestic appliances sub-sector with almost 70 per cent and professional and scientific equipment sub-sectors with 68 per cent. Other important sectors included other electronic components and electric power cables and wires sub-sectors. Table 3.8 below shows the productivity growth rate in the manufacturing sector from 1996 to 2005.

Table 3.8: Productivity Growth Rate for Manufacturing Sector (1996-2005)

Sub-sectors	Productivity Growth Rate (%)
Telecommunication cables and wires	152.0
Domestic appliances	69.2
Professional and scientific equipment	67.5
Other electronic components	61.2
Electric power cables and wires	29.1
Rubber gloves	20.2
Plastic extruded products	16.9
Other basic industrial chemicals	16.0
Refined petroleum products	15.1
Other rubber products	13.2
Basic industrial chemicals	13.0

Source: Department of Statistics Report (2006)

The Pace of trade liberalization during the IMP2 accelerated, with concurrent initiatives taken at the multilateral, regional and bilateral levels. Apart from multilateral negotiations under the World Trade Organization (WTO), Malaysia has participated in negotiations of free trade agreements in the areas of trade in goods, rules of origin, and investment at both regional and bilateral levels. At the regional level, Malaysia's involvement is through ASEAN, while at the bilateral level, Malaysia has concluded a bilateral free trade agreement with Japan under the Japan-Malaysia Economic Partnership Agreement, and regional agreements under the ASEAN- Republic of Korea FTA, and the ASEAN-China FTA, besides the Trade and Investment Framework Agreement (TIFA) with the USA. Hence during this phase under the implementation of IMP2 there was an increasing trend for countries to engage in bilateral and regional trade arrangements. Global challenges such as competition for foreign investment, the need to develop innovative, creative and highly skilled human capital and the need to identify and develop new sources of growth, as well as the need to achieve domestic industrial growth with equitable distribution require a more comprehensive approach in planning. Using the experience gained in implementing the previous industrial plan, the government has pursued the Third Industrial Master Plan (IMP3) from 2006 to

2020 to achieve greater industrial development and high-income country status by 2020. Table 3.9 below shows the targeted growth of gross domestic product, by sector during the third plan period.

Table 3.9: Gross Domestic Product Contribution by Sector

Sector	IMP2 Target Average annual growth (%)	IMP2 Actual (%)		IMP3 Target Average annual growth (%)
	1996-2005	2000	2005	2020
Manufacturing	38.4	31.9	31.4	28.5
Services	48.4	53.9	58.1	66.5
Non-government services	-	47.1	50.5	59.7
Government services	-	6.8	7.6	6.8
Agriculture, forestry & fishery	8.2	8.9	8.2	7.0
Mining & Quarrying	4.2	7.3	6.7	4.4
Construction	4.7	3.3	2.7	2.5
(-) Imputed bank services charges	-	7.5	9.1	10.0
(+) Import duties	-	2.2	1.9	1.1
	100.0	100.0	100.0	100.0

Source: Malaysian Ministry of International Trade and Industry (2006)

During the entire Third Industrial Master Plan (IMP3) period, the Malaysian economy is targeted to grow at an average 6.3 percent per annum and to meet this target an estimated of RM1.3 trillion of overall investment which is equal to RM84.6 billion per year is required. Total trade is targeted to grow almost 3 fold to RM2.8 trillion by 2020 from RM967.8 billion in 2005. All these figures are estimated at constant 2005 prices. Meanwhile the manufacturing sector was targeted to be the second sector in driving growth after the service sector.

3.6 Selected Issues in the Manufacturing Sector

3.6.1 Channels of Growth

During the 1980s the World Bank Report had classified the Malaysian economy as a well performing economy with outstanding gross domestic product (GDP), sectoral and social development growth. Some of the economic scholars argued that the high growth performance of Malaysia in the middle of the 1980s can be attributed to the factors such as the successful adoption of the export-oriented trade policies, massive accumulation of physical and human capital, the rapid inflows of foreign direct investment and the active influential role played by the government. As such several determinants perceived to have influence the growth of the economy have been selected for analysis. These determinants which will be known as growth channels in the rest of the papers are foreign direct investment inflows, fixed capital formation, government consumption, quality of macroeconomic policies, manufacture exports and human capital.

Economic growth’s relationship with trade openness has also seriously been investigated and debated among policy makers and economists in developing countries over the past few decades. Nair et al (2006) claimed that the impact of trade openness on an economy can be characterized into two schools of thought. Firstly, the proponents that claimed trade openness improved industrial efficiency and technical development and promotes exports and productivity. Secondly, the critics of trade openness that claimed success or failure of free trade depend on the characteristics of the host country. These characteristics include the infrastructure and level of institutional development, the innovative capability of the firms, the absorbability of human capital, and the availability of other traditional factors of production such as land and natural resources (mineral, water, forestry, food commodities, flora and fauna among others) that are used in the production.

3.6.1.1 Foreign Direct Investment

Malaysia has a long history of encouraging foreign direct investment inflows and these investments have played a prolonged and important role in the development of the economy. The contribution made by investment to growth is evident not only from the amount invested but also by its sectoral composition. Specific incentives for export-oriented industries which accumulated most of the foreign investment have been provided since the late 1960s. For example in 1968, the government enacted the Investment Incentives Act to promote manufacturing exports; these include exemptions of incentives from company tax and duty on imported inputs, relief from payroll tax, investment tax credits and accelerated depreciation allowances on investment. A study by Gan and Soon (1996) showed that the ratio of real fixed investment to GDP had increased to 44 percent by 1995 from 22 percent in the 1970s. The result showed that investment was channeled mainly into the manufacturing sector which had yielded higher returns than the agricultural sector. 50 percent of the annual increase in capital expenditure was spent by the manufacturing sector mainly on plant and machinery.

More than 60 percent of the investment in Malaysia came from foreign direct investment from its traditional trading partners such as the United States, Japan and Korea. From 1984 until 1988, the average annual flow of foreign direct investment (at constant price 1985) was about USD0.56 billion per annum whereas from 1989 to 1994, the average rose to USD3.7 billion per annum. Ariff and Chee (1987), Ariff (1991), Ishak and Rahmah (2002) and Ang (2007) concluded that foreign direct investment had contributed in bringing in modern technology and an extensive export marketing network besides closing the domestic resource gap. As a source of additional capital it has also brought along management know-how, and market access which had resulted in higher financial development and expanded the production activities in Malaysia.

Malaysia’s open policy toward trade and investment has resulted in a major contribution by foreign direct investment in capital formation and the development of the economy. Table 3.10 shows the ratio of foreign investment to gross domestic product and gross fixed capital formation.

Table 3.10: Gross Domestic Product, Gross Capital Formation, and Foreign Direct Investment Inflows (1970 – 2009)

Year	GDP (current US$)	GCF (current US$)	FDI net Inflows (current US$)	FDI as % of GDP	FDI as % of GFCF
1970	427.67	77.75	9.4	2.20	12.09
1975	989.04	252.81	35.05	3.54	13.86
1980	2493.71	746.73	93.39	3.75	12.51
1985	3177.22	912.14	69.47	2.19	7.62
1990	4402.42	1454.70	233.25	5.30	16.03
1995	8883.25	3871.87	417.82	4.70	10.79
2000	9378.97	2373.13	378.76	4.04	16.00
2005	13784.82	2830.27	396.6	2.88	14.01
2006	15652.34	3260.35	606.36	3.88	18.60
2007	18598.14	4047.65	845.56	4.53	20.90
2008	2116.08	4273.65	737.60	3.34	17.26
2009	19160.06	4538.52	160.93	0.84	3.55

Source: World Bank (1970-2009)

Between 1970 and 2009 net foreign direct investment inflows into Malaysia contributed an average of 3.43 per cent to the country's annual gross domestic product and almost 13.37 per cent of the country's annual gross fixed capital formation with the highest share in 2007. However, Malaysia's foreign direct investment regime has remained tightly regulated in the sense that all foreign manufacturing activity must be licensed regardless of the nature of the business in which it is engaged.

Foreign equity restrictions in Malaysia are not determined by law. Instead, Malaysia has 'Foreign Equity Guidelines' that can be easily changed by the government. Until 1998, foreign equity share limits were made conditional on the export performance of the foreign owned entity. The restriction was suddenly abolished by the Ministry of Trade and Industry (MITI) when the country was in dire need of foreign investment after the economic crisis in 1998. Besides abandoning the export requirement in 1998, Malaysia has, for a long time, taken steps to minimize other negative incentives, such as nationalization and appropriation, double taxation, joint venture requirement, domestic employment restrictions and restriction on remittance of profits.

Malaysia had successfully attracted massive inflows of foreign direct investment during each phase of the industrialization development stages. One of the contributing factors highlighted by the government was the country's extremely flexible investment regime that was adaptable to the specific needs of the industry or the economy. Other factors were the government's selective, but comprehensive and carefully-crafted fiscal incentives packages which served to attract foreign investment. From the middle of 1980s until 2000, electrical and electronic products were the largest recipients of the foreign investment with RM237.3 million (26 percent of total foreign investment) and RM 1020.9 million (51.5 percent of total foreign investment) in 1995 and 2000, respectively. However, the pattern of foreign inflows started to change especially after the middle 2000s when the value of inflows into industries such as electrical and electronic products and scientific and measuring instruments among others started to decline. Table 3.11 below shows the capital investment from both domestic and foreign investment by industry for 2005, 2010 and 2012 respectively.

Table 3.11: Capital Investment by Industry (2005 – 2012)

Industry	2005 Domestic Investment (RM million)	2005 Foreign Investment (RM million)	2010 Domestic Investment (RM million)	2010 Foreign Investment (RM million)	2012 Domestic Investment (RM million)	2012 Foreign Investment (RM million)
Electrical and Electronic Products	247.4	1131.8	1451.3	11842.3	734.7	3252.0
Basic Metal Products	277.4	43.1	1649.6	3595.5	1859.1	1934.0
Chemicals & Chemical Products	85.1	86.9	1094.6	1735.6	766.3	5671.2
Food Manufacturing	92.5	53.1	1224.9	1215.5	2281.4	1118.0
Scientific & Measuring Equipment	6.2	136.4	175.7	2179.8	738.4	177.1
Transport Equipment	91.2	50.3	2784.7	745.4	5931.9	1848.7
Plastic Products	58.5	59.4	524.8	255.8	401.7	707.3
Machinery & Equipment	45.7	56.9	896.6	1019.4	607.0	1243.1
Paper, Printing & Publishing	82.9	12.3	224.7	70.0	274.2	597.4
Non-Metallic Mineral Products	32.5	59.6	974.7	2237.4	321.9	310.0
Rubber Products	55.7	21.5	743.0	172.7	131.7	1218.6
Fabricated Metal Products	50.8	25.1	1004.9	1524.3	624.1	605.4
Petroleum Products (Inc. Petrochemicals)	60.1	13.3	4663.5	1089.4	4660.6	1376.8
Furniture & Fixtures	44.8	6.3	201.8	241.2	314.3	81.4
Textiles & Textile Products	22.7	14.6	125.1	500.5	143.0	328.0
Wood & Wood Products	28.3	7.7	238.9	49.3	257.6	149.8
Beverages and Tobacco	1.7	7.8	109.1	2.1	126.9	220.6
Leather & Leather Products	0.5	0.3	NA	NA	15.6	0.3
Miscellaneous	32.5	1.3	32.4	580.5	16.6	5.7
Total	1317.3	1788.2	18120.4	29056.6	20207.0	20845.4

Source: Report Performance of the Manufacturing and Service Sector (2005-2012)
Note: * no additional capital was made to the industry except for Expansion/Diversification of existing projects

These figures show a contrasting pattern to the flows of foreign investment into the manufacturing sector in the 1980s and 1990s. Malaysia as a developing country can be characterized as having both low innovative capabilities and low levels of human capital development. Therefore, the inflows of foreign direct investment were mainly to a labor intensive sector.

3.6.1.2 Gross Fixed Capital Formation

Fixed capital formation can be classified into private domestic investment and public domestic investment. Saving is an important component in domestic investment and the mobilization of savings is an important prerequisite for capital formation. Historically Malaysia had managed to sustain a high growth rate of savings between 1960 and 1980 when national savings were able to finance investment outlays without significant resource to external financing. Since the 1960s, Malaysia has saved an average of 24 percent of gross national product (GNP) per annum, reaching 31 percent per annum from 1986 to 1990. By 1996 the saving rate had increased to 38 percent of the GNP. Malaysia had consistently achieved a high rate of growth with relative price stability due to the availability of adequate saving for productive long-term investment. The World Bank (2002) recognized Malaysia’s gross national savings rate as among the highest in the world averaging 34 percent per annum of the gross domestic product, exceeding gross domestic investment by 13 percent.

The gross capital formation in both the public and private sector from 2007 to 2013 recorded a gradual increase from RM 61.8 million in 2007 to RM 108.2 million in 2013 and RM76.6 million in 2007 to RM165.7 million in 2013 respectively. The share of gross capital formation in GNI increased from 22 percent in 2007 to 28.7 percent in 2013 during this period. Despite a decrease in private sector gross capital formation in 2009 overall since 2007 until 2010 the growth rate of the gross capital formation for both public and private sector was satisfactory. Table 3.12

below shows the figures for saving and investment by the public and private sectors from 2007 to 2013.

Table 3.12: Malaysia's Saving-Investment Gap (2007-2013)

(RM million)	2007	2008	2009	2010	2011	2012	2013
Public Sector							
Savings	103,841	80,879	65,161	85,898	87,998	95,710	48,081
Gross capital formation[1]	61,816	64,834	71,670	81,238	84,395	101,523	108,198
Surplus/Deficit	42,025	16,045	-6,509	4,660	3,603	-5,843	-60,117
Private Sector							
Savings	136,753	191,583	145,443	187,032	220,265	204,199	252,404
Gross capital formation[1]	76,587	78,115	26,796	104,510	121,443	141,008	165,710
Surplus/Deficit	60,166	113,468	118,647	82,522	98,822	63,191	86,944
Overall							
Gross National Savings	240,594	272,462	210,604	272,930	308,263	299,909	300,485
(% of GNI)	38.3	38.0	31.7	35.4	35.7	33.1	31.5
Gross capital formation[1]	138,403	142,949	98,466	185,748	205,838	242,561	273,908
(% of GNI)	22.0	19.9	14.8	24.1	23.9	26.8	28.7
Surplus/Deficit	102,191	129,513	112,138	87,181	102,425	57,348	26,577
(% of GNI)	16.3	18.1	16.9	11.3	11.9	6.3	2.8

Sources: Economics Report 2007-2013
Notes: [1] including change in stocks.
Total may not add up due to rounding

The private sector registered a dramatically increased surplus trend in 2008 and 2009 compared to the public sector which experienced a first deficit in 2009, repeated in 2012 and 2013. This condition was in contrast to the period from 1992 to 1997, where the public saving-investment balance experienced an increasing surplus, while the private sector registered larger deficits. The share of Gross National Savings (GNS) decreased to 35.1 percent of gross national income (GNI) in 2013 compared to 38.3 percent of GNI in 2007. From 2007 to 2013 the highest share of the gross national saving was from the private sector, accounting for an average 70 percent of the total. The savings-investment gap in 2013 recorded a surplus of RM26.6 billion or 2.8 percent of GNI compared to a larger surplus of RM102.2 billion in 2007 which shows the decreasing trend in the ability of the economy to finance investments primarily from domestic sources.

3.6.1.3 Export of Manufactured Goods

The relative importance to growth of exports and investment was related to the phase of development in Malaysia. During the early phase of export-oriented industrialization, export was definitely the source of growth through the generation of income, diversification and deepening of industrial activities and employment creation. After 1980, investment had taken over the role, especially through public sector investment and then after 1990 the role was taken over by the private sector with the implementation of the privatization policy.

Manufactured export marked its initial stage in late 1970s with a narrow range of exports in electrical and electric items, textiles and clothing and footwear. Then, the share of electronic and electrical items in the total manufactured exports increased to 47.7 percent in 1980. Similarly, the share of textiles, clothing and footwear in total exports expanded from 5.2 percent to 12.8 percent between 1970 and 1980. Within the electronic and electrical items category, exports of electronic components alone accounted for 36.3 percent of total manufactured exports in the 1980. Nevertheless, the importance of the electronic industry as a net export earner remains suspect, since most of the firms in this industry are foreign-owned with their products having high import content[35]. Altogether the contribution of manufactured exports to total export expanded significantly from 11.9 percent to 59.3 percent between 1970 and 1980.

In the early 1980s, the government had embarked upon a heavy industrialization stage with the establishment of the Heavy Industrialization Corporation (HICOM). However, due to arguments concerning the limited domestic market, the industries which involved the manufacturing of cars[36], steel and cement and oil-refining were accorded with high level of protection for their survival. Exports of transport equipment recorded the fastest average growth of 40.3 percent per annum. The share of manufactures in export earnings increased sharply from 22.4 percent in

1980 to 59.3 percent in 1990. The share of electrical machinery in manufactured exports rose from 7.1 per cent to 26.3 per cent during 1980-1990 with the industry's contribution to manufactured exports increasing from 47.7 percent in 1980 to 56.2 percent in 1990. However, the share of electronic components in total manufactured exports declined to 24.7 percent in 1990. However, due to the data compilation problem prior to the 1990s, the complete data for exports of manufactured goods based on the classification of electrical and electronic and non-electrical and electronic products were only available from 1997.

Although there were two significant elements pointed out by the Malaysian government and the scholars during their debate about the export and economic growth nexus in the 1980s, the thrust of Malaysia's export promoting policy was to hasten the growth of exports and the diversification of export products and markets. The debates and arguments were concerning the expansion of exports[37] itself and the creation of investment[38]. Malaysia had to rely heavily on foreign participation in the early stage of the industrialization process as the economy lacked the entrepreneurial skills and technological capability needed to undertake high-risk industrial innovations. Foreign direct investment does not stimulate any growth in research and development activities through such innovations but it does act as an important determinant of international competitiveness and export diversification of Malaysian manufactured exports in terms of both the commodity and market structures.

Malaysia has been a very open economy even after independence. Manufacturing exports' contribution of total exports had amounted to an average of 81 percent from the 1980s to the 1990s. Until the late 1990s economic growth was driven by manufacturing exports, which was related directly to export-oriented industrialization and the abolition of the export duties. The ratio of total exports to gross national product (GNP) had increased to an average 82 percent per annum in middle 1990s from an average 46 percent per annum in the 1960s. Foreign direct investment played a critical role in the process of export promoting policy, and in this respect Malaysia's investment promotion and industrialization policies are closely intertwined with export promotion policies.

Between 1987 and 1995 Malaysia's export earnings increased at a rapid pace averaging 20.2 percent per annum. Meanwhile the share of manufactured exports to total exports increased from 45 percent in 1987 to 79.7 percent in 1995. In 1996, the share of the manufacturing's sector gross domestic product was 34.2 percent and its contribution to growth was 47.1 percent. International comparisons made by the World Trade Organization (1998) showed that in 1997 Malaysia was ranked the 18^{th} largest exporter in the world moving up from 22^{nd} place in 1992. The high growth rate was largely due to the sustained strength of manufactured exports, averaging 28.6 percent per annum during that period. Meanwhile in 2008, the export share had increased to almost 40 percent with the export of manufactured goods represent almost 70 percent of total export value. Malaysia was also ranked as the 18^{th} most competitive country in the global competitiveness survey[39] of 57 countries by the Switzerland-based Institute for Management Development (IMD) in its World Competitiveness Yearbook 2009. During the first seven months of 2010 a value of RM283.4 billion exports of manufactured goods were recorded which were resulted from strong demand by the ASEAN countries as well as export to major destinations, particularly China, Japan and the United States at that particular time.

According to the report of International Trade Statistics (2013), despite the weak global demand and declining global price, Asia's export of manufactured goods in 2012 increased to 4.4 trillion and the value expanded by 3 percent. As a result, Asia's share in the world export of manufactured goods increased to 38 percent and Malaysia was ranked at the 10^{th} place of top exporters of integrated circuits, telecommunication and office equipment with total value of USD62.0 billion. Given the challenging external environment, particularly lower global demand for manufactured goods and softening prices, export of manufactured goods grew by 10.6 percent per annum with an average of 60 percent of the total export share. The value of manufactured goods export as at August 2013 was RM41.96 billion with the major export products including electrical and electronic products, refined petroleum products, liquefied natural gas, chemicals and chemical products and palm oil which show a major decrease as compared to the value accumulated in 2010. Table 3.13 below shows the exports of manufactured goods by export items classification from 1997 to 2013.

Table 3.13: Export of Manufactured Goods (1997-2013)

Year	1997		2000		2010		2013	
Exports Item	RM (million)	% of total exports	RM (million)	% of total exports	RM (million)	% of total exports	RM (million)	% of total exports
Electronics & electrical machinery & appliances	**119025**	**70.9**	**148937**	**71.4**	**146200**	**51.6**	**150883**	**43.3**
Semiconductors	40887	24.4	}		57565	20.3	69081	19.7
Electronic equipment and Parts	39888	23.8	} 108282	51.9	58558	20.7	50179	14.6
Machinery and electrical products	38248	22.8	40655	19.5	30076	10.6	31623	9.0
Non-electrical & electronics	**48863**	**29.1**	**59697**	**28.6**	**137153**	**48.4**	**198279**	**56.7**
Chemicals, chemical and plastic products	8137	4.8	11010	5.3	27110	9.6	35843	10.4
Petroleum products	3372	2.0	6369	3.0	16830	5.9	41775	11.6
Iron, steel and metal Products	5661	3.4	5857	2.8	15457	5.5	22605	6.3
Machinery and equipment	NA	NA	NA	NA	12784	4.5	17612	5.2
Wood products	6489	3.8	6630	3.2	8032	2.8	8646	2.5
Textiles, apparel and Footwear	7616	4.5	7258	3.5	5446	1.9	6672	1.9
Food, beverages and tobacco	3723	2.2	3720	1.8	10129	3.6	14623	4.3
Rubber products	3959	2.4	3201	1.5	9233	3.3	12608	3.7
Transport equipment	4959	3.0	1926	0.9	6295	2.2	6409	1.9
Non-metallic mineral products	1709	1.1	1705	0.8	2809	1.0	3520	1.0
Other manufactured goods	3238	1.9	12021	5.8	23029	8.1	27966	8.1
Total	**167888**	**100.0**	**208634**	**100**	**283353**	**100.0**	**349162**	**100.0**

Source: Economic Planning Unit Report (1997-2014)

The figures in table 3.13 show that in 1997 and 2000 the export of electronics and electrical products; such as semiconductors, electronic equipment and parts and machinery and electrical products; contributed more than 70 percent of the total export. However, the share of these categories recorded a downward trend in 2010 and 2013. On the other hand, the share for non-electrical and electronic products showed a dramatic increase from 29 percent in 1997 to 56.7 percent in 2013.

Traditionally, Singapore, Japan and the United States are Malaysian's major export markets, accounting for approximately 50 percent of its exports since 1970. In 2000, they continued to account for more than 52 percent of Malaysian exports. Singapore was Malaysia's largest export market in 1970 and remained so in 1993, accounting for about 22 percent of the exports. Japan was Malaysia's second largest export market in 1970; however the position was taken by the United States in the 1990 and Japan remained as third in the major export destinations until the present. By 2000, the United States had overtaken Singapore with 21 percent, leaving Singapore at 18 percent, and Japan at 13 percent.

Since the manufactured exports have increased substantially, some major characteristics in terms of their composition have been identified. Specifically, most of the manufactured exports have been in the form of intermediate manufactured goods, whose share increased from 23 percent in 1970 to 49 percent in 2000. The exports of machinery and transport equipment increased from 2 percent in 1970 to 25 percent in 2000. According to the World Bank, the share of export of high-technology products was approximately 44.5 percent of the total manufactured products in 2010. High-technology products are products with high research and development intensity such as in aerospace, computers, pharmaceuticals, scientific instruments and electrical machinery. On the other hand, Malaysian exports of final manufactured goods were still relatively small contributing only 8 percent of the total exports in 2000.

Empirical findings pertaining to Malaysia had shown that exports had led economic growth. Ariff and Hill (1985) concluded the importance of government policies which were designed to promote manufacturing exports in the success of export-led growth. Warr (1987) concluded that manufacturing exports contributed to income and employment growth. Ariff (1994) concluded that there was a significant positive relationship between Malaysian gross national product (GNP) and exports for the period 1970 to 1991. A similar conclusion was obtained by Athukorala and Menon (1997) who studied the association between growth and the degree of export orientation. Lee (1997) concluded that export growth has had significant effects on the growth of Malaysian gross domestic product.

3.6.1.4 Government Consumption

Another significant factor that has contributed to the growth of the economy is the size of the expenditure by the government. Most government expenditure on goods and services is on items not sold in markets but valued at the price the government pays for them. The calculation of government spending for gross domestic product purposes excludes transfer payments and interest payments on the debt.

The relationship between government expenditure and economic growth has continues to generate debate among the scholars. Some scholars argue that increase in government expenditure on socioeconomic and physical infrastructures encourages economic growth. For example, government expenditure on health and education raises the productivity of labor and increases the growth of national output. Similarly, expenditure on infrastructure such as roads, communications, power and others, reduces production costs, increases private sector investment and profitability of firms, thus fostering economic growth. Supporting this view, scholars such as Abdullah (2000), Al-Yousif (2000), Ranjan and Sharma (2008) and Cooray (2009) concluded that expansion of government expenditure contributes positively to economic growth.

But others assert that higher government expenditure may slow down the overall performance of the economy. For instance, in an attempt to finance rising expenditure, government may increase taxes and borrowing. Higher income tax discourages individuals from working for long hours or searching for jobs and this in turn reduces income and aggregate demand. Similarly, higher tax tends to increase production costs and reduce investment expenditure as well as the profitability of firms. Moreover, if government increases borrowing (especially from the banks) in order to finance its expenditure it will compete against (crowd-out) the private sector, thus reducing private investment. Furthermore, in a bid to score cheap popularity and ensure that they continue to remain in power, politicians and governments officials sometimes increase expenditure and investment in unproductive projects or in goods that the private sector can produce more efficiently. Thus, government activity sometimes produces misallocation of resources and impedes the growth of national output. In support of this argument, studies by Laudau (1986), Barro (1991), Engen and Skinner (1992) and Folster and Henrekson (2001) conclude that large government expenditure has a negative impact on economic growth.

3.6.1.5 Quality of Macroeconomic Policies

Macroeconomic stability is important in inducing growth by reducing price uncertainty and moderating public deficit and debt levels (Fisher 1993) and the effects of certain policy variables such as an increase in investment have a permanent effect on the aggregate growth rate (Jones 1995).The objectives of macroeconomic policy should include a wide range of indicators such as economic growth and stabilization (short term and long term), stable prices, distribution of income and wealth, broad social goals such as income security, average standard of living, the quality of public services, full employment, education and training, universal health care, and the management of economic growth. These objectives vary according to the political priorities of the governments and the financial and economic condition of the country; however the macroeconomic performance of any one nation is affected by events, policies and shocks in other countries. In a more liberalize and sophisticated economy, the degree of economic freedom is also perceived to be another measurement of the quality of macroeconomic policies. The degree of economic freedom (or autonomy) that policy makers have depends on the economic circumstances of the time and also the extent to which a country is locked into a set of institutions. The soundness of macroeconomic policies should be judged by their efficacy in meeting all the above mentioned objectives.

Our study has employed an Index of Economic Freedom as a proxy for the quality of macroeconomic policy. The specific definition of economic freedom justified by the Heritage Foundation 2008 report and the Fraser Institute 2013 report is "The highest form of economic freedom provides an absolute right of property ownership, fully realized freedoms of movement for labor, capital, and goods, and an absolute absence of coercion or constraint of economic liberty beyond the extent necessary for citizens to protect and maintain liberty itself.[40]" The index components also suggest that countries with higher levels of economic freedom will have greater absorptive capacity in the sense of reaping more benefits from foreign direct investment spillovers, besides having less regulation which in general will be good for economic growth.

The most common index used by empirical researchers is the one constructed by the Fraser Institute. The Fraser institute lists five areas or components of the index of economic freedom namely the size of the government, freedom to trade internationally, legal structure system and security of property rights, access to sound money and regulation pertaining to credit market, labor market and business. Size of government includes components such as government spending, transfer and subsidies and revenue generated from taxes, private investment and enterprises. This area will be excluded from the analysis since it has been explained in the previous part of this chapter and is included under the government consumption growth channel. The next area is freedom to trade internationally. Trade freedom is a composite measure of the absence of tariffs, non-tariff barriers and black market exchange rates that affect imports and exports of goods and services. Since the components under freedom to trade internationally are similar to the trade liberalization components, this area will also be excluded from the first regression model. The trade liberalization variable will be regressed in the second model pertaining to the impact of trade liberalization on the industrial growth channels.

The legal structure system and security of property rights variables measure the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It includes areas such as judicial independence, impartial courts, protection of property rights, military interference in rule of law and politics, integrity of the legal system and legal enforcements of contracts among others. The protection of the legal system and property rights is an integral element of economic freedom. Countries providing better protection of property rights are expected to benefit more from multinational corporations (MNCs') presence because they are more likely to encourage MNCs to expand their research and development activities locally besides attracting foreign direct investment of higher technology content. MNCs have been linked to superior technologies, patents, trade secrets, brand names, management techniques and marketing strategies.

Access to sound money means absence of price controls and inflation both of which distort market activity and is essential to protect property rights. This area includes money growth, standard deviation of inflation and freedom to own foreign currency bank accounts. The last area relates to regulations pertaining to the credit market, labor market and business. Under this area, credit market regulations include regulatory restraints, extent of credit supplied to private sector and controls on interest rates that limit the freedom of exchange in the domestic credit market. Labor market regulations include employment laws for hiring and firing of employees. If these laws are very restrictive, managers and workers who were trained by MNCs with new technology or management activities techniques may find difficulties in joining local firms and this could limit the spillover effects from foreign direct investment through labor mobility. Meanwhile, business regulations are quantitative measures of the ability to start, operate, and close businesses that represent the overall burden of regulation as well as the efficiency of government in the regulatory process. As explained previously, our analysis will employ three of the components as the proxies for the quality of macroeconomic policy. These components are legal structure system and security of property rights, access to sound money and regulations pertaining to credit market, labor market and business.

3.6.1.6 Human Capital

The general definition of human capital is individual capabilities, knowledge, skills and experience of employees and managers of a firm or institution. The scope of human capital is actually broader than human resources. 'The concept and perspective of human capital stem from the fact that there is no substitute for knowledge and learning, creativity and innovation, competencies and capabilities; and that they need to be relentlessly pursued and focused on the firm's environmental context and competitive logic' (Rastogi, 2000).

Theories of international specialization point to human capital accumulation as another important determinant of growth. Starting from the 1980s, there has been an upsurge in empirical research on the subject. The main issues analyzed are whether higher levels of education or greater improvements in education are associated with faster output growth. So far, empirical studies have shown mixed results when looking at the cross-country evidence and this been attributed to factors such as difficulties when specifying cross-country growth regression. This studies include Temple (1999), Durlauf et al. (2005), Krueger and Lindahl (2001), Cohen and Soto (2001), Fuente and Domenech (2001, 2005), Hanushek and Kimko (2000), and Barro (2001).

The emphasis on knowledge is important, and though the human resources literature has many things to say about knowledge, the debate is traditionally rooted in an individual level perspective, chiefly concerning job-related knowledge, whereas the human capital literature has moved beyond the individual to also embrace the idea that knowledge can be shared among groups and institutionalized within organizational processes and routines (Wright et al. 2001). Under Malaysia's five-year development plans, education and training are accorded high priority in national development. At present, there are 20 public and 18 private universities and as well as more than 500 colleges, polytechnics and industrial training institutes that offer courses leading to certificate, diploma, degree or post-degree qualifications. The educational institutions set up by the private sector[41] have played an important supplementary role to the government's efforts in generating a larger pool of professional and semi-professional workers.

Educational institutions generate a large pool of professionals with degree and post-graduate qualifications. The Human Resource Development Fund (HRDF) was launched in 1993 to encourage training, retraining and skills upgrading in the private sector. Employers in the manufacturing and service sector who contribute to the fund are eligible to apply for grants to defray or subsidize the costs incurred in training and retraining their workforces. The Department of Skills Development (DSD) which was established in 2006, formerly known as the National Vocational Training Council under the Ministry of Human Resources, coordinates the setting up of all public and private training institutions, evaluates the demand for existing and future skills, identifies future vocational and industrial training needs and will continue to develop standards under the National Occupational Skills Standards (NOSS).

Besides the increasing number of public training institutions, collaborative efforts between the government, enterprise and foreign governments have resulted in the establishment of several advanced skills training institutes such as the German-Malaysian Institute, Malaysia France Institute, British Malaysia Institute, Malaysian Spanish Institute, and Japan Malaysia Technical Institute among others. The Malaysian government encourages[42] companies to give practical training to all the labor forces so that the employment pattern will reflect the multi-racial composition of the country. In such cases where there is a shortage of trained Malaysians, companies are allowed to bring in expatriate personnel[43] whether for permanent posts known as 'key posts' or for posts for a specified time known as 'time posts'. A 'key post' is a high level managerial post which is essential for companies to safeguard their interest and investment. On the other hand, 'time posts' can be executive or non-executive posts.

During the period of the economic "boom" from 1988 to 1996, due to the rapid growth in the manufacturing sector, the Malaysian workforce's costs were competitive compared to other countries in the Asia. Claimed by the government, backed by their continued support of human resource development in all sectors, the quality of Malaysia's workforce[44] is one of the best in the region. However, after the 1997/98 Asian financial crisis until the present, the percentage of skilled workers in relation to the total workforce was on average 25 percent per annum which is low when compared to a country such as Singapore (51.9 percent). Realizing the fast changing requirements of high skilled workers, starting from 2009 the government has implemented an Economic Transformation Program

(ETP) with one of the pillars being to enhance the workforce of the country in order to achieve a high-income country by 2020. One of the approaches under the pillar is to increase the enrolments of school leavers into the Technical and Vocational Education and Training (TVET) courses.

3.6.2 Imported Inputs

One of many important aspects in the growth of the Malaysian economy is related to the content of imported intermediate inputs which influences the growth of the manufacturing industries. Sub-industries such as the electrical and electronics industries were classified with a high content of imported inputs as early as the 1970s. A high imported input content can be translated into being highly dependent on the foreign produced inputs. Since the end of 1980s Malaysia had depended mostly on high technology industries and according to the Malaysia Investment Development Authority (MIDA), a majority of the investment approved projects between the ends of 1980s until present were in the high technology industries. For example since 2012 until present the investment approved projects were concentrated in the aerospace, semiconductors, solar, machinery and equipment, biotechnology, petroleum and petrochemical products and medical devices industries.

High technology refers to products and services that embody advanced technologies and have a high level of research and development intensity. High technology industry generally covers sub-industries such as pharmaceuticals, office, accounting and computing machinery, radio, television and communications equipment, medical precision and optical instruments, aircraft and spacecraft. Based on the experience of developed countries, high technology manufacturing is able to contribute to higher output growth and capabilities of stimulating structural change in the economy by creating externalities for other sectors in the economy towards higher value added activities where it establishes strong linkages with the other sectors of the economy.

Alavi (2013) criticizes that due to high dependence of imported inputs in the major high technology export industries, the Malaysian manufacturing sector after decades of operation has faced several major challenges which have depressed the economy. These arguments are against the hypotheses that we have discussed on the earlier part of this thesis (hypothesis R1 and R2 which assumed that imported inputs are good for the growth of both industries and firms). Previous study by Alavi (1999) also explained that a large number of exporting manufacturing firms in Malaysia have more than 80 percent of imported input content. Another study by Malaysian Institute of Economic Research (MIER) researchers in 2012 found that more than 50 percent of the Malaysian manufactured exports' value comes from the high-technology products which are highly dependent on imported technology, inputs and design. High imported input content contributes to low value added, low research intensity and low level of patenting activities in the offshore subsidiaries because core technology and high value-added production stages are usually controlled by the MNCs in the originating country.

Study by Aun (2013) on value creation in Malaysia shows that the high-technology share of total manufacturing exports declined in the 2000s and that manufacturing productivity growth has shown a dramatically slowing down trend from the 1990s to the present. As such, some of the challenges highlighted by economists include low value added in the high technology dependence industries, which also contributes to the second challenge of losing their competitiveness to the other Asian neighboring countries such as Thailand and Vietnam, and lastly the challenge faced by Malaysia on how to enhance and create value in the manufactured products trade so that the country can ensure sustainable economic growth and achieve high-income country status by 2020.

Our study perceives that it is therefore very important to have a clear picture of the current dependent state of these industries on foreign intermediate inputs so as to make suggestions to the government and policy makers for relevant action plans. Therefore, this chapter will discuss the content of imported input content in the high technology sub-industries. It will further focus on the structure of the ownership. Besides that the importance of imported inputs in determining revenue in the manufacturing industries is also discussed at firms' level.

3.6.2.1 Imported Inputs in the Manufacturing Sector

Malaysian manufacturing exports depend highly on the imports of intermediate inputs, especially in industries such as electronics, textiles and machinery equipment. The Malaysian government has implemented various economic policies with intent to reduce dependency on importation of goods especially for consumption. The first phase of the import substitution policy from 1958 until 1967 was implemented especially for this purpose. In 1967 the Malaysian government established an institution known as the Malaysian Industrial Development Authority (MIDA). MIDA and its industrial strategy served as the conduit to reduce dependency on imported inputs and in turn encourage the utilization of domestic inputs through the enforcement of the Investment Act (1986). The institution also served to invigorate the manufacturing sector especially by segregation of resource and non-resource based industries.

This segregation is important to identify the inputs usage for these industries separately. It also serves as a tool to identify significant industries in each group based. The utilization of domestic inputs is usually associated with resource based industries and the utilization of imported intermediate inputs is usually associated with the non-resource based industries (Sulaiman, 2012). However, the encouragement of the utilization of domestic inputs by the resource and non-resource based industries is due to several reasons. Firstly, to increase the domestic value-added production in both resource and non-resource based industries. Secondly, the resource and non-resources based industries need to create intense linkages between economic sectors especially between manufacturing and agricultural sectors. Besides, the efforts to promote domestic inputs utilization will create and encourage the linkages between foreign and local industries, particularly in relation to small and medium industries (SMIs), since these foreign industries have been given incentives to encourage the use of domestic inputs in their production activities. Lastly, use of domestic inputs can improve the deficit in current balance of payment by reducing the leakages arising from the dependency of imported inputs. Table 3.14 below shows the classification of industries according to resource based and non-resource based industries group.

Table 3.14: Classification of Industries

Classification by Base	
Resource based industries	**Non-resource based industries**
Vegetables, animals oils and fats	Textiles, wearing apparel and leather
Other food processing, beverages and tobacco	Electronics
Rubber processing and products	Basic metal industry
Paper and paper products, printing and publishing	Metal products
Industrial chemicals, fertilizers and plastic products	Transport equipment
Wood products including furniture	Manufacture of machinery (except electrical)
Petroleum products, crude oil, coal	Electrical machinery
Non-metallic mineral products	
Off-estate processing	

Classification by Orientation	
Domestic-oriented industries	**Export-oriented industries**
Food products, beverages and tobacco	Electrical and electronic products
Paper and paper products	Rubber products
Plastic products	Wood and wood products
Chemical and chemical products	Textiles, wearing apparel and leather
Transport equipment	Petroleum products
Basic metal and fabricated metal	Machinery and equipment
Non-metallic mineral	Scientific instruments
	Off-estate processing

Source: Department of Statistics, Malaysia

Resource based industries comprise 22 subsectors of the manufacturing sector such as food processing, beverages and tobacco, rubber processing, paper products, industrial chemical, petroleum products and non-metallic mineral products among others. Non-resource based industries consist of 9 subsectors such as textiles and apparel, electronics, basic metal industry, transport equipment and electrical machinery among others. The table also depicts classification by orientation which shows that domestic oriented industries comprise 7 subsectors such as food products, plastic products, chemical products, basic metal and fabricated metal among others and export-oriented industries consist of 8 subsectors such as electrical and electronic products, rubber products, wood products, petroleum products and scientific instruments among others.

During the implementation of the first phases of import substitution policies the imports of consumer goods declined from 46.7 percent in 1961 to 28.3 percent in 1970. On the other hand the imports of intermediate and capital goods increased significantly from 28.4 percent to 37.6 percent and 17.1 percent to 32.4 percent respectively**.** This reflects the industrial policy which has supported local industries producing consumer goods for domestic market, but with increasing utilization of imported inputs.

The success of the first phase of import-substituting industrialization policies is reflected in the reduced need to import consumption goods. Imports of consumption goods as a proportion of total imports decreased from 46.7 percent in 1961 to only 28.5 percent in 1970. The share of investment goods in total imports expanded from 17.1 percent in 1961 to 25.2 percent in 1970, while that of intermediate goods rose from 28.4 percent to 35 percent. The share of consumption goods in total imports continued to slide to 18.4 percent in 1980 while those of investment goods and intermediate goods expanded to 30.0 percent and 49.9 percent, respectively. The imports of consumption goods exhibited some resurgence in the 1980s, plausibly due to the government's policy of liberalizing such imports.

The first phase of the import substitution policy was subsequently followed by the second phase of the import substitution policy from 1981 until 1985 which emphasized the reduction of imported inputs used in the manufacturing sector especially for the assembly activities comprised of intermediate inputs. Between 1972 and 1992 intermediate imports for manufacturing expanded at a moderate pace of 17.4 percent per annum (Economics Report: 1993/94). Both import substitution policies were exclusively undertaken to develop local industry especially for small and medium scale industries (SMIs) as well as handing out incentives to foreign companies to raise this utilization of domestically produced inputs.

One of the earliest empirical investigations pertaining to the imported input dependency level in the Malaysian manufacturing sector was conducted by Alavi (1987). The findings shows that resource based industries such as agriculture-based food products, wood and wood products, rubber and rubber products, petroleum refining and non-metallic metal products industries had procured most of their inputs from local producers and utilized a small imported input content. However in the foods processing, beverages and tobacco sector dependency on imported inputs existed and varied widely among the industries. For example the dairy products sub-industries utilized 42 percent of imported inputs, flour mills 62 percent, sugar refinery 78 percent, animal feed products 37 percent and cigarette manufactures 50 percent. Table 3.15 shows the imported input content in Malaysian manufacturing sector in 1987.

Table 3.15: Imported Inputs Content in the Manufacturing Sector (1987)

	Inputs content (%)		
	From ERP study		From Bank Negara
Industry	**Imported**	**Domestically Procured**	**Imported**
Food, Beverages & Tobacco	27	73	n.a
Textiles & Apparel	96	4	80-90
Wood & Wood Products	1	99	5-20
Paper & Paper Products	62	38	50-70
Chemical & Chemical Products	82	18	90-95
Petroleum and Products	0	100	n.a
Rubber and Products	23	77	20-30
Non-metallic metal products	26	74	n.a
Metal Products	64	36	80-90
Electrical and Electronics	98	2	80-85
Transport and Equipment	91	9	40-50
Others	53	47	n.a

Source: Alavi (1996)

In 1987, most of the intermediate goods imported were industrial supplies such as metal, fuel and lubricants, parts and accessories of capital goods (except transport equipment). These were amongst the intermediate goods required as parts of the material input for the production of non-resource based industries. Since the 1980s the growing industrial production has had a profound effect on the structure of imports. The share of intermediate goods in the gross import continued to increase from 45.5 percent in 1980 to 73.8 percent in 2000. This represented 79 percent of total intermediate inputs or 36 percent of total imports, reflecting the increasing dependency on imported inputs by the export oriented industries at that particular period (Sulaiman, 2012). During this period the intermediate inputs imported mainly comprised of electronic components which recorded the largest expansion and accounted for more than a fifth of the total increase in imports of intermediate goods.

An empirical analysis by Sivarajan (2012) shows that from 2000 to 2005, there was a positive relationship between usage of imported input and the share of export in the Malaysian manufacturing sub-industries. The findings shows that from 69 sub-industries analyzed, almost 50 percent of the sub-industries could be categorized as high import intensity industries and the highest ranking sub-industries were semi-conductor devices and tubes and circuit boards followed by the office accounting and computing machinery industries in second place and petroleum refinery industries in third. The study classified industries which imported more than 50 percent of their inputs as high import intensity industries.

The Central Bank reported that heavy dependency on imported raw materials and machinery had resulted in an increase in the current account deficit to 5.9 percent of GDP in 1997. Substantially, as discussed above, the largest share of foreign direct investment is concentrated in non-resource based industries. These reflect one of the major problems in the development of the manufacturing sector, that is, the rather weak links forged with the domestic economy. The other major problem lies in the narrow industrial base with the export of manufactured goods concentrated in the electrical and electronic as well as the textile sectors. By 2005 the share of imports in intermediate inputs had decreased slightly to 71.0 percent, a fall of the capital goods sector from 15.1 percent in 2000 to 14.0 percent in 2005. Although the reduction of imported capital goods and imported consumption goods has decreased from 2000 to 2005, it was most likely that a reduction in these two imported goods has been replaced by increasing high shares of imported intermediate goods. Table 3.16 below further illustrates the share of imported goods, real gross domestic products and trade indicators in percentages between 1980 and 2005.

Table 3.16: Share of Imported Goods, Real GDP Growth and Trade Indicators for Malaysia (1980-2005)

Indicators	1980	1985	1990	1995	2000	2005
Capital goods	37.5	31.2	35.5	41.6	15.1	14.0
Intermediate goods	45.5	46.8	41.5	40.8	73.8	71.0
Consumption goods	18.0	21.0	21.9	16.5	5.6	5.7
Dual use goods	na	Na	Na	na	2.0	2.6
Others					1.5	1.7
Import for re-exports	2.0	0.7	1.1	1.1	2.0	5.0
Real GDP growth rate (%)	7.4	-1.1	9.0	9.8	8.8	5.2
	1980-1989		**1990-1999**		**2000-2005**	
Average real growth rate	4.8		7.3		5.2	
Trade balance (RM million)	5.2	8.9	7.1	0.2	79.1	125.6
Current account balance (RM million)	-0.6	-1.7	-2.5	-18.7	32.0	75.7
Current account (as % of GDP)	-1.2	-1.9	-2.1	-9.7	9.4	14.8
Import (as % of export)	81.3	77.1	90.7	99.9	78.8	76.7

Source: Sulaiman (2012)
Figures in percentage

Malaysia experienced a continuous deficit in its current account[45] balance, increasing from 2.1 percent in 1990 to 9.7 percent in 1995, and having a surplus only in the late 1990s. Total imports as percentage of total exports had recorded values larger than 75 percent over the same period, peaking at more than 80 percent in 1995. On average the percentage of imported inputs from 1980 to 1995 was lower than 45 percent, meanwhile from 2000 until the present the percentage has increased gradually which supports the initial argument of high dependency upon foreign inputs in the Malaysian manufacturing sector. Since manufacturing goods contributed a large amount of the Malaysia's exports, it can be concluded that the exports of the manufacturing sector contained a high content of imported raw materials. Table 3.17 below shows the content of capital, intermediate and consumption goods imported by Malaysia between 2006 and 2012.

Table 3.17: Capital, Intermediate and Consumption Goods (2006-2012)

Year	Import/GDP (%)	Capital Goods (%)	Intermediate Goods (%)	Consumption Goods (%)
2006	95.1	15.02	78.74	6.24
2007	96.7	15.28	78.40	6.32
2008	104.6	14.52	78.76	6.71
2009	114.2	16.67	75.36	7.97
2010	117.7	15.57	77.16	7.27
2011	118	15.81	76.09	8.09
2012	119	18.76	72.35	8.89

Source: Department of Statistics (2006-2012)

Table 3.16 suggest that intermediate goods show the highest import content among the three components, at more than 70 percent of the total import compared to 20 percent content of capital goods and less than 10 percent content of consumption goods. The highest percentage of intermediate inputs imported was 78.76 percent in 2008. It also shows that the trend of both capital goods and consumption goods has been moderate. By contrast, the import of investment goods experienced a slight down-trend in their share over the period 1985-1988, reflecting the decline in the inflow of foreign direct investments. Gross imports of goods by economic function from 1960 until 1990 are shown in Table 3.18.

Table 3.18: Gross Imports of Goods by Economic Function (1961-1990)

Year **Imports**	**1961**	**1965**	**1970**	**1975**	**1980**	**1985**	**1990**
Total Import (RM million)	2815.7	3356.1	4288.4	8530.4	23451.0	30437.8	79120.1
Consumption*	46.7	42.3	28.5	22.2	18.4	21.0	16.0
Investment*	17.1	21.2	25.2	31.7	30.0	31.2	37.8
Intermediate*	**28.4**	**29.7**	**35.3**	**41.4**	**49.4**	**47.0**	**45.5**

Source: Ariff and Chye (2003)

Notes: * Percentages do not add up to 100, as the table excludes the category of 'imports for re-exports'.

The figure in Table 3.18 above show that the share of imported intermediate inputs initially had increased from 28.4 percent in 1961 to 49.4 percent in 1980. The main imported item was the thermionic valves and tubes followed by industrial supplies. However, in 1990 the intermediate inputs share had declined slightly to 45.5 percent. Table 3.19 shows the gross import for capital goods, intermediate goods and consumption goods from 2000 until 2010 with detail classification of the import items.

Meanwhile Table 3.19 below presents the gross import of capital, intermediate and consumption goods from 2000 to 2010. The share of intermediate inputs declined from 73.7 percent to 68.6 percent with the main imported item being the thermionic valves and tubes followed by industrial supplies. On the other hand the share of consumption goods recorded a gradual increase from 5.6 percent in 2000 to 6.7 percent in 2010.

Table 3.19: Gross Import by End Use (2000-2010)

Imports Item / Year	2000 RM million	Share (%)	2005 RM million	Share (%)	2010 RM million	Share (%)
Capital goods	**30861**	**15.1**	**33186**	**13.7**	**42344**	**14.0**
Capital goods (except transport equipment)	29056	14.2	30015	12.4	37392	12.4
Transport equipment (industrial)	1805	0.9	3171	1.3	4952	1.6
Intermediate goods	**151019**	**73.7**	**174436**	**71.8**	**207140**	**68.6**
Food and beverages, primary and processed mainly for industry	2519	1.2	4873	2.0	9452	3.1
Industrial supplies, primary and processed	46347	22.6	56471	23.2	77228	25.6
Fuel and lubricants primary, processed, others	7705	3.8	14711	6.1	21409	7.1
Parts and accessories of transport equipment	2787	1.4	6979	2.9	7384	2.4
Parts and accessories of capital goods (except thermionic valves and tubes)	30009	14.6	32397	13.3	32529	10.8
Thermionic valves and tubes	61651	30.1	59005	24.3	59138	19.6
Consumption goods	**11510**	**5.6**	**13736**	**5.7**	**20062**	**6.7**
Food and beverages, primary and processed, mainly for household consumption	4162	2.0	5273	2.2	8666	2.9
Transport equipment (non-industrial)	59	0.03	162	0.06	348	0.1
Other consumer goods	7289	3.6	8301	3.4	11048	3.7
Durables	1442	0.7	1927	0.8	2528	0.8
Semi-durables	3091	1.5	2555	1.0	3224	1.1
No-durables	2756	1.3	3819	1.6	5297	1.8
Other (including dual use goods)	**7337**	**3.6**	**10763**	**4.4**	**11332**	**3.8**
Imports for re-exports	**4159**	**2.0**	**10958**	**4.5**	**21013**	**7.0**
Total	**204886**	**100.0**	**243079**	**100.0**	**301890**	**100.0**

Source: Malaysia Economic Report (2000-2010)

By 2014 the overall growth of the economy had strengthened in tandem with better prospects of international trade growth and strong domestic economic activities. This was strongly supported by stable commodity prices and resilient domestic demand since 2011. Gross exports in 2014 had rebound on a rate of 2.3 percent supported by stronger regional demand for resource-based products and consumer electronic products. From being the world’s largest producer of rubber and tin in the 1960s, Malaysia at present is one of the world’s leading exporters of semiconductor devices, computer hard disks, audio and video products and room air-conditioners. Meanwhile during the same period, gross imports had expanded 3.4 percent as a result of continuous strong import of consumption and capital goods and as import of intermediate goods increased in tandem with higher manufacturing activities.

Unrestrained and high importation of raw materials for the chains of production in non-resource based industries can exert pressure on a country’s current account. In fact, a current account deficit has been a major concern particularly since imported raw materials create huge leakages and heavy financial burdens in terms of acquiring machines, parts and technology due to lack of spillover, capital and knowledge effects in these industries. Despite the leakage created by import of intermediate goods the economy had benefited from an increase in the domestic content of net manufactured exports and development of linkages between large export-oriented multinational corporations and locally owned companies especially during the 1970s and 1980s. The ten sub-industries with the highest import leakages identified by the government are iron and steel, petrol and coal products, electricity and gas, household machinery, industrial chemical, paper and board, animal feeds, radio and television and communication equipment (Hamid 2013). Generally since the early 1980s resource based industries have registered a more than 60 percent share of domestic inputs and less than 40 percent imported input content. On the other hand, non-resource based industries have shown less than 50 percent of domestic input and more than 50 percent of imported inputs used. This shows that the contents of imported inputs are used extensively in non-resource based industries where the foreign direct investment inflows are also very high. Table 3.20 below shows the improvement in productivity according to the type of input utilized from a study by Sulaiman (2012). The analysis was constructed from the 2005 Input-Output table. They represent the productivity improved since 1983 until 2005 in resource and non-resource based industries, due to utilization of domestic and imported intermediate inputs in their production.

Table 3.20: Productivity Improved by Input Content Used (1983-2005)

Industry	1983-1987	1987-1991	1991-2000	2000-2005
	Domestic Intermediate input (%)			
Resource based industries	19.7	0.7	10.2	12.9
Non resource based industries	40.1	35.5	6.0	12.7
Weighted average in resource and non- resource based industries	22.2	20.6	17.2	13.1
	Imported intermediate input (%)			
Resource based industries	22.6	14.7	19.5	2.7
Non resource based industries	50.4	25.3	36.7	2.4
Weighted average in resource and non- resource based industries	37.0	20.2	27.2	0.7
	Total input			
Weighted average in resource based industries	13.0	8.0	14.3	6.7
Weighted average in non-resource based industries	46.1	32.9	30.0	4.3

Source: Sulaiman (2012)

The figures show that in the 1980s, the improvements in productivity for non-resource based industries are higher than 45 percent especially in industries that utilize imported intermediate input. However, the industries experienced decreasing productivity improvement from 1987 to 1991. From 1991 to 2000, the productivity in these non-resource based industries improved again. On the other hand, productivity improvement in the non-resource based industries that utilize domestic input have experienced gradually decrease during these period. As such, from 2000 to 2005, productivity improvement in both resources based and non-resources based industries that use imported intermediate input have declined majorly.

3.6.2.2 Ownership in the Malaysian Manufacturing Sector

Massive actions have been taken by the government mainly through the Malaysia Investment Authority Development (MIDA) to ensure that Malaysia will be profiled as an ideal place for high-value added business. After a few years of extensive efforts, the government has perceived that Malaysia has gained an enviable reputation as a global and regional hub for manufacturing and services attracting quality investment that will accelerate the country's shift to high value-added, high technology, knowledge intensive and innovation-based industries before achieving the government vision of a high-income[46] country by 2020.

The largest foreign participation in the manufacturing industries in 2012 was by Japan with total investment value of RM 2.9 billion, followed by Saudi Arabia with investment amounting to RM2.6 billion, Singapore with RM2.2 billion, the People's Republic of China with RM 2 billion and the Republic of Korea with RM1.6 billion. These five countries jointly accounted for 53.8 percent of total foreign investment approved. Japan's investment projects came from transport equipment sub-industries such as manufacture and assembling of passenger cars, SUVs, 4x4s, light truck eco tyres, besides polyimide film. Meanwhile Saudi Arabia invests in chemical products industries such as manufacture of polycrystalline silicone, sodium hydroxide chlorine, hydrogen, hydrochloric acid, silicon tri-chloride and other chemicals.

The high-technology industries which contribute to the growth of the manufactured exports include the electrical and electronic industries, medical industries, oil and gas and the aerospace industries among others. Electrical and electronic industries have been the largest contributors to the manufactured exports since the 1970s, with 112 new projects with investment amounting to RM3.9 billion in 2012. Most of the biggest investment projects in all the sub-industries under electrical and electronic sub-industries (RM3.2 billion or 82.1 percent of the total) were owned by foreign entities. For example in the electronic components sub-industries only one project, with investment value of RM68.3 was jointly owned while the rest of the projects approved were foreign owned, while all approved projects under consumer electronics sub-industries were foreign owned. Similarly, the biggest investment projects in the industrial electronics sub-industries (RM 165 million) and in the electrical sub-industries (RM 1200 million) were also foreign owned.

The government encourages companies in the engineering support industries to move up the value chain by providing financial and non-financial facilities, advisory and consultant services for high-technology industries such as semiconductors, machinery and transport equipment, medical, oil and gas and aerospace sub-industries. The initiatives also include strategies such as identifying new ideas and emerging technologies, innovative activities, improving design activities and implementing more efficient processes. These are in line with the country's effort to become the preferred location for global engineering outsourcing. However, in 2012, most of the engineering support industries projects that were approved are companies owned by Malaysians. Meanwhile, the basic metal products industry in Malaysia has played a major role in the development of the manufacturing and construction industry. Here the share of foreign-owned firms in approved projects is intermediate between the figures for electronics and engineering. In 2012, a total of 96 new projects were approved with 52 of them and 50.9 percent of the investment of from foreign investors and 44 of them (49.1 percent) from domestic investors. From the discussion of the approved projects in the selected industries, mainly related to electrical and electronic which is the major contributor to manufacturing growth, we can concluded that foreign entities have played a major role in the development of high technology products manufactured in Malaysia. This indirectly reflects that there is also a very high content of imported inputs in these industries.

3.6.2.3 Trade Liberalization and Imports

Trade comprises imports and exports; both are beneficial for firms, countries and global economic performance. Imports can improve firm productivity and export competitiveness, and trade growth can contribute to global economic growth. The key to how imports improve productivity and competitiveness is trade in intermediate goods and services. Analysis by Organization for Economic Co-Operation and Development (OECD) shows that trade in intermediates dominates trade flows representing 56 percent of trade in goods and 73 percent of trade in services in OECD countries. Europe, Asia and North America are the most important traders of intermediate goods. Asia is a net exporter of intermediate goods to Europe while Europe is a net exporter to North America. The largest inter-regional flow of intermediate goods is actually exports from the Middle East and North Africa to Asia which relates to primary resources, such as oil or gas. The opposite pattern occurs for services, with Europe a net importer of intermediate services from North America. Intra-regional trade is generally higher than inter-regional trade, indicating the importance of regional production networks. This is because intermediate imports are very sensitive to trade costs. Major emerging economies are well integrated into global production networks, with intermediates exceeding 70 percent of total goods imports. This provides benefits both to domestic economies and to those with whom they trade. Brazil, China, India and Indonesia each has a share of intermediates in total imports of more than 70 percent which is above the OECD average of 56 percent.

The positive relationship between tariff protection and the level of fabrication has been argued to be one of the important reasons behind the high imported input dependency. The structure of tariff protection induced resources to flow to finished products industries rather than to intermediate product industries. This has prevented the development of strong backward linkages and the deepening of the industrial structure. Malaysian governments should consider this high dependency on intermediate inputs trade when formulating trade policies as the implementation of the two phases of export oriented industries strategy had worsened the situation further. Industries which are situated in the Free Trade Zones and other export-oriented industries are allowed to import intermediate inputs duty-free. This policy militates against the export-oriented industries buying locally produced inputs.

3.6.3 Intra Industry Trade

Intra-industry trade particularly related to trade in merchandised goods has been recognized as another channel for Malaysian growth. Intra-industry trade is generally classified as a simultaneous export and import of similar types of goods or services belonging to the same industry, thus representing the exchange of these products ‘within’ rather than ‘between’ industries. The phenomenon of intra-industry trade first received attention in the 1960s in studies by Verdoorn (1960) and Balassa (1966) following international trade problems accompanying the economic integration during the formation of the European Economic Community (EEC) in 1958. The European Economic Community had to deal with problems such as to settle the disputes between member countries, to gradually eliminate tax barriers and tariffs within and between the member countries and to equalize the tariffs and taxes on imports for all member countries. Some of the approaches taken during this revolution were to specialize within industries and to increase two-way international trade, where certain developed countries exported and imported the same product categories. Later, the concepts were properly developed and these concepts; later known as intra-industry trade; had increased the trade flows among the European countries.

In the middle of the 1970s, Grubel and Lloyd (1975) provided the definitive empirical study on the importance of intra-industry trade and how to measure it. Solid theoretical foundations for explaining intra-industry trade came later in the 1980s and the 1990s with the new literature and were broadly based on a monopolistic competition framework. The hot empirical debate regarding trade among the industrial countries had pointed to three stylized facts about international trade. Firstly, much of world trade is between countries with similar factor endowments. Secondly, the trade between similar countries is largely intra-industry in character; it consists of two-way trade in similar products. Lastly, much of the expansion of trade in the post-war period has happened without sizeable reallocation of resources or income-distribution effects[47]. The first and second stylized facts according to Krugman (1981) were first explained by Kravis (1971). The third stylized fact was resolved with the argument that income-distribution effects are outweighed by the gains from a larger market when countries are sufficiently similar.

The nature of trade depends on how similar countries are in their economic or market size. As countries become more similar, the trade between them will increasingly become intra-industry in character. Intra-industry trade also depends on the existence of factor endowments and economies of scale in production. Economies of scale in production lead each country to produce only a subset of the products within each group. Thus when similar countries have an incentive to trade, their trade will typically be in products produced with similar factor proportions; and this trade will not involve the income-distribution effects characteristic of more conventional trade. Therefore, the presence of economies of scale in countries with similar factor endowments enables intra-industry trade. In other words, specializations of inter-industry trade which reflect the importance of comparative advantage come hand in hand with intra-industry specialization which reflects scale economies. The effect of opening trade depends on its type. If intra-industry trade is sufficiently dominant, the advantages of extending the market will outweigh the distributional effects, and the owners of scarce as well as of abundant factors will be better off. Similarity in economic or market size can also represent similarity in demand structures i.e. customers' taste and preferences for a diversity of products.

Generally, there are two types of intra-industry trade namely horizontal intra-industry trade (HIIT); which refers to the simultaneous exports and imports of good classified in the same sector and at the same stage of processing; and vertical intra-industry trade (VIIT); which refers to the simultaneous exports and imports of good classified in the same sector but at different stages of processing. HIIT is based on product differentiation. An example is Malaysia's simultaneous import and export of mobile phones in the final processing stage. As these mobile phones are produced using similar technology and provide similar functions, they are classified in the same sector. While VIIT is likely to be based on the increasing ability to organize 'fragmentation' of the production process into different stages, each performed at different locations, this taking advantage of the local conditions. For example, Malaysia imports technology-intensive automobile components and uses its abundantly available labor force to assemble these components in the labor-intensive final production stage, before the automobile components (as part of finished components) are exported again to the United States and Japan. However, this thesis only focuses on the analysis of total intra-industry trade instead of disentangling it into the two main types. Hence the total intra-industry trade which will be referred to as intra-industry trade which will be addressed through the rest of the chapter.

3.6.3.1 Malaysian Intra-Industry Trade Experience

The Malaysian economy has always been trade dependent, influenced by both its major trading partners and by commodity prices. The rising share of manufactures in the total exports of Malaysia for more than three decades was proven to be a result of the growing volume of intra-industry trade flows.

Ariff (1991) had estimated these indexes using the Grubel and Lloyd index. These indexes show the share of total trade that consists of two-way exchange of products within the same industry classification. The indexes indicated significant increase in Malaysia's intra-industry trade with all its major partners such as the United States, Japan, Canada, Australia, New Zealand, NIEs and ASEAN. The study further noted that Malaysia's trade with the US, the Northeast Asian NIEs, and the ASEAN partners was particularly significant with intra-industry trade indexes increasing from 3.8 percent to 64.8 percent, 12.5 percent to 43.1 percent and 45.8 percent to 70.0 percent from 1970 to 1987, respectively. Meanwhile, the study concluded that the intra-industry trade was unimportant with respect to Malaysia's trade with Japan. The growing importance of intra-industry trade from 1970 to 1987 was attributable largely to the activities of MNCs. The study also indicated that the bulk of the intra-industry trade consisted of intra-firm sales. The MNCs operating in Malaysia had generated both exports and imports through their international investment and trading networks. For example, the United States and Japanese firms in the electronics industry have developed complex production networks that span several countries in the Asia-Pacific region. Table 3.21 present the indexes at the three-digit SITC level for each of Malaysia's major trading partners since 1970 until 1987.

Table 3.21: Intra Industry Trade Indices for Selected Trading Partners (1970-1987)

Year / Trading Partner	1970 (%)	1975 (%)	1980 (%)	1985 (%)	1987 (%)
United States	3.8	43.0	12.2	61.1	64.8
Japan	1.6	10.5	9.7	16.8	21.7
Canada	4.7	12.9	50.2	18.5	15.6
Australia	10.2	24.4	32.0	25.2	24.3
New Zealand	19.2	13.4	17.9	10.9	24.3
NIEs	12.5	25.5	27.2	33.1	43.1
ASEAN	45.8	51.9	72.7	70.7	70.0

Source: Ariff and Chye (2003)

3.7 Conclusion

This chapter has thoroughly discussed the background of the Malaysian economy covering the framework, the development phases, the economy's structural transformation, the role played by industrialization activities and various policies related to the economy. The structure of the economy has evolved from being highly dependent on two primary commodities, rubber and tin, to an extensively industrialized economy specializing in production of semiconductor devices and electrical and electronics products. This transformation was due mainly to massive efforts made by the government to formulate and implement a series of development plans ranging from short to long-term. Various policies and incentives have been undertaken and various institutions have also been established to support and enhance the growth and development of the economy.

The success story of Malaysian industrialization dates back to the adoption of two strategies, namely the import substitution industrialization strategies and the export oriented industrialization strategies, which have been implemented hand-in hand and overlap each other. The success can also be attributed to massive inflows of foreign direct investment as a result of attractive investment packages and promotions and also due to consistent efforts made by the government. The growth and development of the manufacturing industries has contributed to sustainable and significant growth of the Malaysian economy from as early as in the 1980s, during the period of the first industrial master plan, and continued to excel in the second master plan until the present. Growth in the manufacturing industries has also generated growth in exports and has increased the population's standard of living through creation of employment opportunities.

Despite, massive growth of the manufacturing industries, there are some pressing issues which need to be tackled in order to improve or at least sustain the flourish growth that has been enjoyed so far. One of the issues is related to identifying new growth channels which can be enhanced to promote future growth of industries. These channels need to be specially addressed in order to improve the contribution of industry, and especially that of the export-oriented industries. Another issue is related to high dependency of the industries on imported input content especially in the high-tech export related industries. Great dependency on imported inputs which is not accompanied by transfer in know-how and technology or spillover effects could result in depressed growth in the related industries. In addition to the above mentioned issue, another important issue is related to the growing share of intra industry trade and its role in shaping the trade of manufactured goods in Malaysia. Empirical literature has shown that the share of intra industry trade between Malaysia and its trading partners, especially Japan and China, is increasing. As such, it is important to identify factors which determine the growth of this kind of trade. The issues highlighted above should be paid more attention in order to improve and sustain the contribution of the manufacturing sector especially in generating growth in exports and employment.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

This section address in detail the methodology for each issue as outlined in the first chapter. It can be divided into three sections which specify three main model specifications for regression analysis, namely the growth channels analysis, the imported inputs analysis and the intra-industry trade analysis. The chapter also explained the variables selected for the regression analysis and the sources for the data. The last part of the section clarifies the tools and statistical estimation techniques used for analysis. The model specification for each section is constructed based on the panel data literature with the assumptions of a two-way error components model.

The sub-section for all the three issues pertaining to Malaysian manufacturing industries will include a detailed explanation of the model specification for each issue that has been developed based on previous theoretical and empirical studies. Beside that the discussion will also include the description and sources of each of the data that have been used and also an in-depth analysis of the issues specified for each chapter, five, six and seven, in the later sub-section part. The impact of trade liberalization on growth in chapter five will be measured through the proxies for trade openness of tariff and non-tariff barriers. This sub-section will also determine the method of analysis using panel data which in this case has the properties of a short time period with a larger dimension of individual data namely the industries.

4.2 Hypotheses Development

To answer the research questions and address the research objectives, several hypotheses have been developed. These hypotheses are arranged according to the three issues as highlighted in the previous chapter.

4.2.1 Growth Channels Hypotheses

The formulation of hypotheses related to the effect of foreign direct investment on the growth of industrial output is based on the arguments in the endogenous growth theory. According to the endogenous growth theory the impact of foreign direct investment is expected to be twofold. Firstly, foreign direct investment via technological upgrading and knowledge spillover is expected to be growth enhancing by encouraging the incorporation of new inputs and foreign technologies into the recipient industries. In this condition foreign direct investment is claimed to have a direct impact on economic growth by increasing the productivity of the physical capital in the recipient economy which would lead to increased efficiency of production. Secondly foreign direct investment through knowledge transfer is expected to augment the existing stock of knowledge in the recipient country through labor training and skill acquisition. Therefore foreign direct investment is claimed to have an indirect impact on the economic growth by inducing human capital development and promoting technological upgrading. As such based on these theoretical arguments, foreign direct investment inflow is assumed to have a positive impact on economic growth.

Empirical studies pertaining to the impact of foreign direct investment on the Malaysian economy are massive. The studies include by Hussin et al. (2013), Masron et al. (2012), Ismail and Lazim (2012) and Kogit et al. (2010). Hussin et al. (2013) investigate the determinants of Malaysian economic growth at aggregate level and one of the determinants included in this study is the foreign direct investment inflows. The study used a time series data from 1970 to 2010 and employed Johansen and Juselius's co-integration approach. The Vector Error Correction model (VECM) results show that foreign direct investment has a significant but negative impact on economic growth in the short run while the Granger causality test result shows that there is no relationship between FDI and economic growth in the long run. They concluded that one of the possible explanations for the short run results is due to the high import content of Malaysian export products, thus giving a negative impact on the economic growth while the long run results was due to FDI being not correlated to economic growth in the long run. Similarly, Kogid et al. (2010) investigate the relationship between FDI and Malaysian economic growth at aggregate level from 1971 to 2009 using the Johansen VECM approach. The results show that there exists a co-integration relationship between FDI and economic growth in the long-run, however the relationship is negative. Their findings also show that in the short-run, foreign direct investment had Granger caused economic growth in Malaysia. They conclude the negative co-integration relationship was due to the utilization of net FDI (the difference between FDI inflows and FDI outflows) as the explanatory variable and the result was due to domination of FDI outflows over FDI inflows.

Meanwhile, Masron et al. (2012) investigate the role of foreign direct investment at a sub-sector level. This study employed correlation analysis to investigate the extent of spillover effects of FDI within the manufacturing sector in Malaysia over the period from 1999 to 2004. The hypothesis stated in this study is that the positive value of the correlation coefficient demonstrates positive spillover effects and conversely the negative coefficient may potentially suggest a crowd-out effect from the FDI inflows. The results show that positive spillover effects exist in 14 out of the 19 sub-sectors analyzed while the rest of the sub-sectors were adversely affected by the inflows of FDI. The positive spillover effects occur in sub-sectors such as food and tobacco products, textile and wearing apparels products, rubber products, and non-electrical machinery products, among others. However, this study did not identify the channels (technological upgrading and knowledge spillover or human capital development) through which this positive spillover effect occurred. On the other hand, the crowding out phenomenon occurs in sub-sectors such as wood products, petroleum and coal products, metal products, electrical machinery products and other transport equipment sub-sectors. They concluded that the crowding out phenomenon might occur due to several reasons. One possible explanation is that the openness or liberal economic policies which favor MNC's could allow MNC's to outsource their inputs from other efficient countries such as Thailand, Viet Nam and Indonesia, leading to negatives consequences for the Malaysian manufacturing sectors. Another possible explanation of the negative spillover is that while FDI enhances the productivity of firms receiving FDI (foreign-owned firms), it has depressed the non-FDI receiving firms (domestic-owned firms). This means that firms in industry with high FDI involvement tend to enjoy positive spillover effects, and vice versa. Meanwhile a study by Ismail and Lazim (2012) found that there exists a long-run positive causal relationship between foreign investment and capital formation in Malaysia whereas in the short-term the findings revealed a bi-directional causality between the two economic indicators. Therefore based on the theoretical discussion and empirical results above, the first hypothesis that will be tested is:

Hypothesis A1: Foreign direct investment has a positive relationship with industry growth.

Next, our study chose gross fixed capital formation as the second explanatory variable. Both neoclassical and endogenous growth theory stress the importance of capital accumulation in long-run economic growth. Based on constant returns to scale assumption in neoclassical growth theory, growth can be achieved in the short run through a higher rate of saving which will result in a higher rate of capital formation. Gross capital formation is assumed to affect economic growth in the same way as foreign direct investment which is by increasing both the amount and the productivity of physical capital stock in the economy.

Empirical studies pointing to the impact of capital formation on the Malaysian economy are scarce. Among others, they include studies by Hussin et al. (2013) and Hussin and Saidin (2012). Hussin et al. (2013) investigate the relationship between gross fixed capital formation and economic growth in Malaysia from 1970 to 2010. The study employed the Johansen and Juselius co-integration approach to measure the long run relationship between the variables. The causality test shows that gross fixed capital formation does not Granger cause economic growth and that the actual causality is the inverse: growth in the Malaysian economy determines growth in gross fixed capital formation. On the other hand, the co-integration results show that gross fixed capital formation plays a significant positive role to stimulate economic growth in Malaysia in the long run, but not in the short run. Next, another study by Hussin and Saidin (2012) who examine the impact of fixed capital formation on Malaysian economic growth from 1981 to 2008. However, in this study Malaysia is analyzed as a panel or pooled data together with 3 other ASEAN countries; Indonesia, Thailand and Philippines. This analysis was conducted using three static model estimations; pooled model, fixed effects model and random effects model. The findings show that gross fixed capital formation has a positive relationship with economic growth in all countries including Malaysia. Therefore the second hypothesis that will be tested is:

Hypothesis A2: Gross capital formation has a positive relationship with industry growth.

The hypothesis for government consumption's impact on growth is based on theoretical arguments which have been set out in chapter two. In brief, the nature of a link between government consumption and economic growth is not clear since an increase in government consumption may enhance economic growth by injecting purchasing power into the economy. On the other hand it may reduce the productivity growth rate by crowding out private investment. Empirical studies related to the impact of government consumption on Malaysian economy include studies by Kogid et al. (2010) and Sinha (1998) among others. Kogid et al. (2010) investigate the determinants of economic growth in Malaysia from 1970 to 2007. The study uses the co-integration analysis and causality approach of Johansen and ECM. The findings show that there are long-run co-integration and short-run causal relationships between government expenditure and economic growth in Malaysia. They concluded that whether government consumption affects economic growth positively or negatively depends on the consumption decision made by the government which changed every time when the yearly budget was formulated. Meanwhile, Sinha (1998) examines the relationship between government expenditure and economic growth in Malaysia from 1950 to 1992. The findings show that there was a long run positive relationship between government consumption and economic growth. However looking at the causality relationship, the Granger causality test shows that there is no causality relationship between the two variables in either direction which means that increases in government consumption do not cause growth in the Malaysian economy from 1950 to 1992. They concluded that the difference occurred due to the transformation of the data where the co-integration test was performed on the level data while the causality test was performed on the first difference data. Based on the above discussion, the relationship between the government expenditure and industries growth, either positive or negative, will depends on the spending decision made by the government. Therefore the third hypothesis that will be tested is:

Hypothesis A3: Government consumption has a positive/negative relationship with industry growth.

Macroeconomic policy can be defined as a set of government policies, rules and regulations to control or stimulate the aggregate indicators such as national income, inflation and the unemployment rate to meet the economic objectives at macro level. In Malaysia the macroeconomic policy is based on fiscal and monetary policies besides the exchange rate policy. Traditionally according to the

Keynesian approach, these policies are the effective tools used for macroeconomic management. The objectives of macroeconomic management in Malaysia are to achieve rapid, sustained and non-inflationary growth rather than the traditional macroeconomic objective of stabilization. In a sustainability perspective, radical and proactive government policies are required to achieve economic development that is socially just and ecologically sound. Good governance and well managed economic resources are also important in order to sustain economic growth. Therefore our study believes that the objectives of macroeconomic policy should include a wide range of indicators such as average standard of living, universal health care, distribution of income and wealth, broad social goals such as income security, the quality of public services, education and training, full employment and not just be focused on the aspect of economic growth and stabilization. We perceived that another suitable instrument to represent the above mentioned objectives is by using the index of economic freedom as proxies. Based on the discussion above the relationship between the quality of macroeconomic policy and growth of the industry is expected to be positive. The fourth hypothesis that will be tested is:

Hypothesis A4: The quality of macroeconomic policies has a positive relationship with industry growth.

Malaysia adopted the export-led growth approach in the 1970s. The implementation of export-oriented strategies has resulted in a rapid growth of the Malaysian economy with a widely held view that such growth is driven by exports particularly of manufactured goods. The number of empirical studies related to the relationship between trade (export) and economic growth is enormous. Ab. Rashid and Ab. Rahim (2014) examine the relationship between exports and economic growth in Malaysia by classifying the trade characteristics into two; export-led growth (ELG) and growth driven export (GDE). This study used 30 years of annual data, from 1981 to 2010, and employed the Johansen co-integration and Granger causality tests. The co-integration results show that there exists a long run relationship between exports and economic growth. However, the Granger causality results show that it was economic growth that caused growth in exports during the period of study and that a causal association does not exist in the inverse direction. They concluded that the result failed to support the export-led growth hypothesis and that was because the Malaysian government has to protect domestic markets in order for them to achieve comparative advantage and economies of scale. Meanwhile, Kogid et al. (2010) investigated the relationship between exports and economic growth in Malaysia at aggregate economic level from 1970 to 2007. The study shows that there exist positive long-run co-integration and short-run causal relationships between export and economic growth in Malaysia. They concluded that more emphasis should be accorded to exports when drafting future economic policies. Therefore the fifth hypothesis that will be tested is:

Hypothesis A5: Manufactured export has a positive relationship with industry growth.

Our hypothesis for human capital is based on the assumptions made in endogenous growth theory. Human capital corresponds to any skills and stock of knowledge that accumulates over time in the labor force which is either innate or acquired and according to the endogenous growth models labor that is educated, healthy, talented and skilled will be productive and be able to use capital and technology more efficiently. This will lead to rapid and long sustainable high growth performances. Increases in human capital have played a significant role in driving economic growth because human capital is an important input into the production process. Hence, the relationship between human capital and growth of the industry is expected to be positive. Meanwhile the standard approach in labor economics views human capital as a set of skills or characteristics that increase a worker’s productivity. Generally there are two main sources of human capital: firstly through formal education from learning accumulated at school and secondly through training and learning by doing which includes knowledge generated by spillover effects. Based on the discussion above, our study has chosen the secondary school enrolment as a proxy of human capital since secondary school education is the highest level of education obtained by majority of Malaysian citizens.

Empirical studies pointing to human capital's impact on economic growth for Malaysia are rich. These include among others studies by Sieng and Yusoff (2014) and Ab. Karim and Ahmad (2012). Sieng and Yusoff (2014) investigate the short run and the long run relationship between human capital and economic growth in Malaysia for the period from 1981 to 2010. The study employed co-integration and Autoregressive Distributed Lags (ARDL) estimation techniques. The results show that in the long run labor force education level has an impact on Malaysian economic growth however the results are insignificant in the short run. Among all education levels tested, labor force with secondary and tertiary education level contributed positively to economic growth, while labor force with primary education level has an insignificant positive impact. They concluded that investment in human capital through the secondary and tertiary education level are crucial to stimulate the growth of the economy.

Meanwhile, Ab. Karim and Ahmad (2012) examine the components of human capital and their role in achieving sustainable industrial development in the Malaysian manufacturing sector. They developed a single-equation regression model to analyze the data for the manufacturing sector which covers the period from 1981 to 2010. Three variables are selected to represent the components of human capital. The findings show that based on the elasticity values calculated, employment components has the highest elasticity in contributing to the share of gross domestic product (GDP) of manufacturing sector. It is followed by labor productivity and human capital investment in education and health components. Since the duration of study covers the implementation of both the first and second industrial master plan (1986-1995; 1996-2020) where the export-oriented strategies are seriously emphasized, they concluded that the increase in global market competition has pushed Malaysia to give greater attention to the development of its human capital. To sustain the development of the manufacturing sector, the quality of the labor force should be improved through greater investment allocation in education, training and health. Therefore the sixth hypothesis that will be tested is:

Hypothesis A6: Human capital has a positive relationship with industry growth.

Since to date there is no empirical study which analyzed specifically the relationship between foreign direct investment inflows, fixed capital formation, government consumption, quality of the macroeconomic policy, exports of manufactured goods and human capital with growth at industry level, especially for the manufacturing sub-industries, we believe our study is crucial and could make contribution to the empirical literature.

Based on a compelling message from most empirical literatures, the general relationship between trade openness and economic growth is assumed to be positive. Performances of countries actively involved in foreign trade indicate significant changes and growth over the past decades. Such economic growth and policies changes are reflected in the performance of the Asian Tigers (Singapore, Taiwan, Hong Kong and South Korea) and the recent growth of giant economies India and China. Experiences of these countries indicate that trade liberalization through both technological progress and technical efficiencies have a positive and significant impact on economic growth. Gains from trade through cheaper imported inputs obtained from reducing tariffs on inputs can raise industry productivity particularly through quality effects and foreign technology embodied in the inputs. Ulasan (2012) claimed that researchers cannot rely on a theoretical framework to synthesis the nature of the relationship since theories do not provide a decisive answer to the trade-growth relationship. Therefore the only option is to deal with the matter empirically.

Empirical studies conducted by Dollar (1992), Sachs and Warner (1995), Edwards (1998), Frankel and Romer (1999), Willard (2000) and Lopez (2005) among others have provided evidence in favor of a positive impact that trade openness has had on economic growth. Again, following the study by Wacziarg (2001), we have chosen the same six growth channels to determine the impact of trade liberalization on industries' output growth. Therefore, the first and second hypotheses for trade liberalization that will be tested are:

Hypothesis TL1: Openness to trade has a positive causal relationship with industries' output through government expenditure.

Hypothesis TL2: Openness to trade has a positive causal relationship with industries' output through the quality of macroeconomic policies.

The relationship between trade liberalization and foreign direct investment is assumed to be positive. Trade liberalization and foreign direct investment which raises competition and increases the efficiency of the industrial sectors are important to enhance the sectors' growth and attract more technological innovation and spillovers. An empirical study by Dutta and Ahmad (2004) shows that trade sector policies which support foreign direct investment have a long run positive relationship with industrial sectors' growth. Meanwhile Oyamada (2003) found that trade liberalization between Japan and the ASEAN 4 countries increased the foreign direct investment in the Multi-National Enterprises (MNEs) operating in the partner countries. Furthermore, the increase in foreign direct investment does not reduce the domestic production volume of the MNEs either in Japan or the ASEAN 4 countries. Similarly, Liargovas and Skandalis (2011) show the importance of trade liberalization in attracting foreign direct investment into developing countries.

Since direct analysis of the relationship between trade liberalization and capital formation in Malaysia is limited and most existing analysis emphasizes the effects of trade liberalization on economic growth as a whole, we perceive that it is important to investigate this concern. Although the empirical findings pertaining to the relationship between foreign direct investment and capital formation for Malaysian are not massive, based on the discussion which indicates that trade liberalization has a positive impact on foreign direct investment and foreign direct investment has a positive impact on capital formation, this thesis will test the assumption that the relationship between trade liberalization and capital formation for Malaysia is also positive. As such, the next hypotheses for trade liberalization that will be tested are:

Hypothesis TL3: Openness to trade has a positive causal relationship with industries' output through foreign direct investment.

Hypothesis TL4: Openness to trade has a positive causal relationship with industries' output through gross capital formation.

Empirical studies by Barua and Chakraborty (2006), Smith (1970) and Tybout (1992) show that trade liberalization reduces the costs of production and increases the industries' output and export performances. Similarly, Dutta and Ahmad (2004) have shown that there exists a long run positive and stable relationship between trade liberalization and exports, besides a long run positive relationship between trade liberalization and secondary school enrollment as a proxy for human capital. Similarly Chaudhry et al. (2010) and Karimzadeh (2013) find both short run and long run co-integration and causal relationships between trade liberalization and human capital in Pakistan and India, respectively. Their findings show that causality runs from trade liberalization and human capital to economic growth. Based on these arguments the next hypotheses for trade liberalization that will be tested are:

Hypothesis TL5: Openness to trade has a positive causal relationship with industries' output through the manufactured exports.

Hypothesis TL6: Openness to trade has a positive causal relationship with industries' output through human capital.

Again, since there is also no empirical study which analyzed specifically the relationship between trade liberalization with growth through the foreign direct investment inflows, gross capital formation, government expenditure, quality of the macroeconomic policy, exports of manufactured goods and human capital channels, at industry level for the manufacturing sector, we believe our study is crucial and could make contribution to the empirical literature.

4.2.2 Imported Inputs Hypotheses

Within the endogenous growth framework preferential policies toward foreign direct investment rest on the assumption that foreign direct investment generates externalities in the form of technology transfer which include management methods, new products and processes. Indirectly this leads to an involvement of foreign entities (ownership) over the economy. Altomonte et al. (2008) empirically found that the firms participating in international networks are on average more productive than the non-participating firms. Using data of 35,000 Italian manufacturing firms operating in the period from 1996 to 2003, the study found that import penetration of inputs positively matters for productivity growth and is larger in firms operating in the up-stream industries compared to firms operating within-industries. Findings by Kasahara and Rodrigue (2006) indicate that becoming an importer of foreign intermediates improves productivity through better resource allocation and that importing firms accumulate more capital and are less likely to exit the industry than non-importers. However, Zeile (1998) has expressed his concern about the outsourcing of intermediate inputs among the foreign-owned manufacturing where he believed that these foreign-owned manufacturing affiliates may contribute to increase import dependency in the intermediate product sectors.

Malaysian manufacturing industries consist of more than 80 percent foreign entities and it is believed that these industries have been massively outsourcing their inputs. Further discussion pertaining to the dependency of Malaysian industries on imported inputs will be discussed in the next chapter. Other issues that have raised concern especially for most developing countries such as Malaysia include the penetration of the domestic market, reduction in domestic employment, and competition for factors of production between foreign and domestic firms since it is perceived that foreign-owned manufacturers relying on foreign sources for their intermediate inputs might impede the development of the indigenous suppliers through backward linkages. Since the 1970s, Malaysia has been relying on more than 60 percent foreign inputs in its manufacturing process especially in the electrical and electronic sub-sector. The dependency has been continuing and increasing since then until now with huge dependency existing in high-technology industries such as petrochemical and automotive among others.

Therefore, this thesis saw the urgency of investigating this situation by analyzing sub-industries and firms from the manufacturing sector. To develop the first hypothesis, we postulate that, similar to the discussion in the early part of this chapter, foreign investment will contribute to the transfer of technological progress and innovation besides the growth of physical capital stock. Hence, this means that through adoption and imitation of imported technologies, industries in recipient countries can take advantage of research and development (R&D) abroad to improve their production efficiency. Therefore, importing intermediate goods that embody R&D from an industrial country can significantly boost a country’s productivity (Helpman, 1995; Helpman and Hoffmaister, 1997). Countries those are more open to trade benefit more from foreign R&D because they are better able to access improvements in technology by importing intermediate goods. Based on the above discussion, we perceive that indirectly type of ownership will have an effect on the growth of an industry or firm which is why we will be carrying out separate analyses of Malaysian and non-Malaysian owned entity. Therefore, the hypotheses for both industry and firm that will be tested are:

Hypothesis R1: Imported input content has a positive relationship with the growth of the industry.

Hypothesis R2: Imported input content has a positive relationship with the growth of the firm.

Besides the content of imported inputs which is assumed to have its influence on the growth of both industry and firm in the manufacturing sector, we believe that industry and firms' growth are also determined by other characteristics. These characteristics which include capital expenditure, research and development and human capital education attainment are included in the regression as control variables.

An equally important hypothesis concerns the relationship between trade liberalization and the use of imported inputs in the production process. Amiti and Konings (2007) stated that cheaper imported inputs can raise the productivity of firms via learning, variety, and quality effects and a fall in input tariffs can lead to a productivity gain for firms that import their inputs. Similarly, according to Goldberg et al. (2009) an important consequence of the input tariff liberalization in India was to relax technological constraints through firms' access to new imported inputs that were unavailable prior to the liberalization. As such, the imported intermediate inputs gained from reducing tariffs on these inputs can raise industry productivity through quality effects and foreign technology embodied in the inputs. In this study the openness to trade measured by tariff and non-tariff barriers, is expected to be positively associated with the volume of imported inputs used by the industry or firm. Therefore, the hypotheses for both industry and firm that will be tested are:

Hypothesis R3: Openness to trade has a positive relationship with the content of imported inputs used in the industry.

Hypothesis R4: Openness to trade has a positive relationship with the content of imported inputs used in the firm.

Since to date, there is also no empirical study which has analyzed specifically the relationship between the imported inputs with growth at industry and firms' level as well as the relationship between trade openness with imported inputs at industry and firms' level particularly in the manufacturing sector, we believe our study is crucial and could make a contribution to the empirical literature.

4.2.3 Intra Industry Trade Hypotheses

Empirical study examining intra industry trade determinants for Malaysia's manufacturing sector solely is scarce and most of the existing studies focus on explaining the trade pattern between Malaysia and her trading partners. Since there are no empirical studies which analyzed specifically the relationship between trade determinants and the share of intra industry trade particularly at specific manufacturing industry level, we believe our study is crucial and could make a contribution to the empirical literature.

The development of the first and second hypotheses is based on the theoretical discussion of economic or market size of a country on page 52 in chapter two. Average economic size of two trading countries, proxies by average of GDP per capita, is chosen to evaluate the potential market size of a country which was seen to be a determinant of the extent of economies of scale and the variety of differentiated products. Based on the discussion above, we assume that the potential share of intra-industry trade is expected to be positively related to the average economic size of the two countries. Following this assumption, the first hypothesis that will be tested is:

Hypothesis Q1: The higher the average economic size of two trading countries, the higher the share of intra-industry trade.

Meanwhile difference in economic size of two trading countries proxies by difference in GDP is chosen to evaluate the difference in demand structure for products. Therefore, the second hypothesis that will be tested is:

Hypothesis Q2: The greater the differences in the economic size of two trading countries, the lower the share of intra-industry trade.

The lowest value of per capita gross domestic products and the highest value of per capita gross domestic products between the trading countries are included into the study as proxies to capture the relative size effects of the trading countries. Consistent with the hypothesis of a positive correlation between the share of intra-industry trade and similarity in gross domestic products (factor endowments), Helpman (1987) and Hummels and Levinshon (1995) assume a positive sign for the relationship between the lowest value of per capita gross domestic products with the share of intra industry trade. Meanwhile, consistent with the hypothesis that the more similar countries are in economic dimension, the greater the share of intra-industry trade between them and the smaller the share of inter-industry trade, Helpman (1987), Hummels and Levinshon (1995) and Greenaway et al. (1994) assume a negative sign for the relationship between the highest value of per capita gross domestic products with the share of intra industry trade. Therefore the third and fourth hypotheses that will be tested are presented as:

Hypothesis Q3: The greater the lowest value of gross domestic product of two trading countries, the higher the share of intra-industry trade.

Hypothesis Q4: The greater the highest value of gross domestic product of two trading countries, the lower the share of intra-industry trade.

According to the standard theory of foreign direct investment developing economies rarely possess the technology to produce high-tech commodities such as telecommunications equipment and advanced office machinery that belong to the same statistical categories as the commodities exported by the developed economies. As such, developing economies' main source of advanced technology has been through inward direct investment. Generally there are two schools of thought on how foreign direct investment might cause intra-industry trade. The first theory perceives that most goods produced by multinational enterprises (MNEs) are differentiated; firms engage in trade producing horizontally or vertically differentiated goods to meet different incomes or tastes. The second theory posits that most intra-industry trade is intra-firm trade from MNEs, who locate different stages of the production process in different countries. Grubel and Lloyd (1975) and Greenaway and Milner (1986) among others have argued that in the presence of demand for different varieties of the same products with production subject to increasing return to scale, there may be a tendency for foreign direct investment and intra-industry trade to go hand in hand. Based on the above discussion our study assumes that foreign investment promotes Malaysian intra-industry trade through economies of scale and technological intensity so the association between foreign investment and the share of intra-industry trade is expected to be positive. Therefore, the fifth hypothesis that will be tested is:

Hypothesis Q5: The higher the foreign direct investment inflows, the higher the share of intra-industry trade.

In the international trade literature, the gravity equation has provided convincing rationales for the negative relationship between distance as a proxy for trade cost and the volume of trade. Greater distances impose large transport and trade costs thereby reducing the intensity of all trade. Distance between trading partners serves as a proxy for costs of information necessary for trading non-standardized products. Krugman (1979) developed a model using Chamberlinian monopolistic competition which demonstrates that intra-industry trade occurs between identical economies or countries with geographical proximity. Economists such as Balassa (1986a; 1986b), Grubel and Lloyd (1975), Balassa and Bauwens (1987), Stone and Lee (1995), Clark and Stanley (1999) and Bergstrand and Egger (2006), among others have pointed out that the share of intra-industry trade to total trade will tend to be greater when trading partners are geographically close. Geographical closeness might be a measurement of psychological and cultural similarities which have the possibilities of creating similar consumption patterns and increasing trade in differentiated products (intra-industry trade products) which can reduce costs in trading countries through economies of scale. Countries which have increasing-returns industries will usually engage in a larger share of intra-industry than the other side of trade. Physical distance also acts as a natural trade barrier that, ceteris paribus, deters trade proportionately more for closely substitutable products (intra-industry trade products) than for standardized products (inter-industry trade products) due to differences in consumer incomes and differences in costs and quality of natural and financial resources, infrastructure and information technologies utilized to produce them. Based on the discussion above, our study assumed that distance through channels of increasing information costs would reduce the share of intra-industry trade in Malaysia. Therefore, the sixth hypothesis that will be tested is:

Hypothesis Q6: The higher the distance, the lower the share of intra-industry trade.

The next hypothesis is based on the framework proposed by Grubel and Lloyd (1975). The basic formula proposed is $IIT_i = [\,1 - \Sigma|X_i - M_i| / \Sigma(X_i + M_i)]$, where X_i

denotes the exports of good i and M_i denotes the imports of good i. The authors pointed out that the measurement of intra-industry trade at aggregate level will be affected by the total trade imbalance of a country. The greater the share of net trade, the smaller the share of intra-industry trade in total trade would be. Therefore the Grubel-Lloyd index tends to becomes smaller as the size of the trade imbalance increases (this is explained in more detail on page 190). Hence, they suggested that their index may be adjusted for the impact of overall imbalance by expressing intra-industry trade as a proportion of total trade minus the trade imbalance. Meanwhile, Clark and Stanley (1999) pointed out that the estimated coefficient in the intra-industry trade regression equation will be biased if the trade imbalance is correlated with the explanatory variables. Hence, the size of the trade imbalance with trading partners is included in the model in order to control for any possible bias in estimating the determinants of intra-industry trade. Similarly Shahbaz and Leitao (2010) also show that there exists a negative relationship between these variables. Therefore, the seventh hypothesis that will be tested is:

Hypothesis Q7: The higher the trade imbalance, the lower the share of intra-industry trade.

Trade openness has been used by researchers as a proxy to analyze the extent of trade restrictions. Edward (1989; 1991) developed a growth model that related trade orientation to the ability to absorb technological progress. The finding provides strong support to the hypothesis that country with more open and less distortive trade policies tend to grow faster than those with more restrictive commercial policies. An earlier formulation of trade orientation by Balassa (1986b) defined the proxy as the residual from a regression of per capita exports on per capita income. The proxy was then re-examined and defined by Stone and Lee (1995) as the residuals from a regression of per capita trade (export plus import) on per capita income and population. This study will employ the methodology proposed by Stone and Lee (1995). Therefore, the eighth hypothesis that will be tested is:

Hypothesis Q8: The higher the trade orientation, the higher the share of intra-industry trade.

Countries that share common borders are likely to trade more than countries which do not. As suggested by Grubel and Lloyd (1976) in their intra industry framework, intra-industry trade may occur 'in products which are functionally homogeneous but differentiated by location' in countries that share a common border. Therefore, it may be hypothesized that the extent of intra-industry trade will be greater in a country which shares a common border with its trading partners. Balassa and Bauwens (1987) pointed out that the existence of common borders represents the possibilities of intra-industry trade in response to location advantages. Meanwhile, Clark and Stanley (1999) pointed out that factors such as border trade, seasonal trade, cultural and language differences will deter proportionately substitutable non-standardized products (intra-industry trade products) more than the standardized products (inter-industry products) due to differences in incomes and difference in costs that arise from distance between the trading countries. The greater differences in incomes of two trading partners reflect the greater differences in the demand structures. Low level of customer per capita income generally reflects a small and standardized demand with respect to product characteristics, but with a higher level of per capita income, demand will become more complex and differentiated, thus this will lead to greater demand for differentiated products. Therefore, based on the discussion above, the ninth hypothesis that will be tested is:

Hypothesis Q9: The existence of a common border between two trading partners raises the share of intra-industry trade.

Countries join regional economic integration groups to reap the benefits of globalization. Their purpose in combining with other countries is more than that of achieving economic growth through an enlarged market because they are also motivated by a desire to raise the national standard of living, strengthen their global economic and political bargaining power, and to find solutions for social and political problems (Berry et al., 1993). Balassa and Bauwens (1987) pointed out that the participation in a regional integration scheme such as ASEAN indicates the possibilities of increased intra-industry trade. Differences in factors such as preference and taste, culture, administrative and political structure besides language and communication which might make ASEAN itself less likely also deter proportionately substitutable non-standardized products (intra-industry trade products) more than the standardized products (inter-industry products). Growing intra-industry trade as an independent phenomenon can provide a motive for economic integration. Based on the argument above and close integration between Malaysia and her trading partners, our study assumes that the relationship between economic integration and the share of intra-industry trade is positive. Therefore, the tenth hypothesis that will be tested is:

Hypothesis Q10: The more integrated the two trading partners, the higher the share of intra-industry trade.

Similar to the previous hypotheses, the hypotheses developed for intra industry trade issues are also unique and hence could make a contribution to the existing empirical literature since there is no empirical study yet which analyzed specifically for the manufacturing sub-industries.

4.3 Methodology of Study

The research methodology section is divided into three parts. The first part explain the methodologies related to industries growth channels, followed by the second part which described methodologies for intermediate inputs and finally the methodologies for intra-industry trade.

4.3.1 Industries Growth Determinants

This section firstly explains the model specification, followed by the sources of data at panel and individual level. Possible sources of growth for Malaysia namely foreign direct investment, gross capital formation, government consumption, quality of macroeconomic policy, manufacturing export and human capital are included in the model. The section will later include an openness index proxy in the form of a tariff and non-tariff barrier index, in order to estimate the effect of openness on output growth through the growth channels as mentioned in the earlier part of this chapter. With time-series and cross-section sets of data, featuring a short time dimension, i.e. a small number of years (t=8), and a larger industry dimension (i=19), we have used the Arellano and Bond (1991) difference generalized method of moments (Difference GMM) and the Arellano and Bover (1995) and Blundell and Bond (1998) system generalized method of moments (System GMM) to analyze the data. Usually the panels used in microeconomic studies are much larger in the cross sectional dimension and a little shorter in the time series. Therefore the small number of time series observations in the dataset should be of no concern because all the asymptotic properties of the GMM estimator rely on the size of the cross-sectional dimension of the panel.

There are at least two reasons for choosing the GMM estimator. The first is to control for industry-specific effects, which cannot be done with industry-specific dummies due to the dynamic structure of the regression equation. Secondly this technique also has the advantage for addressing the bias associated with the fixed effects in short panel (small i) for example simultaneity bias due to the presence of a lagged dependent variable and bias caused by the possibility that some of the explanatory variables may be endogenous. The inclusion of the lagged dependent variables in the equation implies that there is correlation between the explanatory variables and the error term since the lag of the output of industry y_{it-1} depends on

ε_{it-1} which is a function of the industry-specific effect μ_i which disappears only if T is large or approaches infinity.

The GMM estimation technique is similar to Instrumental Variable (IV) estimation technique. In fact some researchers had concluded that GMM estimation is another form of IV estimation. The GMM approach is specified to be more flexible and suitable for analysis because it uses lagged values of both level data and difference data as instruments until orthogonality is reached in the estimation. According to Wooldridge (2002) the GMM estimator is more efficient than standard IV since it used the efficient weighting matrix and the choice of instruments (Z_i) can be set at an optimum, while the list of potential instruments for standard IV is endless.

We also perceive that this estimation technique is suitable for our data analysis because it can deal with data classified as microdata (short time dimension with larger characteristic dimension). GMM has been identified over the past decades as a major econometric advance in dealing with microdata. Besides, the GMM technique is also the most common tool used especially when there are potential problems of endogeneity, heteroskedasticity or serial correlation in the model. Our second part of analysis takes the form of dynamic estimation techniques which require the inclusion of lagged dependent variable as the instrument. GMM is a well suited method than standard IV to control for the endogeneity of the lagged dependent variable problem, especially when we want to use dynamic microdata such as firm data. According to Baum et al. (2003) in the presence of heteroskedasticity, the GMM estimation is more efficient and consistent than the IV estimation since in IV only the coefficient is consistent, but not the standard errors. The Breusch-Pagan and the White tests for the presence of heteroskedasticity can be applied directly to GMM regression but can only apply to IV regression under restrictive assumptions. Meanwhile we can test the reliability and validity of the adopted instruments derived from the GMM estimation with the Sargan or Hansen test.

4.3.1.1 Model Specification

Following Wacziarg (2001) six growth channels are assumed to have impact on the growth of the manufacturing sector and are selected for our analysis. These channels are the inflow of foreign direct investment, gross fixed capital formation, size of the government, quality of macroeconomic policy, manufactured exports and human capital. Consider the Cobb-Douglas production function relationship investigating the growth in industry's production as follows:

$$y = f\ (fdi, gfcf, gc, mq, mx, hc,) \qquad (1)$$

where *y* denotes real output of the industry (in RM'000 million), *fdi* denotes real foreign investment in the industry (in RM'000 million), *gfcf* denotes the real fixed capital formation in the industry (in RM'000 million), *gc* denotes the real government consumption at aggregate level (in RM'000 million), *mq* denotes the quality of macroeconomic policy at aggregate level proxy by an index of economic freedom (rating between 10-100), *mx* denotes the real manufactured exports at aggregate level (in RM'000 million), and lastly *hc* denotes the human capital in the industry proxy by the secondary school enrolment (in million). All variables at constant (year 2005) prices are expressed in logarithmic form.

Since we are interested in investigating 19 industries in the manufacturing sector for a period of 8 years, the above panel model has to be considered in static and dynamic form. Furthermore in the static model, the ordinary least square (OLS), fixed effects and random effects estimators are assumed to be biased and inconsistent. In the static model the simultaneity bias is associated with the fixed effects in the short panel; *t* = 8 year which exist due to the presence of a lagged dependent variable. Such biases can be solved using the Generalized Method of

Moment (GMM) approach. We will conduct the Wooldridge test and General White test to check for the serial correlation and heteroskedasticity in the data. Another bias is caused by the possibility that the explanatory variables may be endogenous due to factors such as measurement error and reverse causality. We will conduct the Durbin-Wu-Hausman test to check for the presence of endogeneity in the model. In a dynamic form the model will be presented as;

$$y_{it} = \alpha + \beta 1 y_{it-1} + \beta 2 fdi_{it} + \beta 3 gfcf_{it} + \beta 4 gc_{t} + \beta 5 mq_{t} + \beta 6 mx_{t} + \beta 7 hc_{it} + \varepsilon_{it} \qquad (2)$$

where the subscript i denotes the i-th industries (i = 1...19) in the manufacturing sector and the subscript t denotes the t-th year (t = 1...8). The equation is expressed in logarithmic form. We will assume that the disturbance term ε_{it} follow a two-way error component model:

$$\varepsilon_{it} = \mu_{i} + \lambda_{t} + v_{it} \qquad i = 1.....19 \quad t = 1......8$$

where μ_i denotes an industry-specific effect, $\mu_i \sim$ IID $(0,\sigma^2 u)$; λ_t denotes a year-specific effect, $\lambda_t \sim \text{IID}(0,\sigma^2\lambda)$ and v_{it} denotes the remainder of the disturbance terms, $v_{it} \sim \text{IID}(0,\sigma^2 v)$; all these are independent of each other and among themselves. Following Arellano and Bond (1991), equation (2) is transformed into first-differences to eliminate the industry-specific effect μ_i as follows:

$$y_{it} - y_{it-1} = \alpha + \beta 1 (y_{it-1} - y_{it-2}) + \beta 2 (fdi_{it} - fdi_{it-1}) + \beta 3 (gfcf_{it} - gfcf_{it-1}) + \beta 4 (gc_{t} - gc_{t-1}) + \beta 5 (mq_{t} - mq_{t-1}) + \beta 6 (mx_{t} - mx_{t-1}) + \beta 7 (hc_{it} - hc_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \qquad (3)$$

This procedure eliminates the industry-specific effect but introduces two drawbacks firstly a correlation between the new error term ($\varepsilon_{it} - \varepsilon_{it-1}$) and the lagged dependent variable ($y_{it-1} - y_{it-2}$) and secondly the endogeneity of the explanatory variables.

Since the model includes a lagged dependent variable y_{it-1}, the main problem arising is the correlation between this variable and the error term. y_{it} is a function of

ε_{it}, hence y_{it-1} is also a function of ε_{it}, which means that y_{it-1} is also correlated with the error term. To address the correlation between $(y_{it-1} - y_{it-2})$ and $(\varepsilon_{it} - \varepsilon_{it-1})$ and the simultaneity bias of the explanatory variables, Arellano and Bond (1991) suggest using the lagged levels of the explanatory variables in levels as instruments. This approach is known as difference GMM estimation and is valid under two assumptions; firstly the error term is not serially correlated and secondly the lags of the explanatory variables are weakly exogenous. Therefore the moment conditions used are as follows:

$$E\,[y_{i,t-s}\ .(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{4}$$

$$E\,[fdi_{i,t-s}\ .(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{5}$$

$$E\,[gfcf_{i,t-s}\ .(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{6}$$

$$E\,[gc_{t-s}\ .(\varepsilon_{t} - \varepsilon_{t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{7}$$

$$E\,[mq_{t-s}\ .(\varepsilon_{t} - \varepsilon_{t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{8}$$

$$E\,[mx_{t-s}\ .(\varepsilon_{t} - \varepsilon_{t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{9}$$

$$E\,[hc_{i,t-s}\ .(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \tag{10}$$

Using these moment conditions, Arellano and Bond (1991) propose a two-step GMM estimator. In the first step, the error terms are assumed to be both independent and homoskedastic, across industries and over time. Meanwhile in the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoskedasticity. Although the difference estimator above is able to control for industry-specific effects and simultaneity bias, it nevertheless has one major shortcoming. Alonso-Borrego and Arellano (1999) and Blundell and Bond (1998) show that if the lagged dependent and the explanatory variables are persistent over time, the lagged levels of these variables become weak instruments for the regressions in differences and may lead to biased parameter estimates in small samples and larger variance asymptotically.

In order to overcome the problems specified above we use an alternative method that estimates the regression in differences jointly with the regression in levels as proposed by Arellano and Bover (1995). The GMM estimator that combines the moment conditions for the differenced model with those for the levels model is called the system estimator. Arellano and Bover (1995) proposed a forward orthogonal deviation transformation procedure. This transformation essentially subtracts the mean of future observations available in the sample from the first *T-1* observations. It is because of the orthogonal deviations that the transformed explanatory variable will not be missing. It is expected that the GMM estimator of the model transformed by the forward orthogonal deviation will work better than if transformed by the first difference. Blundel and Bond (1998) show that this estimator is able to reduce biases and create more precision especially when the series are persistent. Following Arellano and Bover (1995) the additional moment conditions for the second part of the system (the regression in levels) are set as follows:

$$E[y_{i,t-s} - y_{i,t-s-1}) .(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \tag{11}$$

$$E\,[fdi_{i,t-s} - fdi_{i,t-s-1}) .(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \tag{12}$$

$$E\,[gfcf_{i,t-s} - gfcf_{i,t-s-1}) .(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \tag{13}$$

$$E\,[gc_{t-s} - gc_{t-s-1}) .(\eta_i + \varepsilon_t)] = 0 \text{ for } s = 1 \tag{14}$$

$$E\,[mq_{t-s} - mq_{t-s-1}) .(\eta_i + \varepsilon_t)] = 0 \text{ for } s = 1 \tag{15}$$

$$E\,[mx_{t-s} - mx_{t-s-1}) .(\eta_i + \varepsilon_t)] = 0 \text{ for } s = 1 \tag{16}$$

$$E\,[hc_{i,t-s} - hc_{i,t-s-1}) .(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \tag{17}$$

where η_i and ε_{it} are assume to be independently distributed across i and have the familiar error components structure in which E(η_i) = 0, E($\varepsilon_{i,t}$) = 0 and E($\varepsilon_{i,t}$ η_i) = 0 for i = 1….N and t = 2…T. The moment conditions in Equations (4) to (17) are employed to generate consistent and efficient parameter estimates based on the GMM procedure.

The consistency of the GMM estimator in producing unbiased, consistent and efficient results depends on the adoption of the appropriate instruments. There are two commonly used specification tests as suggested by Arellano and Bond (1991) and Arellano and Bover (1995). The first is the Sargan test or Hansen test of over-identifying restrictions which tests the overall validity of the instruments by analyzing the sample analogue of the moment conditions used in the estimation process. If the moment condition holds, then the instruments are valid in the sense that they are not correlated with the errors in the first difference equation and the model has been correctly specified. As such, under the null of joint validity of all instruments, the empirical moments have zero expectation, so the J statistic is distributed as a χ^2_k with degrees of freedom equal to the degree of over identification. The second test is the test for serial correlation among the transformed error terms. The test examines the hypothesis of no second-order serial correlation in the transformed error term of the first-difference equation. Failure to reject the null hypotheses of both tests provides support to the estimated model.

The GMM estimators are typically applied in one- and two-step variants. The one-step estimators use weighting matrices that are independent of estimated parameters, whereas the two-step GMM estimator uses the optimal weighting matrices in which the moment conditions are weighted by a consistent estimate of their covariance matrix. This makes the two-step estimator asymptotically more efficient that the one-step estimator. However, the use of the two-step estimator in small samples has several problems which result from the proliferation of instruments. In a simulation analysis two-step GMM estimation with numerous instruments can lead to biased standard errors and parameter estimates (Windmeijer, 2005) and also may lead to a weakened over identification test (Bowsher, 2002). In order to alleviate the problems induced by the proliferation of instruments, this study applies the recommendation made by Roodman (2009) by reducing the dimensionality of the instrumental variable matrix[48]. According to Roodman, in order to deal with instrument proliferation two main techniques can be used in limiting the number of the instruments; firstly by using only certain lags instead of all the available lags for the instruments and secondly by combining the instruments through addition into smaller sets which collapses the block of the instrument matrix.

Our analysis will employ the Granger causality test (Granger, 1969) to capture the causal relationship between the chosen variables. To estimate the causal relationship between trade liberalization on the growth of industries output through the channels as mentioned in the earlier part of this thesis we proposed a causal interaction as follows:

if A granger cause B ($A \rightarrow B$) and B granger cause C ($B \rightarrow C$), this means that indirectly A will granger cause C ($A \rightarrow C$).

In this case, A is a notation representing trade liberalization, B represents the growth channels and C is the output of industries. Using the test, our interest is to find whether trade liberalization variables Granger-cause growth of industries through the growth channels. The main idea proposed is that trade liberalization variables Granger-cause growth of industries if growth of industries can be better predicted using the past values of the trade liberalization variables, the channels and the growth of industries together rather than using the past values of growth of industries alone. Conceptually, the Granger-causality assumes the following conditions. First, it assumes temporality where only past values of trade liberalization and growth channels can cause the growth of industries. Second, it assumes exogeneity where a necessary condition for trade liberalization and growth channels to be exogenous of growth of industries is that there is no reverse causation from the dependent to the explanatory variables. Third, it assumes homogeneity where the coefficients are the same for all industries chosen for analysis. Finally, it assumes stationary where if all the variables are non-stationary, they can produce a spurious regression result.

4.3.1.2 Sources of Data

This panel estimation firstly consists of annual observations for 19 manufacturing sub-industries in the Malaysian manufacturing sector over the period of 8 years from 1999 until 2006 covering the output of each industry. The 19 industries classified are; food manufacturing, beverages and tobacco, leather and leather products, textiles, wood, plastic, rubber, paper, printing and publication, basic metal, fabricated metal, non-metallic mineral, petroleum, chemical and chemical products, electrical and electronic, machinery, sciences and measuring equipments, furniture, transport and other miscellaneous products[49]. The selection of these industries is based on two factors discussed in the earlier part of the thesis: firstly, the existing and increasing trade performance and secondly, the massive investment opportunities during the period studied respectively. The summary of the description, sources and the expected relationship of the explanatory variables for growth channels are provided in Table 4.1 below.

Table 4.1: Variables Description, Sources and Expected Sign for Industrial Growth Channels

No.	Variables	Description	Sources	Expected Sign
1	Output of Industry (y)	Is the dependent variable which is the value of output for industry categorized at 19 sub-industries in Malaysian Ringgit.	The Department of Statistics, Malaysia	
2	Foreign direct Investment (fdi)	Foreign direct investment in approved projects by industry.	Malaysian Industrial Development Authority (MIDA)	Positive
3	Gross fixed capital formation (gfcf)	Gross fixed capital formation by industries.	The Department of Statistics, Malaysia	Positive
4	Human Capital (hc)	Secondary school enrolment	The Department of Statistics, Malaysia	Positive
5	Export of Manufactures Goods (mx)	Shares of manufactures exports in merchandise exports.	World Bank, World Development Indicator.	Positive
6	Government Consumption (gc)	Government consumption as a percentage of GDP.	World Bank, World Development Indicator	Negative
7	Quality of Macroeconomic Policies (mq)	Quality of Macroeconomic policies is proxy by index of economic freedom	Fraser Institute Database at www.freetheworld.com	Positive

Gross fixed capital formation and human capital by industry are the determinants representing the allocation and distribution of domestic capital and expenditure. This industry level data were gathered from the Malaysian Department of Statistics. Foreign direct investment in approved projects by industry is a determinant representing knowledge spill over and technology transmission. The data are obtained from the Malaysian Industrial Development Authority annual report. Meanwhile government consumption is a determinant representing the government size. The index of macroeconomic quality is a determinant representing the government policies and share of manufactures export is a determinant representing the outward orientation of policy. An index of economic freedom is used as a proxy for the macroeconomic quality. This index is a guideline to measure the degree and advancement of economic freedom for countries worldwide based on four areas such as rule of law, size of the government, regulatory efficiency and open market access. This annual index data are obtained from the Fraser Institute Database and the data for aggregate share of manufactures export and government consumption are obtained from the World Bank Database. Table 4.2 below exhibits the description, sources and the expected sign for trade liberalization and the growth channels.

Table 4.2: Variables Description, Sources and Expected Sign for Trade Liberalization

No.	Variables	Description	Sources	Expected Sign
1	Tariff	Tariff Index as a proxy for trade liberalization	Fraser Institute Database at www.freetheworld.com	ambiguous relationship with the government expenditure ambiguous relationship with the quality of macroeconomic policies positive relationship with the foreign direct investment positive relationship with the gross capital formation positive relationship with the manufactured export positive relationship with the human capital
2	Non-Tariff	Non-Tariff index as a proxy for trade liberalization	Fraser Institute Database at www.freetheworld.com	ambiguous relationship with the government expenditure ambiguous relationship with the quality of macroeconomic policies positive relationship with the foreign direct investment positive relationship with the gross capital formation positive relationship with the manufactured export positive relationship with the human capital

The links between growth channels and industrial growth as well as the tariff barrier index incorporated in this model are meant to capture the theories concerning dynamic gains from trade. The underlying assumption is that these channels can adequately capture most of the causal effect of trade policy on growth. As such, the causality relationship between all channels and industry growth is expected to be positive[50] (except for government consumption) and the relationship between trade openness and all channels is also expected to be positive.

4.3.2 Imported Inputs

The second issue investigates the relationship between total revenue earned and the utilization of imported intermediate inputs in production. Variables such as capital expenditure, information and technology expenditure and human resources attainment are included in the analysis as control variables. The chapter includes investigation at industry level data for 53 sub-industries and at firms' level data for 300 firms classified as Malaysian owned and 227 non-Malaysian owned. However, the analysis is available for 7 years only (from 2000 to 2006) due to limited data provided by the Department of Statistics. The model specification for firms' level analysis will be constructed similar to the model for industry analysis. This section will firstly explain the model specification followed by the sources of data.

4.3.2.1 Model Specification

The model was formulated based on the neoclassical model of two factor productions; capital and labor. However our study augmented the Cobb-Douglas production function by including research and development expenditure. Consider the following augmented model investigating the industry total revenue relationship with revenue which depends on the input factors as follows:

$$tr = f\,(im, ce, rd, hc) \qquad (1)$$

Let *tr* denote the real revenue of the industry in (RM'000 million), *im* denotes the real imported inputs volume (in RM'000 million), *ce* denotes the real capital expenditure (in RM'000 million), *rd* denotes the real research and development expenditure (in RM'000 million), and finally *hc* denotes the human resources education attainment proxy by the secondary school enrolment (in million). All variables at constant (year 2000) price are expressed in logarithmic form. Capital expenditure, research and development expenditure, and human resources education attainment are control variables. In a dynamic presentation the equation will be as follows;

$$tr_{it} = \alpha + \beta 1 tr_{it-1} + \beta 2 im_{it} + \beta 3 ce_{it} + \beta 4 rd_{it} + \beta 5 hc_{it} + \varepsilon_{it} \qquad (2)$$

where the subscript *i* denotes the *i*-th industries (*i*=1...53) in the manufacturing sector, the subscript *t* denotes the *t*-th year (*t*=1...7) from 2000 to 2006. The equation is expressed in logarithmic form. In the model tr_{it} is a function of the error term ε_i, hence the lagged dependent tr_{it-1} is also a function of ε_i which means that tr_{it-1} is correlated with the error term. Therefore, the OLS estimator of this model is biased and inconsistent.

The above equation is estimated twice for Malaysian owned industry and then for non-Malaysian owned industry. In both cases, the disturbance term is specified as a two-way error component model;

$$\varepsilon_{it} = \mu_i + \lambda_t + v_{it} \qquad i = 1.....53 \qquad t = 1......7$$

where μ_i denotes an industry-specific effect, μ_i ~ IID $(0,\sigma^2 u)$; λ_t denotes a year-specific effect, λ_t ~ IID$(0,\sigma^2\lambda)$ and v_{it} denotes the remainder of the disturbance terms, v_{it} ~ IID$(0,\sigma^2 v)$ and all these are independent of each other and among themselves.

Following Arellano and Bond (1991) and transforming Equation (2) into first-differenced to eliminate the industry and firm-specific effect μ_i, the equation are proposed as below. The equation is also expressed in logarithmic form.

$$tr_{it} - tr_{it-1} = \alpha + \beta 1 (tr_{it-1} - tr_{it-2}) + \beta 2 (im_{it} - im_{it-1}) + \beta 3 (ce_{it} - ce_{it-1}) + \beta 4 (rd_{it} - rd_{it-1}) + \beta 5 (hc_{it} - hc_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \qquad (3)$$

Therefore, the moment conditions are as follows:

$$E\,[tr_{i,t-s}\,.(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \quad (4)$$

$$E\,[im_{i,t-s}\,.(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \quad (5)$$

$$E\,[ce_{i,t-s}\,.(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \quad (6)$$

$$E\,[rd_{i,t-s}\,.(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \quad (7)$$

$$E\,[hc_{i,t-s}\,.(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2;\ t = 3\ldots,T \quad (8)$$

Following Arellano and Bover (1995) the additional moment conditions for the second part of the system (the regression in levels) are set as follows:

$$E[tr_{i,t-s} - tr_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (9)$$

$$E\,[im_{i,t-s} - im_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (10)$$

$$E\,[ce_{i,t-s} - ce_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (11)$$

$$E\,[rd_{i,t-s} - rd_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (12)$$

$$E\,[hc_{i,t-s} - hc_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (13)$$

where η_i and ε_{it} are assume to be independently distributed across *i* and have the familiar error components structure in which $E(\eta_i) = 0$, $E(\varepsilon_{i,t}) = 0$ and $E(\varepsilon_{i,t}\,\eta_i) = 0$ for *i* = 1….N and t = 2…T.

Trade liberalization or 'openness' beyond a general understanding refers to act of relaxing existing trade barriers. Many empirical studies (see Leamer, 1988, Dollar, 1992; Sachs and Warner, 1995) have described openness in many ways and researchers have used various approaches in the attempt to capture the nature of trade policy. According to Greenaway et al. (2002) at the conceptual level openness is perceived as either tariff liberalization, an act towards relative price neutrality or the substitution of more efficient for less efficient instruments - typically tariffs for quotas. As such, to estimate the effect of trade liberalization on the imported inputs as mentioned in the earlier part of this thesis, we have proposed another model which comprises the trade liberalization proxy in the form of a tariff and non-tariff barrier index as the independent variables and imported inputs as the dependent variable. Following Lim (1997) economic indicators such as ratio of domestic investment to gross domestic product and inflation rate are selected as policy variables and are included in the model as control variables. These variables are selected as proxies for policy variables based on their significant contribution in generating high economy performance from 1980s until present. Therefore, the model is presented as follow:

$$Imp = f(t, nt, dinv, inf) \qquad (14)$$

where *Imp* denotes the real imported inputs contents, *t* denotes the tariff index, *nt* denotes the non-tariff index, both as proxies of trade liberalization, *dinv* denotes the ratio of domestic investment to gross domestic products and *inf* denotes the inflation rate. To examine the effect between these variables, our analysis will employ the Arellano and Bond (1991) difference generalized method of moments (Difference GMM) and the Arellano and Bover (1995) and Blundell and Bond (1998) system generalized method of moments (System GMM) methods to analyze the data. For comparison, we will also estimate the effect of trade liberalization on imported inputs using five components of the index of economic freedom. These index are size of the government, legal structure and security of property, access to sound money, freedom to trade internationally and a regulation of capital, labor and business index. The estimation techniques will be similar to the above model.

4.3.2.2 Sources of Data

The investigation is twofold. The first analysis consists of 53 industries (at SITC 3-digit level) classified as Malaysian owned and non-Malaysian owned industries. The second analysis consists of 300 Malaysian owned firms and 227 non-Malaysian owned firms. Since the time-series and cross-section sets of data also features a short time dimension, small number of years (*t* =7) and a larger industry dimension (*i* =53) for industries' level as well as a larger firm dimension (*i*=300;227) for firms' level, we will also use the Arellano and Bond's (1991) difference generalized method of moments (Difference GMM) and Bonds and Bovers (1995) system generalized method of moments (System GMM) methods to further analyze the data. The base year is 2000 and these data are classified according to Malaysian and non-Malaysian ownership. The summary of the variables description, sources and the expected relationship of the explanatory variables is shown in Table 4.3 below.

Table 4.3: Variables Description, Sources and Expected Sign for Imported Inputs

No.	Variables	Description	Sources/Expected sign
1	Revenue	is the dependent variable which is the value of revenue by industries/firms	Data is obtained from Malaysian Department of Statistics.
2	Imported Inputs	is the value of imported inputs by industries/firms	Data is obtained from Malaysian Department of Statistics. The expected sign is positive.
3	Capital Expenditure:	is the capital expenditure by industries/firms	Data is obtained from Malaysian Department of Statistics. The expected sign is positive.
4	Research and Development	is the research and development expenditure by industries/firms	Data is obtained from Malaysian Department of Statistics. The expected sign is positive.
5	Human Capital	is the human capital proxy by the total number of employee of the industries by industries/firms	Data is obtained from Malaysian Department of Statistics. The expected sign is positive.

Meanwhile the list of 53 selected industries for the industry level analysis is shown in Table 4.4 and the **v**ariables description, sources and expected sign for trade liberalisation and index of economic freedom is shown in Table 4.5.

Table 4.4: List of Malaysian Manufacturing Sub-Industries

No.	Manufacturing Sub-industries	No.	Manufacturing Sub-industries
1	Production, Processing and Preserving of meat, fish, fruit, vegetables, oils and fats	28	Manufacture of structural metal products, tank, reservoirs and steam generators
2	Manufacture of dairy products	29	Manufacture of other fabricated metal products; metal working service activities
3	Manufacture of grain mill products, starches and starch product and prepared animal foods	30	Manufacture of general purpose machinery
4	Manufacture of other food animals	31	Manufacture of special purpose machinery
5	Manufacture of beverages	32	Manufacture of domestic appliances n.e.c
6	Manufacture of tobacco products	33	Manufacture of office, accounting and computing machinery
7	Spinning, weaving and finishing of textiles	34	Manufacture of electrical motors, generators and transformer
8	Manufacture of other textiles	35	Manufacture of electrical distribution and control apparatus
9	Manufacture of knitted and crocheted fabrics and articles	36	Manufacture of insulated wire and cable
10	Manufacture of wearing apparel except fur apparel	37	Manufacture of accumulators, primary cells and primary batteries
11	Tanning and dressing of leather, manufacture of luggage. Handguns, saddler and harness	38	Manufactures of electrical lamps and lighting equipments
12	Sawmilling and planning of wood	39	Manufacture of other electrical equipment n.e.c
13	Manufacture of product of wood, cork, straw and plaiting materials	40	Manufacture of electronic valves and tubes and other electronic components
14	Manufacture of paper and paper products	41	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
15	Publishing	42	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
16	Printing and services activities related to printing	43	Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purpose except optical instruments
17	Reproduction of recorded media	44	Manufacture of optical instruments and photography equipment
18	Manufacture of refined petroleum products	45	Manufacture of watches and clocks
19	Manufacture of basic chemicals	46	Manufacture of motor vehicles
20	Manufacture of other chemicals products	47	Manufacture of bodies (coachwork) for motor vehicles,

			trailers and semi-trailers
21	Manufacture of man-made fiber	48	Manufactures of parts and accessories for motor vehicles and their engines
22	Manufacture of rubber products	49	Building and repairing of ship and boats
23	Manufacture of plastic products	50	Manufacture of aircraft and spacecraft
24	Manufacture of non-metallic mineral products	51	Manufacture of transport equipment n.e.c
25	Manufacture of basic iron and steel	52	Manufacture of furniture
26	Manufacture of basic precious and non-ferrous metals	53	Manufacture of miscellaneous (n.e.c)
27	Casting of metals		

Source: Department of Statistics Malaysia

Table 4.5: Variables Description, Sources and Expected Sign for Trade Liberalization and Index of Economic Freedom

No.	Variables	Description	Sources	Expected Sign
1	Tariff	Tariff Index as a proxy for trade liberalization	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content
2	Non-Tariff	Non-Tariff index as a proxy for trade liberalization	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content
3	Domestic Investment	Ratio of Domestic Investment to Gross Domestic Products	Malaysian Department of Statistics	positive relationship with imported inputs content
4	Inflation rate	Inflation rate	Central Bank of Malaysia	positive relationship with the imported inputs content
5	Government size	Size of the government	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content
6	Legal system	Legal structure and security of property	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content
7	sound money	Access to sound money	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content
8	Freedom	Freedom to trade internationally	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content
9	Regulation	Regulation pertaining to credit market, labor market and business	Fraser Institute Database at www.freetheworld.com	positive relationship with the imported inputs content

Source: Fraser Institute at www.freetheworld.com; Central Bank of Malaysia and Department of Statistics

4.3.3 Intra-Industry Trade Determinants

Based on the theoretical and empirical literature of intra-industry trade discussed in the previous chapter we employed a model which incorporates the country-specific characteristics. It is perceived that the country specific characteristics have an impact on the intra-industry trade between Malaysia and its trading partners. We will follow the standard Grubel-Lloyd index formula for the calculation of manufactured goods and export oriented sub-industries products such as rubber products, wood and wood products, textiles and wearing apparel, electrical and electronics products, and petroleum and fuel products.

Various indexes have been created to measure intra-industry trade such as the Grubel-Lloyd index, the Balassa index, the Aquino index, the Bergstrand index and the Glesjer index. However the Grubel-Lloyd (G-L) index is the standard measure and had been used by many empirical researchers. This method was introduced by Herbert G. Grubel and P.J. Lloyd in 1975. The index determines the degree of intra-industry trade using Standard International Trade Classification (SITC) at 3-digit level which measures the proportion of intra-industry trade in total trade rather than of the absolute amount of intra-industry trade itself. The IIT index is calculated as follows:

$$IIT_{ij} = [\ 1 - \ \Sigma|X_{ij} - M_{ij}| \ / \ \Sigma(X_{ij} + M_{ij})] \qquad (1)$$

where the subscript *i* denotes industry and the subscript *j* denotes country; X denotes exports and M denotes imports of the related industry and country, respectively. The computed value of IIT_{ij} lies between 0 and 1. The closer the value of the index to 1 the greater is the degree of intra-industry trade. In other words, if $X_{ij}=M_{ij}$, then IIT_{ij} would equal 1 indicating that all trade in industry *i* for country *j* is intra-industry and when either $X_{ij}=0$ or $M_{ij}=0$ then the value of IIT_{ij} would equal 0 indicating that all trade in industry *i* for country *j* is inter-industry trade.

However, one point that should be noted is that the index is influenced by the size of the trade imbalance. The greater the trade imbalance (deficit or surplus) value, the smaller the value of the intra-industry trade index. Grubel and Lloyd (1975) and Aquino (1978) then proposed possible adjustments at the industry level but with different approaches. Aquino has suggested that the real values of each export (X_i) and import (M_i) in the Grubel and Lloyd index equation need adjustment by introducing an adjustment factor[51] for both values, respectively. However, his attempt to adjust the trade imbalances were criticized for the underlying assumption that trade imbalances are spread equi-proportionally in all industries. Greenway and Milner (1986) among others have raised questions concerning the validity of the adjustment pointed that it would be difficult to determine equilibrium trade balance when there is no prior knowledge of the particular set of transactions. Another question pointed to the nature and effects of the balance of payments adjustment initiated by the trade imbalance.

Kol and Mennes (1985) in a comparison study of the Grubel-Lloyd index with the Aquino index have concluded that Aquino index measures the 'similarity' of product shares in total trade, not trade overlap**,** so that, as far as measuring trade overlap is concerned, the Grubel-Lloyd index is to be preferred. Similarly, Vona (1991) who reviews the need for correction literatures on trade imbalance concludes that the Aquino adjustment can produce unreliable estimates of intra-industry trade since his index measures the similarity of product share in total trade instead of trade overlap. She added that the corrections are highly arbitrary and unrelated to any theoretical foundation and she suggested that the Grubel and Lloyd index is better. With such drawbacks, our study chooses to correct for any bias with trade imbalance, instead of adjusting the Grubel-Lloyd index. An example of bias occur when classifying the industry at the 3-digit SITC level of aggregation which would put two or more group of products; for example sub-groups of printed circuits and switchboard; that should not be group together, in the same level of aggregation (same industry). Aggregating across improper categories of intra-industry trade can lead to a misrepresentation of the degree of the trade. Following Stone and Lee (1995) the trade Imbalance is defined as:

$$timb_j = [X_j - M_j] / (X_j + M_j)$$

where X_j is exports to country j and M_j is import from country j. So timbj is zero if trade with a country is balanced (i.e., $X_j = M_j$) and one if there are only either export to or import from a country.

As the dataset for intra-industry trade analysis also features a short time dimension, small number of years (t=5) and a larger country dimension (i=15), we will again use the Arellano and Bond (1991) difference generalized method of moments (Difference GMM) and Arellano and Bover (1995) and Blundell and Bond (1998) system generalized method of moments (System GMM) methods to analyze the data.

4.3.3.1 Model Specification

The econometric model used to estimate intra-industry trade in manufactured goods for Malaysia is dictated by the typical formulation postulated by economic theory in the econometric literature. Ten hypotheses constructed and mentioned in chapter one of this thesis are tested using pooled cross section and time series regression analysis between Malaysia and 15 trading partners namely Australia, China, Germany, Hong Kong, Japan, Korea, Netherland, Philippines, Singapore, Thailand, United Kingdom, the United States, India, Viet Nam and Pakistan. The period is 5 years from 2005 -2009.

Following Shahbaz and Leitao (2010) and Faustino and Leitao (2007) several selected variables have been chosen to develop the model of intra industry trade. The specification model is then specified according to the gravity model as follows:

$$iit_{hjt} = \alpha + \beta 1iit_{hjt-1} + \beta 2dgdp_{hjt} + \beta 3agdp_{hjt} + \beta 4mingdp_{hjt} + \beta 5maxgdp_{hjt}$$

$$+ \beta 6dist_{hjt} + \beta 7fdi_{hjt} + \beta 8timb_{hjt} + \beta 9to_{hjt} + \beta 10border_{hjt}$$

$$+ \beta 11asean_{hjt} + \varepsilon_{it} \qquad (2)$$

where all explanatory variables at constant (year 2005) prices are expressed in logarithmic form except trade imbalance (*timb*), trade orientation (*to*), *border* and *asean*. *iit* denotes the unadjusted Grubel-Lloyd index of manufactured goods (SITC 5 to 8) at 3-digit level; *dgdp* denotes the economic differences in income; *mingdp* and *maxgdp* denote the minimum level and the maximum level of per capita income between each pair of countries; following Shahbaz and Leitao (2010) these variables are included to capture the relative size effects of the trading countries. *agdp* denotes the average incomes as a proxy for potential economies of scale and the variety of differentiated products; *dist* denotes the geographical distance (in kilometers) between Malaysia's capital and the capital of the trading partner; *fdi* denotes the average foreign direct investment inflows; *timb* controls for bias in the Grubel-Lloyd unadjusted index; as the index is biased downward when there is trade imbalance in the economy; *to* denotes the extent of trade orientation; *border* denotes the existence of a common border; and *asean* is a dummy for ASEAN membership of each country studied. Subscript *h* denotes 'home country' which refers to Malaysia and subscript *j* denotes each trading partner country individually while subscript *t* denotes year (t=1....5) since 2005 until 2009. ε_{it} denotes a random disturbance assumed to be normal and identically distributed (IID) ~ (0, σ^2).

Transforming Equation (2) above into first-differences to eliminate country-specific effect as proposed below:

$$iit_{hjt} - iit_{hjt\text{-}1} = \alpha + \beta 1(iit_{hjt\text{-}1} - iit_{hjt\text{-}2}) + \beta 2\ (dgdp_{hjt} - dgdp_{hjt\text{-}1}) + \beta 3\ (agdp_{hjt} - agdp_{hjt\text{-}1}) + \beta 4\ (mingdp_{hjt} - mingdp_{hjt\text{-}1}) + \beta 5\ (maxgdp_{hjt} - maxgdp_{hjt\text{-}1}) + \beta 6\ (dist_{hjt} - dist_{hjt\text{-}1}) +) + \beta 7\ (fdi_{hjt} - fdi_{hjt\text{-}1}) + \beta 8\ (timb_{hjt} - timb_{hjt\text{-}1}) +) + \beta 9\ (to_{hjt} - to_{hjt\text{-}1}) +) + \beta 10\ (border_{hjt} - border_{hjt\text{-}1}) +) + \beta 11\ (asean_{hjt} - asean_{hjt\text{-}1}) + (\varepsilon_{it} - \varepsilon_{it\text{-}1}) \tag{3}$$

The equation is again expressed in logarithmic form. Then, following Arellano and Bond (1991) the moment conditions are as follows:

$$E\ [iit_{i,t\text{-}s}\ .(\ \varepsilon_{i,t} - \varepsilon_{i,t\text{-}1})] = 0\ \text{for}\ s \geq 2;\ t = 3\ldots,T \tag{4}$$

$$E\ [dgdp_{i,t\text{-}s}\ .(\ \varepsilon_{i,t} - \varepsilon_{i,t\text{-}1})] = 0\ \text{for}\ s \geq 2;\ t = 3\ldots,T \tag{5}$$

$$E\,[agdp_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{6}$$

$$E\,[mingdp_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{7}$$

$$E\,[maxgdp_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{8}$$

$$E\,[dist_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{9}$$

$$E\,[fdi_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{10}$$

$$E\,[timb_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{11}$$

$$E\,[to_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{12}$$

$$E\,[border_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{13}$$

$$E\,[asean_{i,t-s}\,.(\,\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \; for\; s \geq 2;\; t = 3\ldots,T \tag{14}$$

Following Arellano and Bover (1995) the additional moment conditions for the second part of the system (the regression in levels) are set as follows:

$$E[iit_{i,t-s} - iit_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{15}$$

$$E\,[dgdp_{i,t-s} - dgdp_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{16}$$

$$E\,[agdp_{i,t-s} - agdp_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{17}$$

$$E\,[mingdp_{i,t-s} - mingdp_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{18}$$

$$E\,[maxgdp_{i,t-s} - maxgdp_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{19}$$

$$E\,[dist_{i,t-s} - dist_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{20}$$

$$E\,[fdi_{i,t-s} - fdi_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{21}$$

$$E\,[timb_{i,t-s} - timb_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{22}$$

$$E\,[to_{i,t-s} - to_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{23}$$

$$E\,[border_{i,t-s} - border_{i,t-s-1})\,.(\eta_i + \varepsilon_{i,t})] = 0 \; for\; s = 1 \tag{24}$$

$$E\,[asean_{i,t-s} - asean_{i,t-s-1}) .(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \qquad (25)$$

where η_i and ε_{it} are assume to be independently distributed across i and have the familiar error components structure in which $E(\eta_i) = 0$, $E(\varepsilon_{i,t}) = 0$ and $E(\varepsilon_{i,t}\,\eta_i) = 0$ for $i = 1....N$ and $t = 2...T$.

4.3.3.2 Source of Data

The data for the explanatory variables is sourced from the World Bank, World Development Indicators (2010) and International Monetary Fund (2010). The data for dependent variable calculation is sourced from United Nations Conference on Trade and Development (UNCTAD) 2010 database. Data for structure and direction of trade analysis between Malaysia and its trading partners are gathered from the Malaysian Economic Annual Report available from the Malaysia Treasury Department. The summary of the description, sources and the expected relationship of the explanatory variables is shown in Table 4.6 below.

Table 4.6: Variables Description, Sources and Expected Sign for Intra Industry Trade

No.	Variables	Description	Sources/Expected Sign
1	IIT index	IIT index consists of export from Malaysia and import to Malaysia from 15 partner countries for manufactured goods at the 3-digit level Standard International Trade Classification (SITC 5 to 8) Rev.3. Calculations for the G-L indices (yearly) are made by the author according to the methodology set out earlier in this paper.	The unadjusted Grubel-Lloyd (IIT) index between trading countries (Malaysia and its trading partner countries is calculated using data published by United Nation Comtrade Database (UNCTAD). The data set is annual and runs from 2005-2009.
2	dgdp	Economic difference between trading countries (dgdp) is defined as difference in gross domestic products (PPP) in current international US dollars.	The data for the economic difference is calculated based on the gross domestic products sourced from the World Bank, World Development Indicators (2010). The expected sign is positive.
3	agdp	Average economic between trading countries (agdp) is defined as average in gross domestic products (PPP) in current international US dollars.	The data for the average economic is calculated based on the average gross domestic products sourced from the World Bank, World Development Indicators (2010). The expected sign is positive.
4	mingdp	Minimum level to control for relative size effects between trading countries (mingdp) is define as lowest level of gross domestic products per capita (PPP) in current international US dollars.	The data for the lowest level of income is calculated based on the gross domestic products sourced from the World Bank, World Development Indicators (2010). The expected sign is positive.
5	maxgdp	Maximum level to control for relative size effects between trading countries (maxgdp) is defined as higher level of gross domestic products per capita (PPP) in current international US dollars.	The data for the highest level of income is calculated based on the gross domestic products sourced from the World Bank, World Development Indicators (2010). The expected sign is negative
6	dist	A proxy for the geographical distance between trading countries (dist) is defined according to Stone and Lee (1995) and Balassa (1986). It is defined as the average of the distances (in kilometers) between the two capital cities of both trading countries weighted by the size of the economy of the respective country. Following Hirschberg et al. (1994) the average of the distance were computed using the scale of the latitude and longitude of the geographic distance between each capital city for the respective country.	The data for the distance is sourced from CEPII (Geodesic Distance) website available at http://www.cepii.fr/angluisgraph/bdd/distances.htm The expected sign is negative
7	fdi	Foreign direct Investment (fdi) is defined as the foreign direct	The data for the foreign investment inflows is sourced

		investment inflows in current international US dollars.	from the World Bank, World Development Indicators (2010). The expected sign is positive
8	timb	Trade Imbalance (timb) is defined according to Stone and Lee (1995) as: $TIMBj = [Xj - Mj] / (Xj+Mj)$ where Xj is exports to country j and Mj is import from country j. So TIMBj is zero if trade with a country is balanced (i.e., Xj=Mj) and one if there are only either export to or import from a country.	The data for the trade imbalance is sourced from the World Bank, World Development Indicators (2010). The expected sign is negative
9	to	A proxy for trade orientation (to) is defined according to Stone and Lee (1995) and Balassa and Bauwens (1987) approach. Hence, to is measured by the following regression equation: $\ln PCT = \beta 0 + \beta 1 \ln PCI + \beta 2 \ln POP + \varepsilon t$ where sum of exports and imports value calculated for per capita trade are measured in millions of US dollars and population is measured in thousands. The regression estimated for each year since 1995 until 2009 produced R^2 of between 0.95 and 0.80 with all variables statistically significant. The final trade orientation index is the sum of all the trade orientation indices.	The data for the trade orientation is sourced from the World Bank, World Development Indicators (2010). The expected sign is positive.
10	border	The existence or sharing of common border (border) between trading countries is proxies by dummy variables with value of 0 and 1 where 0 denotes ‘not sharing any border’ while 1 denotes ‘sharing common border’	The expected sign is positive.
11	asean	The involvement or participation of trading countries in economic integration; in this case Association of South-East Asian Nations (asean); is proxies by dummy variables with value of 0 and 1 where 0 denotes ‘not participate in ASEAN economic integration’ and 1 denotes ‘participate in ASEAN economic integration’.	The expected sign is positive.

4.4 Conclusion

Methodology is one of the important factors in determining reliability of a research conducted. Choosing the suitable and right methodology provides consistent results and conclusive evidence of the subject matter. However, a strong theoretical framework is also crucial in demonstrating understanding of theories and concepts that are relevant to the topic. Having reviewed pertinent and applicable research literature, several determinants which influence the growth of output and the share of intra-industry trade in the Malaysian Manufacturing sector were investigated. More specifically, the analysis was also done to examine specific individual export-oriented industries. Six determinants which might influence the growth of output at aggregate industry and individual industry levels are foreign direct investment inflows, fixed capital formation, government consumption, quality of macroeconomic policies, manufactured export and human capital. Meanwhile another determinant which was examined in a separate model is content of imported inputs used in the production. Finally, ten determinants which influence intra-industry trade are the size of the domestic market, similarity in size of the economics, the lowest and the highest value of the gross domestic products of a trading partners, foreign direct investment, distance, trade imbalance, trade orientation, sharing of common border and economic integration.

Based on the theoretical framework produced, this study applies two types of estimation the static and dynamic model. In the static model, Ordinary Least Square (OLS), Fixed and Random Effect and Generalized Least Square (GLS) estimation techniques will be used. In order to confirm the result and to compare the answer with the static model estimation, our study will apply the difference and system GMM method in the dynamic model estimation to examine the relationship of growth channels, imported inputs and intra industry trade with industries and firms growth. The data employed in this study is collected using the secondary data gather from various international and national sources. The international sources include data provided by United Nations Conference on Trade and Development

(UNCTAD) database, World Bank and International Monetary Fund (IMF), among others. Meanwhile the national sources include the Malaysian Department of Statistics (DOS), Malaysian Investment Development Authority (MIDA), Malaysian Ministry of Finance (MOF) and the Central Bank (Bank Negara Malaysia), among others. Applying the methodologies chosen, this study will provide meaningful results and discussion on the issues that have been chosen for analysis.

CHAPTER FIVE

INDUSTRIES GROWTH CHANNELS

5.1 Introduction

Chapter five presents the analysis and results regarding the industries growth determinants. Based on discussion in the hypothesis development section from page 148 to 159 in chapter four, six hypotheses have been developed to examine the relationship between growth determinants (channels) and the growth of industrial output. These determinants are foreign direct investment, gross fixed capital formation, government consumption, the quality of macroeconomic policies, export of manufactured goods and human capital. The hypotheses developed are:

i. Foreign direct investment has a positive relationship with industry growth.
ii. Gross capital formation has a positive relationship with industry growth.
iii. Government consumption has a positive/negative relationship with industry growth.
iv. The quality of macroeconomic policies has a positive relationship with industry growth.
v. Manufactured export has a positive relationship with industry growth.
vi. Human capital has a positive relationship with industry growth.

Besides the above hypotheses, another group of hypotheses have also been developed to examine the impact of trade liberalization on industries growth through the channels. These hypotheses are:

i. Openness to trade has a positive causal relationship with industries' output through government expenditure.
ii. Openness to trade has a positive causal relationship with industries' output through the quality of macroeconomic policies.

iii. Openness to trade has a positive causal relationship with industries' output through foreign direct investment.
iv. Openness to trade has a positive causal relationship with industries' output through gross capital formation.
v. Openness to trade has a positive causal relationship with industries' output through the manufactured exports.
vi. Openness to trade has a positive causal relationship with industries' output through human capital.

The next sub-section of the chapter presents the findings which will be divided into three parts. The first part explains the results for aggregate data where 19 industries are analyzed together. The analysis is aimed at determining which growth channels have impact on the growth of the aggregate manufacturing industry. Since the data depicted micro-panel data characteristics, our analysis covers both static (OLS, Fixed and Random Effects and GLS) and dynamic model (GMM) estimations. In the static estimations we have include the White general test and Wooldridge test to identify for heteroskedasticity and serial correlation problems in the dataset. We have also included the Durbin-Wu-Hausman test to check for the presence of endogenous variables in the model. In order to obtain a more convincing result, we have run the GLS estimation which is robust to heteroskedasticity across panels and serial correlation within panels. Meanwhile, in the dynamic estimations we have estimates the Hansen test and the Arellano-Bond test to identify for over identifying restrictions and serial correlation in the GMM model. The second part explains the analysis of 19 individual industries separately. In this section, the data were extended for 20 years therefore our analysis will only focused on the OLS estimation. No unit root test is required to check for this problem because of the panel data characteristics which is robust to it. The last part of the findings presents results for causality analysis since our main interest is to investigate the causal relationship between trade liberalization and industrial growth through each channel individually.

5.2 Findings and Discussion

Initial analysis will focused on the analysis of aggregate manufacturing industry later followed by individual industry analysis. This analysis for aggregate manufacturing industry will include both static and dynamic model estimations. Static estimation model include estimation of Ordinary Least Square (OLS), Fixed and Random effects and Generalized Least Square (GLS). For dynamic estimation, our study chose Generalized Method of Moments (GMM) estimation techniques since our data features micro panel data characteristics (t=6 and i=19). Meanwhile the analysis for individual industry will focus only on the OLS estimation since the data represent a time series data (t=20 years). In the second part of analysis, all 19 industries will be analyzed separately for cross industries comparison. The impact of trade liberalization on industrial growth through the selected channels will be discussed in the last part of the analysis. We have selected sixth export-oriented industries for the analysis. The industries are electrical and electronic products, textiles and wearing apparel products, wood products, rubber products, petroleum and fuel products, scientific and measuring equipments and machinery and equipments products industries. These industries are selected because they are the main industries which contributed to the growth of export in the manufacturing sector.

5.2.1 Analysis at Industry Level

5.2.1.1 Static Model Estimation

In the static model we are interested in estimating the industry-specific effects and time-specific effects of the model. The industry-specific effects (u_i) can represent any industry-specific characteristics for example; business models, firms' strategies, outsourcing practices, policies related to investment and human resources requirement and business procedure and requirements, and production classification and determinants which are influenced by research and development expenditure and the information and technology expenditure. Meanwhile the time-specific effects (λ_t) are to be estimated as coefficients which can be justified given events such as the shock in production related to the 1997 economic turmoil, which had a long term effect on sub-industries in the Malaysian manufacturing sectors, the economic downturn period during 2001 until 2002 and the impact of 11th September tragedy whether during the short term or for a longer period of time.

From the proposed model in chapter four, the dependent variable is the real output of the industry while the independent variables include real foreign direct investment, real fixed capital formation, real government consumption, the quality of macroeconomic policy proxy by the index of economic freedom, real manufactured exports and human capital proxy by secondary school enrolment. Output of industry, foreign direct investment, fixed capital formation, government consumption, and manufactured export are in real terms. All data are expressed in log transformation. The analysis covers annual observations of 19 manufacturing industries for 8 years from 1999 to 2006. The 19 industries classified are as discussed in chapter four previously. The results of the static estimated model pertaining to OLS, Fixed and Random effect and GLS models are shown in Table 5.1 below.

Table 5.1: OLS, Fixed, Random and GLS Result

Variables	OLS	Fixed	Random	GLS
Foreign direct investment (FDI)	0.1665*	0.0174	0.0500*	0.079*
	(5.16)	(1.25)	(2.55)	(3.98)
Gross fixed capital formation (GFCF)	0.6345*	0.0232	0.1718*	0.572*
	(12.78)	(0.78)	(4.37)	(13.76)
Government Consumption (GC)	1.2526*	0.1445	0.4061	0.605
	(1.81)	(0.59)	(1.16)	(1.6)
Macroeconomic policies Quality (Mq)	0.5652	-0.1543	-0.0315	0.112
	(0.83)	(-0.65)	(-0.09)	(0.33)
Manufactured exports (Mx)	-2.9484*	-5.4921*	-4.6465*	-3.286*
	(-1.76)	(-9.15)	(-5.42)	(-3.41)
Human capital (Hc)	-0.0435	0.0746*	0.1322*	0.148*
	(-0.81)	(2.02)	(2.68)	(2.92)
_cons	14.4644*	38.5805*	30.9552*	18.388*
	(1.80)	(12.60)	(7.20)	(3.96)
F	112.74	58.97	-	-
	(0.000)	(0.000)		
Chi^2	-	-	122.54	665.23
			(0.000)	(0.000)
r^2	0.8235	0.5581	0.8297	-
r^2_a	0.8162	-		-
Sigma_u	-	1.29036	0.35555	-
Sigma_e	-	0.20949	0.20949	-
rho[3]	-	0.97432	0.74230	-
White test	69.96	-		-
	(0.000)			
Wooldridge test	137.43	-		-
	(0.000)			
Durbin-Wu-Hausman test	-	26.59		-
		(0.000)		
N	152	152	152	152

Notes: * p<0.10 indicate the 10 percent or smaller significance levels
Figure in parentheses are t-statistics; [3]fraction of variance due to u_i

The results of OLS regression show that foreign direct investment, fixed capital formation and manufactured exports have a statistically significant association in determining changes in the growth of the industries' output. These variables show the expected sign except for manufactured export which shows a contradictory sign. Overall, our findings indicate that if foreign direct investment and fixed capital formation increase by one percent, it would increase the aggregate output by 0.167 percent and 0.635 percent, respectively. The value of goodness-of-fit measures (R^2) for OLS estimation is 0.824 which indicates a high correlation between variables in the model. Although the coefficient computed represents a highly statistically significant value, a potential problem that may arise in cross-sectional and time-series model is an inefficient result attributed to heteroskedasticity and serial correlation.

Our analysis includes the White general test for heteroskedasticity and Wooldridge test for serial correlation to identify these problems. Since the probability value produced for both estimations is smaller than 0.05, the result rejected the null hypothesis of both tests[52] which means that heteroskedasticity and serial correlation exist in the model. Therefore, the standard errors computed in the OLS estimation are biased and leads to bias in the confidence intervals and the test statistics. We have also included the Durbin-Wu-Hausman test to check for the presence of endogenous variables in the model. The null hypothesis stated that the variables are exogenous. The result rejected the null hypothesis and show that the variables in the model are endogenous since the chi-squared calculated produce a p-value less than 0.05.

We have run the GLS regression which is robust to heteroskedasticity across panels and serial correlation within panels. The result after correcting for the above mentioned problems indicate that a majority of the variables have a statistically significant association at the 90 percent confidence level or higher except for government consumption and the quality of macroeconomic policy. Thus, human capital is now significant while manufactured exports retain their unexpected negative sign. Our results show that if foreign direct investment inflow increases by one percent, it would increase the aggregate output by 0.079 percent. Similarly, a one percent increase in fixed capital formation and human capital would also increase the output by 0.572 percent and 0.148 percent respectively. These findings are consistent with the theories proposed by Grossman and Helpman (1990, 1991a, 1991b) and Barro and Sala-i-Martin (1997) and the empirical result obtained by Kogid et al. (2010) and Dutta and Ahmed (2004). Meanwhile, a one percent increase in manufactured export would decrease the aggregate manufacturing output by 3.286 percent since the relationship is negative. We believe that our findings failed to support the school of thought that the economic growth is being export-led.

5.2.1.2 Dynamic Model Estimation

The data used in analysis features a micro panel with short or small time dimension; small number of years (t=8) and a larger panel dimension (i=19), and theoretical literatures cited previously have indicated that normally endogeneity problems exist in a micro panel data. In conjunction with this, the result of Durbin-Wu-Hausman test supports the presence of endogeneity in our OLS model. Therefore, to deal with the biases as mention above, our study consider two types of Generalized Method of Moments estimator, firstly the Arellano-Bond (1991) Difference GMM Estimation and secondly the Blundell and Bond (1995) and Blundell and Bover System GMM Estimation (1998). These GMM approaches are well suited method when dealing with a dynamic micro panel in the presence of an endogeneity problem. Theoretical literatures had suggested that the two-step estimator in both difference and system generalized method of moments (GMM) regression is more efficient than the first-step estimator. The results of the dynamic estimated model pertaining to both difference and system generalized method of moment models are shown in Table 5.2 below.

Table 5.2: Difference and System GMM Result

Variables	GMM Diff (one-step)	GMM Diff (two-step)	GMM Sys (one-step)	GMM Sys (two-step)
Lag Output	0.0332	0.0238	0.9067*	0.9539*
	(0.26)	(0.25)	(18.64)	(20.28)
	-0.0037	-0.0022	0.0012	-0.0013
Foreign direct investment (FDI)	(-0.34)	(-0.28)	(0.08)	(-0.17)
Gross fixed capital formation	0.0266	0.0268*	0.0672*	0.0593*
(GFCF)	(1.29)	(2.65)	(2.34)	(6.08)
Government Consumption (GC)	-0.2098	-0.2029*	-0.3777*	-0.5857*
	(-1.40)	(-1.98)	(-1.78)	(-4.52)
Macroeconomic policies Quality	0.0666	0.0815	-0.5671*	-0.6346*
(Mq)	(0.39)	(0.86)	(-3.12)	(-7.64)
Manufactured exports (Mx)	-5.1776*	-5.1878*	-0.0789	0.0095
	(-6.32)	(-8.89)	(-0.18)	(0.04)
Human capital (Hc)	0.0364*	0.0379*	0.0522*	0.0562*
	(1.67)	(3.79)	(1.70)	(1.90)
_cons	38.1002*	38.1914*	2.0892	1.6377
	(6.99)	(10.50)	(0.94)	(1.09)
Chi^2	335.95	1706.00	1118.61	25003.53
	(0.000)	(0.000)	(0.000)	(0.000)
Hansen Test	36.3173	18.2176	40.4886	15.9757
	(0.0141)	(0.5731)	(0.0349)	(0.9368)
Arellano-Bond Test 1st order	-	-3.058	-	-2.927
		(0.0022)		(0.0034)
Arellano-Bond Test 2nd order	-	1.0007	-	0.1969
		(0.3170)		(0.8439)
N	114	114	133	133

Notes: * p<0.10 indicate the 10 percent or smaller significance levels
Hansen Test – test of overidentfying restrictions
Arellano-Bond Test – test for serial correlation in first and second order differenced errors
Figure in parentheses are t-statistics, except for Hansen test and Arellano-Bond test which are p-values.

Since the two-step estimator is more efficient than the first-step estimator our discussion will focus mainly on the two-step estimation result. Both two-step difference and system generalized method of moments (GMM) regression results show that the models are statistically fit. This is shown by the estimated p-value for both models which is smaller than 0.05 with χ^2 test values of 121.36 and 25003.53 respectively. The regression results for two-step difference GMM show that fixed capital formation, government consumption, manufactured exports and human capital have a statistically significant association; however again manufactured exports and government consumption show a contradictory sign. The results also shows that if fixed capital formation and human capital increases by one percent, it would increase the growth rate of output by 0.027 percent and 0.038 percent respectively. Meanwhile, if manufactured exports and government consumption increase by one percent, it would decrease the growth rate of output by 5.188 percent and 0.203 percent, respectively. Again, our findings failed to support the school of thought that the economic growth is being export-led. The finding for government consumption might support the proponents of 'smaller government' school of thought. This would show that high spending made by the Malaysian government had undermines economic growth by transferring additional resources from the productive sector of the economy to unproductive sector which uses them less efficiently.

On the other hand, the results for two-step system GMM regression show that previous value of output, fixed capital formation, government consumption, quality of macroeconomic policies and human capital have a statistically significant association in explaining the growth of output. In this estimation again government consumption and quality of macroeconomic policies show a negative sign. As such, the results indicate that if the previous value of the output increases by one percent, it would increase the aggregate output by 0.954 percent. Similarly, if fixed capital formation increase by one percent, it would also increase the output by 0.059 percent. Meanwhile, if government consumption and quality of macroeconomics policies increase by one percent, it would decrease the aggregate output by 0.586 percent and 0.635 percent, respectively. Overall, the results in both difference and system GMM are almost similar to the theories proposed by Grossman and Helpman (1990, 1991a, 1991b) and Barro and Sala-i-Martin (1997) and the empirical result obtained by Kogid et al. (2010) and Dutta and Ahmed (2004).

The results of the specification tests which test the validity of instruments adopted in the model show that the empirical model has been correctly specified**.** The

Hansen test for over identifying restrictions in the two-step difference GMM model which produced a χ^2 calculated value of 18.2176 failed to reject the null hypothesis since the p-value calculated is higher than 0.05. Meanwhile the Arellano-Bond test for serial correlation in the GMM model failed to reject the null hypothesis of no first-order serial correlation while rejecting the null hypothesis of second-order serial correlation which shows that the instruments (moment conditions) used in the model are valid. The results of the over identification restrictions and serial correlation tests are also similar with respect to the two-step system GMM model.

5.2.2 Analysis at Individual Industry Level

We have also conducted the regression analysis for export-oriented industries. However, as these industries are analyzed separately, the methodology applied is related to the static model as the dynamic model is no longer relevant. Dynamic model requires the data to feature a time series and cross-sectional characteristics, whereas our individual analysis will be conducted using time series data for each industry separately. The time analyzed is extended from 1987 to 2006 (t=20 years). Since the data is a time series data, we have conducted the Dickey-Fuller test for unit root, Breusch-Pagan/Cook-Weisberg test for heteroskedasticity and Breusch-Godfrey test for serial correlation.

5.2.2.1 Static Model Estimation

Individual industry analysis for the OLS regression as shown in Table 5.3 below indicates mixed results. The OLS result is the estimation obtained after correcting for the unit root problem; using the first differencing method since both the Breusch-Pagan test and the Breusch-Godfrey test indicate that both heteroskedasticity and serial correlation do not exist when this is done.

Table 5.3: OLS Result for Individual Export-Oriented Industry

Industry	Variables						Statistic Test						
	FDI	GFCF	GC	Mq	Mx	Hc	F	r^2	r^2_a	DF	BP	BG	N
Textiles products	0.006 (0.18)	-0.059 (-1.42)	-2.915* (-5.83)	0.021 (0.10)	0.410 (1.31)	0.155 (0.28)	37.64 (0.00)	0.946	0.920	3.773 (0.003)	0.12 (0.729)	0.022 (0.882)	20
Wood products	-0.087 (-0.57)	0.203* (2.54)	-8.879* (-5.64)	-0.266 (-0.67)	-2.656* (-5.99)	7.602* (3.90)	85.77 (0.000)	0.975	0.964	3.374 (0.012)	0.25 (0.619)	0.124 (0.725)	20
Petroleum products	0.0011 (1.31)	0.035 (0.76)	-2.037* (-6.68)	-0.209 (-1.14)	-0.559* (-7.03)	0.086* (2.74)	47.44 (0.000)	0.956	0.936	4.599 (0.000)	1.35 (0.245)	0.592 (0.442)	20
Rubber products	0.405* (5.31)	0.057 (0.31)	-5.736* (-4.45)	-0.921* (-1.82)	-1.602* (-3.34)	0.413 (1.76)	45.97 (0.000)	0.955	0.934	3.590 (0.006)	0.01 (0.990)	1.681 (0.195)	20
Machinery products	0.755 (1.48)	0.649* (2.18)	-2.628 (-0.62)	0.186 (-0.17)	-1.252 (-1.46)	1.049 (1.14)	19.41 (0.000)	0.899	0.853	4.849 (0.000)	2.67 (0.102)	0.408 (0.523)	20
Electrical & Electronics products	1.133* (3.86)	0.527 (0.84)	7.906 (1.09)	0.747 (0.78)	-2.166 (-3.84)	0.447 (1.36)	57.67 (0.000)	0.964	0.947	4.076 (0.001)	0.67 (0.414)	2.521 (0.112)	20
Scientific & Measuring equipments	0.085 (0.43)	-0.153 (-0.55)	-5.773 (-0.89)	3.378 (1.72)	5.718* (3.28)	0.758* (2.37)	26.38 (0.000)	0.924	0.889	3.028 (0.032)	0.12 (0.726)	0.057 (0.812)	20
Leather products	0.017 (0.04)	0.045* (2.08)	-8.50* (-2.03)	0.073 (0.04)	0.569 (0.39)	0.155 (1.46)	8.13 (0.000)	0.789	0.693	3.284 (0.015)	0.41 (0.521)	0.134 (0.714)	20

Notes: * $p<0.10$ indicate the 10 percent or smaller significance levels;
Figure in parentheses are t-statistics
DF = Dickey-Fuller test for unit root; BP = Breusch-Pagan test for heteroskedasticity; BG = Breusch-Godfrey test for serial correlation.

Estimation results in the OLS model suggest that the foreign direct investment channel has a statistically significant association in the rubber products, and the electrical and electronics products industries at the 90 percent confidence level or higher with the direction as expected. The findings show that if the foreign direct investment increased by 1 percent, it would increase the output of the rubber products and the electrical and electronic products industries by 0.405 percent and 1.133 percent, respectively. Meanwhile, the fixed capital formation has a statistically significant association in the wood products, machinery equipments, and leather products industries at the 90 percent confidence level or higher. All these results show a positive relationship, which is consistent with the hypotheses. The findings indicate that if the fixed capital formation increases by 1 percent, it would increase the output of the wood, machinery, and leather products industries by 0.203 percent, 0.649 percent, and 0.045 percent, respectively.

The government consumption channel has a statistically significant association in the textiles products, wood products, petroleum and fuel products, rubber products and leather products industries at the 90 percent confidence level or higher. The results indicate a negative association in all the industries. Therefore, the results suggest that if the government consumption increased by 1 percent, it would decrease the output of these industries by 2.915 percent, 8.879 percent, 2.037 percent, 5.736 percent and 8.5 percent, respectively. On the other hand, the quality of macroeconomic policies channel has a statistically significant association only in the rubber products industry. The result shows that if the quality of macroeconomic policies increased by 1 percent it would decrease the output of rubber products industry by 0.921 percent. The findings at individual industry level have also support the proponents of ‘smaller government’ school of thought. The result therefore might indicate that spending made by the Malaysian government had undermines growth in these individual industries by transferring additional resources to other unproductive industries.

The manufactured exports channel has a statistically significant association in industries such as the electrical and electronic products, wood products, petroleum and fuel products, rubber products and scientific and measuring equipments industries at the 90 percent confidence level or higher. Again, a majority of the industries show a negative sign except for the scientific and measuring equipments industry. These results indicate that if the manufactured export increased by 1 percent, it would decrease the output of electrical and electronic products, wood products, petroleum and fuel products, and rubber products industries by 2.166 percent, 2.656 percent, 0.559 percent and 1.602 percent, respectively, but it would increase the output of the scientific and measuring equipments industry by 5.718 percent. Meanwhile, the human capital channel has a statistically significant association in the wood products, the petroleum and fuel products and the scientific and measuring equipments industries at the 90 percent confidence level or higher with the direction as expected. Therefore, if the human capital increased by 1 percent, it would increase the output of wood products, petroleum and fuel products and scientific and measuring equipments industries by 7.602 percent, 0.086 percent and 0.758 percent, respectively.

5.2.3 Analysis of Causal Relationship for Industries Growth Channels.

The next stage of analysis is pertaining to the causal relationship of trade liberalization with the growth of the industry's output through the growth channels. As mentioned earlier, our analysis will employ the Granger causality analysis to analyze the causality relationship between the chosen variables. The null hypothesis for Granger-causality test indicates that the endogenous variables do not Granger causes the dependent variable. The null hypothesis will be rejected at a probability value of 5 percent or smaller. We have selected seven export-oriented industries namely textiles products, wood products, petroleum products, rubber products, electrical and electronic products, machinery equipments and scientific and measuring instruments for the analysis. Tables 5.4 to 5.9 below show the result of Granger causality estimation in the export-oriented industries for each of the growth channels.

The Granger Causality results in Table 5.4 below suggest that in the short run, the openness to trade via tariff and nontariff implementation stimulates the growth of foreign direct investment inflows and output in a majority of the export-oriented industries except for the electrical and electronic industry. In the electrical and electronic industry, the results suggest that there is no causality relationship between openness to trade, foreign direct investment and output of this industry. Foreign direct investment has no causal relationship with output of machinery and equipments industry, however the results show that there is a causal relationship when the endogenous variables and the output are analyzed together. Each column of Table 5.4 below show details of the results. Overall, the findings indicate the importance of foreign direct investment channel in generating the growth of a majority of the Malaysian export-oriented industries, and confirm the hypotheses as suggested in chapter one.

Table 5.4: Granger Causality Result for Foreign Direct Investment

Channel	**Lag Level 3**	**Granger Causality**	
FDI	Openness to trade has a causality relationship with the output of industry through the foreign direct investment	**Chi^2**	**Result**
Industries	**Null Hypothesis**		
Textiles products	TARIFF does not Granger cause FDI	18.73 (0.000)	There is a causality relationship between openness to trade, FDI and output of textiles industry
	NONTARIFF does not Granger cause FDI	39.47 (0.000)	
	FDI does not Granger cause output	16.51 (0.001)	
	All variables (tariff, nontariff and FDI) does not Granger cause output	95.04 (0.000)	
Wood products	TARIFF does not Granger cause FDI	56.22 (0.000)	There is a causality relationship between openness to trade, FDI and output of wood industry
	NONTARIFF does not Granger cause FDI	106.1 (0.000)	
	FDI does not Granger cause output	64.40 (0.000)	
	All variables (tariff, nontariff and FDI) does not	276.65	

	Granger cause output	(0.000)	
Petroleum products	TARIFF does not Granger cause FDI	16.10 (0.001)	There is a causality relationship between openness to trade, FDI and output of petroleum industry
	NONTARIFF does not Granger cause FDI	17.07 (0.001)	
	FDI does not Granger cause output	13.49 (0.004)	
	All variables (tariff, nontariff and FDI) does not Granger cause output	63.44 (0.000)	
Rubber products	TARIFF does not Granger cause FDI	97.17 (0.000)	There is a strong causality relationship between openness to trade, FDI and output of rubber industry
	NONTARIFF does not Granger cause FDI	112.77 (0.000)	
	FDI does not Granger cause output	80.84 (0.000)	
	All variables (tariff, nontariff and FDI) does not Granger cause output	219.67 (0.000)	
Electrical & Electronics products	TARIFF does not Granger cause FDI	7.16 (0.067)	There is no causality relationship between openness to trade, FDI and output of electrical and electronic industry
	NONTARIFF does not Granger cause FDI	1.63 (0.653)	
	FDI does not Granger cause output	1.61 (0.658)	
	All variables (tariff, nontariff and FDI) does not Granger cause output	13.85 (0.128)	
Machinery & Equipments	TARIFF does not Granger cause FDI	12.49 (0.006)	FDI does not Granger cause output, but there is a causality relationship between openness to trade, FDI and output of machinery and equipments industry when they are regress together
	NONTARIFF does not Granger cause FDI	32.70 (0.000)	
	FDI does not Granger cause output	3.43 (0.330)	
	All variables (tariff, nontariff and FDI) does not Granger cause output	101.34 (0.000)	
Scientific & Measuring Instruments	TARIFF does not Granger cause FDI	5.57 (0.134)	Tariff does not Granger cause FDI, but there is a causality relationship between openness to trade, FDI and output of scientific & measuring instruments industry when they are regress together
	NONTARIFF does not Granger cause FDI	10.63 (0.014)	
	FDI does not Granger cause output	16.16 (0.001)	
	All variables (tariff, nontariff and FDI) does not Granger cause output	42.47 (0.000)	

Notes: Figure in parentheses is p-values.

The Granger Causality results in Table 5.5 below show that in the short run, the openness to trade stimulates the growth of fixed capital formation which in turn stimulates an increase in output of these export-oriented industries except for the scientific and measuring instruments industry. In the scientific and measuring instruments industry, the result suggests that non-tariff barriers have a causality relationship with the fixed capital formation: however fixed capital formation has no causality relationship with the output of scientific and measuring instruments industry and when analyzed together the results show that there is no causality relationship between the endogenous variables and output of this industry. Detail results are presented in each column of Table 5.5 below. Overall, the findings indicate the importance of fixed capital formation channel in generating the growth of a majority of the Malaysian export-oriented industries, and confirm the hypothesis suggested in chapter one.

Table 5.5: Granger Causality Result for Fixed Capital Formation

Channel	**Lag Level 3**	**Granger Causality**	
FCF	Openness to trade has a positive causality relationship with the output of industry through the fixed capital formation	**Chi^2**	**Result**
Industries	**Null Hypothesis:**		
Textiles products	TARIFF does not Granger cause FCF	59.44 (0.000)	There is a causality relationship between openness to trade, FCF and output of textiles industry
	NONTARIFF does not Granger cause FCF	8.51 (0.037)	
	FCF does not Granger cause output	86.62 (0.000)	
	All variables (tariff, nontariff and FCF) does not Granger cause output	329.47 (0.000)	
Wood products	TARIFF does not Granger cause FCF	18.20 (0.000)	There is a causality relationship between openness to trade, FCF and output of wood industry
	NONTARIFF does not Granger cause FCF	36.33 (0.000)	
	FCF does not Granger cause output	17.24 (0.001)	
	All (tariff, nontariff and FCF) does not Granger cause output	106.53 (0.000)	
Petroleum products	TARIFF does not Granger cause FCF	14.40 (0.002)	Non-tariff does not Granger cause FCF, but there is a causality relationship between openness to trade, FCF and output of petroleum industry
	NONTARIFF does not Granger cause FCF	5.34 (0.149)	
	FCF does not Granger cause output	10.72 (0.013)	
	All variables (tariff, nontariff and FCF) does not Granger cause output	57.95 (0.000)	
Rubber products	TARIFF does not Granger cause FCF	5.26 (0.154)	Tariff does not Granger cause FCF, but there is a
	NONTARIFF does not Granger cause FCF	33.14	

		(0.000)	causality relationship between openness to trade, FCF and output of rubber industry
	FCF does not Granger cause output	18.56 (0.000)	
	All variables (tariff, nontariff and FCF) does not Granger cause output	69.02 (0.000)	
Electrical & Electronic products	TARIFF does not Granger cause FCF	22.01 (0.000)	Non-tariff does not Granger cause FCF, but there is a causality relationship between openness to trade, FCF and output of electrical and electronic industry
	NONTARIFF does not Granger cause FCF	4.58 (0.211)	
	FCF does not Granger cause output	12.35 (0.006)	
	All variables (tariff, nontariff and FCF) does not Granger cause output	31.67 (0.000)	
Machinery & Equipments	TARIFF does not Granger cause FCF	181.03 (0.000)	There is a strong causality relationship between openness to trade, FCF and output of machinery and equipments industry
	NONTARIFF does not Granger cause FCF	1244.6 (0.000)	
	FCF does not Granger cause output	335.63 (0.000)	
	All variables (tariff, nontariff and FCF) does not Granger cause output	2025.5 (0.000)	
Scientific & Measuring Instruments	TARIFF does not Granger cause FCF	7.33 (0.062)	There is a causality relationship between non-tariff and FCF but there is no causality relationship between openness to trade, FCF and output of scientific & measuring instruments industry when they are analyzed together
	NONTARIFF does not Granger cause FCF	9.05 (0.029)	
	FCF does not Granger cause output	1.76 (0.623)	
	All variables (tariff, nontariff and FCF) does not Granger cause output	16.65 (0.054)	

Notes: Figure in parentheses is p-values.

The Granger Causality results in Table 5.6 indicate that in the short run, the openness to trade variables stimulates the growth of government consumption and output in all the export-oriented industries chosen. In the electrical and electronic industry, the result suggests that both tariff and nontariff barrier have no causality relationship with the government consumption channel and this channel also has no causality relationship with the output of electrical and electronic industry, however the results show that there is a causal relationship between these endogenous variables and the output of the electrical and electronic industry when they are analyzed together. Each column of Table 5.6 below shows the results in detail. Overall, the findings indicate the importance role of government consumption channel in generating the growth of the selected export-oriented industries.

Table 5.6: Granger Causality Result for Government Consumption

Channel	**Lag Level 3**	**Granger Causality**	
GC	Openness to trade has a positive causality relationship with the output of industry through the government consumption	**Chi^2**	**Result**
Industries	**Null Hypothesis:**		
Textiles products	TARIFF does not Granger cause GC	8.26 (0.041)	GC does not Granger cause output but there is a causality relationship between openness to trade, GC and output of textiles industry when they are regress together
	NONTARIFF does not Granger cause GC	49.08 (0.000)	
	GC does not Granger cause output	7.07 (0.070)	
	All variables (tariff, nontariff and GC) does not Granger cause output	63.49 (0.000)	
Wood products	TARIFF does not Granger cause GC	8.13 (0.043)	There is a causality relationship between openness to trade, GC and output of wood industry
	NONTARIFF does not Granger cause GC	12.15 (0.007)	
	GC does not Granger cause output	12.71 (0.005)	
	All variables (tariff, nontariff and GC) does not Granger cause output	90.17 (0.000)	
Petroleum products	TARIFF does not Granger cause GC	18.14 (0.000)	There is a causality relationship between openness to trade, GC and output of petroleum industry
	NONTARIFF does not Granger cause GC	18.20 (0.000)	
	GC does not Granger cause output	10.01 (0.019)	
	All variables (tariff, nontariff and GC) does not Granger cause output	56.04 (0.000)	
Rubber products	TARIFF does not Granger cause GC	15.61 (0.001)	There is a causality relationship between openness to trade, GC and output of rubber industry
	NONTARIFF does not Granger cause GC	28.16 (0.000)	
	GC does not Granger cause output	9.56 (0.023)	
	All variables (tariff, nontariff and GC) does not Granger cause output	47.24 (0.000)	
Electrical & Electronics products	TARIFF does not Granger cause GC	5.21 (0.157)	There is a weak causality relationship between openness to trade, GC and output of electrical and electronic industry when they are
	NONTARIFF does not Granger cause GC	1.57 (0.667)	
	GC does not Granger cause output	4.2632 (0.23)	
	All variables (tariff, nontariff and GC) does not	18.26	

	Granger cause output	(0.032)	regress together
Machinery & Equipments	TARIFF does not Granger cause GC	32.22 (0.000)	There is a strong causality relationship between openness to trade, GC and output of machinery and equipments industry
	NONTARIFF does not Granger cause GC	103.4 (0.000)	
	GC does not Granger cause output	22.47 (0.000)	
	All variables (tariff, nontariff and GC) does not Granger cause output	211.63 (0.000)	
Scientific & Measuring Instruments	TARIFF does not Granger cause GC	11.06 (0.011)	There is a causality relationship between openness to trade, GC and output of scientific and measuring instruments industry
	NONTARIFF does not Granger cause GC	10.65 (0.014)	
	GC does not Granger cause output	16.11 (0.001)	
	All variables (tariff, nontariff and GC) does not Granger cause output	42.38 (0.000)	

Notes: Figure in parentheses is p-values.

The Granger Causality results in Table 5.7 below suggest that in the short run, the openness to trade variables stimulates the growth of quality of macroeconomic policies which in turn stimulates an increase in output of the export-oriented industries. The result for the machinery and equipment industry indicates a strong causality relationship between all the variables. As regards to the petroleum industry, the results show that quality of macroeconomic policy separately has no causality relationship with the output of petroleum products, however there is a causality relationship between the endogenous variables with the output when they are analyzed together. Similarly, quality of macroeconomic policy has no causality relationship with the output of textiles industry but when analyzed together, the result show that there is a causal relationship between these endogenous variables with the output. The rest of the results are presented in each column of Table 5.7 below. Overall, the findings indicate the importance of quality of macroeconomic policies channel in generating the growth of the Malaysian export-oriented industries, and again confirm the hypotheses as suggested in chapter one.

Table 5.7: Granger Causality Result for Quality of Macroeconomic Policies

Channel MQ	Lag Level 3 Openness to trade has a positive causality relationship with the output of industry through the quality of macroeconomic policy	Granger Causality Chi^2	 Result
Industries	**Null Hypothesis:**		
Textiles products	TARIFF does not Granger cause MQ	7.74 (0.052)	MQ does not Granger cause output, but there is a causality relationship between openness to trade, MQ and output of textiles industry when they are regress together
	NONTARIFF does not Granger cause MQ	29.78 (0.000)	
	MQ does not Granger cause output	4.16 (0.245)	
	All variables (tariff, nontariff and MQ) does not Granger cause output	53.76 (0.000)	
Wood products	TARIFF does not Granger cause MQ	9.34 (0.025)	There is a causality relationship between openness to trade, MQ and output of wood industry
	NONTARIFF does not Granger cause MQ	15.64 (0.001)	
	MQ does not Granger cause output	11.05 (0.011)	
	All variables (tariff, nontariff and MQ) does not Granger cause output	84.18 (0.000)	
Petroleum products	TARIFF does not Granger cause MQ	16.69 (0.001)	Non-tariff does not Granger cause MQ, but there is a causality relationship between openness to trade, MQ and output of petroleum industry when they are regress together
	NONTARIFF does not Granger cause MQ	1.59 (0.663)	
	MQ does not Granger cause output	5.27 (0.153)	
	All variables (tariff, nontariff and MQ) does not Granger cause output	43.22 (0.000)	
Rubber products	TARIFF does not Granger cause MQ	8.77 (0.032)	There is a causality relationship between openness to trade, MQ and output of rubber industry
	NONTARIFF does not Granger cause MQ	53.59 (0.000)	
	MQ does not Granger cause output	51.88 (0.000)	
	All variables (tariff, nontariff and MQ) does not Granger cause output	149.62 (0.000)	
Electrical & Electronics products	TARIFF does not Granger cause MQ	42.52 (0.000)	There is a strong causality relationship between openness to trade, MQ and output of electrical and electronic industry
	NONTARIFF does not Granger cause MQ	46.44 (0.000)	
	MQ does not Granger cause output	72.96 (0.000)	
	All variables (tariff, nontariff and MQ) does not Granger cause output	132.17 (0.000)	
Machinery & Equipments	TARIFF does not Granger cause MQ	61.59 (0.000)	There is a strong causality relationship between openness to trade, MQ and output
	NONTARIFF does not Granger cause MQ	321.15 (0.000)	

	MQ does not Granger cause output	93.01 (0.000)	of machinery and equipments industry
	All variables (tariff, nontariff and MQ) does not Granger cause output	620.16 (0.000)	
Scientific & Measuring Instruments	TARIFF does not Granger cause MQ	4.81 (0.186)	There is a causality relationship between openness to trade, MQ and output of scientific and measuring instruments industry
	NONTARIFF does not Granger cause MQ	60.78 (0.000)	
	MQ does not Granger cause output	104.24 (0.000)	
	All variables (tariff, nontariff and MQ) does not Granger cause output	200.43 (0.000)	

Notes: Figure in parentheses is p-values.

The Granger Causality results in Table 5.8 below indicate that in the short run, the openness to trade variables stimulates the growth of export of manufactured goods which in turn stimulates growth in the output of these industries. Although the trade liberalization proxies shows no causal relationship with export of manufactured goods in a few of the export-oriented industries, but, when these endogenous variables are analyzed together with the output of the industry, all of them show that there is a causal relationship between them. Detail results of each industry are presented in Table 5.8 below. These findings indicate the importance of manufactured exports channel in generating the growth of all the selected export-oriented industries, and confirms the hypotheses as suggested in chapter one.

Table 5.8: Granger Causality Result for Export of Manufactured Goods

Channel	**Lag Level 3**	**Granger Causality**	
MX	Openness to trade has a positive causality relationship with the output of industry through the manufactured export.	**Chi^2**	**Result**
Industries	**Null Hypothesis:**		
Textiles products	TARIFF does not Granger cause MX	8.20 (0.042)	There is a causality relationship between openness to trade, MX and output of textiles industry when they are regress together
	NONTARIFF does not Granger cause MX	39.00 (0.000)	
	MX does not Granger cause output	8.40 (0.038)	
	All variables (tariff, nontariff and MX) does not Granger cause output	67.92 (0.000)	
Wood products	TARIFF does not Granger cause MX	3.15 (0.369)	Tariff does not Granger cause MX, but there is a causality relationship between
	NONTARIFF does not Granger cause MX	34.99 (0.000)	

	MX does not Granger cause output	11.55 (0.009)	openness to trade, MX and output of wood industry when they are regress together
	All variables (tariff, nontariff and MX) does not Granger cause output	85.98 (0.000)	
Petroleum products	TARIFF does not Granger cause MX	17.07 (0.001)	There is a causality relationship between openness to trade, MX and output of petroleum industry
	NONTARIFF does not Granger cause MX	8.23 (0.042)	
	MX does not Granger cause output	16.19 (0.001)	
	All variables (tariff, nontariff and MX) does not Granger cause output	72.77 (0.000)	
Rubber products	TARIFF does not Granger cause MX	23.67 (0.000)	There is a causality relationship between openness to trade, MX and output of rubber industry
	NONTARIFF does not Granger cause MX	44.28 (0.000)	
	MX does not Granger cause output	16.19 (0.001)	
	All variables (tariff, nontariff and MX) does not Granger cause output	63.29 (0.000)	
Electrical & Electronics products	TARIFF does not Granger cause MX	19.87 (0.000)	Non-tariff does not Granger cause MX, but there is a causality relationship between openness to trade, MX and output of electrical and electronics industry when they are regress together
	NONTARIFF does not Granger cause MX	2.25 (0.523)	
	MX does not Granger cause output	20.75 (0.000)	
	All variables (tariff, nontariff and MX) does not Granger cause output	45.59 (0.000)	
Machinery & Equipments	TARIFF does not Granger cause MX	9.40 (0.024)	There is a causality relationship between openness to trade, MX and output of machinery and equipments industry
	NONTARIFF does not Granger cause MX	112.65 (0.000)	
	MX does not Granger cause output	27.03 (0.000)	
	All variables (tariff, nontariff and MX) does not Granger cause output	238.03 (0.000)	
Scientific & Measuring Instruments	TARIFF does not Granger cause MX	4.40 (0.221)	Tariff does not Granger cause MX, but there is a causality relationship between openness to trade, MX and output of scientific and measuring instruments industry when they are regress together
	NONTARIFF does not Granger cause MX	123.53 (0.000)	
	MX does not Granger cause output	105.36 (0.000)	
	All variables (tariff, nontariff and MX) does not Granger cause output	202.43 (0.000)	

Notes: Figure in parentheses is p-values.

Finally, the Granger Causality results in Table 5.9 below show that in the short run, the openness to trade variable stimulates the growth of human capital which in turn stimulates growth in the output of these industries. The result for human capital channel is similar to the export of manufactured goods' results in the sense that the trade liberalization proxies shows no causal relationship with export of manufactured goods in a few of the export-oriented industries. However, the overall findings indicate the importance of human capital in generating the growth of the Malaysian export-oriented industries, and confirms the hypotheses as suggested in chapter one. Detail results are presented in each column of Table 5.9 below.

Table 5.9: Granger Causality Result for Human Capital

Channel	**Lag Level 3**	**Granger Causality**	
HC	Openness to trade has a positive causality relationship with the output of industry through the human capital.	**Chi^2**	**Result**
Industries	**Null Hypothesis:**		
Textiles products	TARIFF does not Granger cause HC	24.22 (0.000)	There is a causality relationship between openness to trade, HC and output of textiles industry
	NONTARIFF does not Granger cause HC	105.41 (0.000)	
	HC does not Granger cause output	30.87 (0.000)	
	All variables (tariff, nontariff and HC) does not Granger cause output	143.08 (0.000)	
Wood products	TARIFF does not Granger cause HC	11.49 (0.009)	There is a causality relationship between openness to trade, HC and output of wood industry
	NONTARIFF does not Granger cause HC	14.35 (0.002)	
	HC does not Granger cause output	17.36 (0.001)	
	All variables (tariff, nontariff and HC) does not Granger cause output	106.95 (0.000)	
Petroleum products	TARIFF does not Granger cause HC	22.63 (0.000)	Non-tariff does not Granger cause HC, but there is a causality relationship between openness to trade, HC and output of petroleum industry when they are regress together
	NONTARIFF does not Granger cause HC	3.33 (0.344)	
	HC does not Granger cause output	36.20 (0.000)	
	All variables (tariff, nontariff and HC) does not Granger cause output	126.86 (0.000)	
Rubber products	TARIFF does not Granger cause HC	4.200 (0.241)	Tariff does not Granger cause HC, but there is a causality relationship between openness to trade, HC and output of rubber industry when they are
	NONTARIFF does not Granger cause HC	50.17 (0.000)	
	HC does not Granger cause output	23.59 (0.000)	
	All variables (tariff, nontariff and HC) does	81.19	

	not Granger cause output	(0.000)	regress together
Electrical & Electronics products	TARIFF does not Granger cause HC	0.39 (0.942)	Tariff does not Granger cause HC, but there is a causality relationship between openness to trade, HC and output of electrical and electronics industry when they are regress together
	NONTARIFF does not Granger cause HC	10.73 (0.013)	
	HC does not Granger cause output	19.95 (0.00)	
	All variables (tariff, nontariff and HC) does not Granger cause output	44.26 (0.000)	
Machinery & Equipments	TARIFF does not Granger cause HC	8.74 (0.033)	There is a causality relationship between openness to trade, HC and output of machinery and equipments industry
	NONTARIFF does not Granger cause HC	38.94 (0.000)	
	HC does not Granger cause output	17.26 (0.001)	
	All variables (tariff, nontariff and HC) does not Granger cause output	181.45 (0.000)	
Scientific & Measuring Instruments	TARIFF does not Granger cause HC	5.35 (0.148)	Tariff does not Granger cause HC, but there is a causality relationship between openness to trade, HC and output of scientific and measuring instruments industry when they are regress together
	NONTARIFF does not Granger cause HC	14.42 (0.002)	
	HC does not Granger cause output	152.78 (0.000)	
	All variables (tariff, nontariff and HC) does not Granger cause output	287.48 (0.000)	

Notes: Figure in parentheses is p-values.

5.3 Conclusion

This study has been set out to provide empirical evidence of output growth determinants in Malaysia during the period from 1999 to 2006. The analysis is in two categories, analysis at aggregate output and at individual industry output particularly export-oriented industries. Six determinants which were also named as growth channels in our study were selected. These channels are foreign direct investment inflows, fixed capital formation, government consumption, quality of macroeconomic policies, export of manufactured goods and human capital. Meanwhile the export-oriented industries are wood products, textiles and apparel products, petroleum and fuel products, rubber products, machinery products, electrical and electronic products, leather products and scientific and measuring equipments. The dynamic methodology adopted i.e GMM has allowed us to further confirm the results obtain in the GLS static estimation techniques.

During the period studied, the results suggest that for aggregate industry analysis channels such as fixed capital formation and human capital are always statistically significant regardless of the test applied in both static and dynamic estimation techniques. In static estimation, the GLS results show that an increase of one percent in fixed capital formation and human capital would increase the aggregate output by 0.572 percent and 0.148 percent, respectively. Meanwhile in dynamic estimation, the two-step system GMM results show that an increase of one percent in fixed capital formation would increase the aggregate output by 0.059 percent. Similar to the effect in the static model, an increase of one percent in human capital would also increase the aggregate output by 0.148 percent in the dynamic model. This results indicate that the growth of output for aggregate manufacturing sector depend highly on the fixed capital formation and human capital channels.

On the other hand, exports of manufactured goods which are statistically significant in almost all tests applied in both static and dynamic estimation methodology but with a consistently negative association with aggregate output growth. In static estimation, the GLS results show that an increase of one percent in exports of manufactured goods would decrease the aggregate output by 3.286 percent. Meanwhile in dynamic estimation, the two-step difference GMM results show that an increase of one percent in exports of manufactured goods would decrease the aggregate output by 5.188 percent. We believe that our findings failed to support the school of thought that the economic growth is being export-led during the period under study.

Regarding the results for individual industry, analysis show that growth in the output for the export-oriented industries was driven by all the growth channels that have been chosen for the analysis. All channels show a strong association effect in at least some of the industries. Again, our findings failed to support the school of thought that the economic growth is being export-led during the period under study for these individual industries. The findings at individual industry level for government consumption also support the proponents of the 'smaller government' school of thought. The result therefore might indicate that spending made by the Malaysian government had undermines growth in the individual industries by transferring additional resources from these industries to other unproductive industries. Detailed explanation about these findings will take place in chapter eight. Our findings have also shown that trade liberalization has played an important role in generating the growth of a majority of the export-oriented industries through the selected channels. However, the results also suggest that there is no causal relationship between trade liberalization and the output of the electrical and electronic industry through foreign direct investment. Similarly, there is also no causal relationship between the trade liberalization and the output of the scientific and measuring instruments industry through fixed capital formation. Overall, the findings still indicate that the growth of a majority of the Malaysian export-oriented industries in the short run depend on the openness of the economy.

Chapter six will discuss another interesting issue pointing to the use of imported inputs and its relationship with growth of industries and firms in the Manufacturing sector.

CHAPTER SIX

IMPORTED INPUTS

6.1 Introduction

The second issue pertaining to our study is to investigate the relationship between growth of industries' and firms' revenue and the decision to use imported intermediate inputs. Referring to our discussion in the hypothesis development section from page 159 to 162 in chapter four, two hypotheses have been developed to examine the relationship between imported inputs content and growth for industries and for firms, separately. The estimation for both industry and firm are done according to the type of ownership; whether owned by Malaysian or non-Malaysian. These hypotheses are:

i. Imported input content has a positive relationship with the growth of the industry.
ii. Imported input content has a positive relationship with the growth of the firm.

Another two hypotheses have been developed to investigate the relationship between trade liberalization and the imported inputs used in industries and firms, separately. These hypotheses are:

i. Openness to trade has a positive relationship with the content of imported inputs used in the industry.
ii. Openness to trade has a positive relationship with the content of imported inputs used in the firm.

The next sub-section of the chapter presents the findings which will be divided into five parts. The first part explains the share of inputs in the manufacturing sector.

The second part describes the manufacturing sector's imported inputs content according to the ownership types. The next two sub-chapters discuss the relationship between imported inputs content and output growth at industry and firms' level, while the last sub-chapter explains the relationship between trade Liberalization and imported Inputs. Since the data again depicted micro-panel data characteristics, our analysis will includes both static and dynamic model estimations. Similar to chapter five, in the static estimations we have include the White general test and Wooldridge test to identify for heteroskedasticity and serial correlation problems in the dataset. In order to obtain a more convincing result, we have run the GLS estimation which is robust to heteroskedasticity across panels and serial correlation within panels. Meanwhile in the dynamic estimations we have estimates the Hansen test and the Arellano-Bond test to identify for over identifying restrictions and serial correlation in the GMM model.

6.2 Findings and Discussion

In our study, we will focus on two types of analysis; industry level and firms level analysis. 53 sub-industries and 300 and 227 firms have been randomly selected for analysis and these industries and firms are classified according to two types of ownership, Malaysian and non-Malaysian, respectively. The analysis examines whether importing their inputs has influence on the industries' or firms' revenue growth. Industries and firms with shared ownership are not included in the study because there is inconsistency in the recorded data since most of the data are missing. As a result, during our initial estimation, the estimation produce is unreliable. The number of individual characteristics in the panel data estimation is not enough to represent the whole population when they are aggregate and analyzed together.

Our analysis will also discuss whether types of ownership will influenced the use of imported inputs in production. Therefore, our discussion will be focused mainly on the two types of ownership as mentioned above. Regarding the first part of 53 sub-industries analysis which is classified as Malaysian and non-Malaysian owned industries, we will estimate both static and dynamic model estimation. Meanwhile in the second part of analysis, our findings will indicate estimations at firm's level which consists of 300 Malaysia owned firms and 227 non-Malaysian owned firms. Both analysis will be related to static and dynamic estimation techniques since our data features micro panel data characteristics (t=6; i=53 and t=6;i=300;227). Since our data which relate to imported inputs also features a micro panel data, we will again use the GMM estimation method.

6.2.1 Share of Inputs in the Manufacturing sector

Table 6.1 below shows the share of domestic and imported inputs in the Malaysian manufacturing sector from 1983 to 2005. In 1983 the share of domestic inputs used by the resources based industries (66.14 percent) was higher that non-resources based industries (49.3 percent). The data during late 1980s to early 1990s are also consistent with the Malaysian Central Bank Report in the 1990s that the export-oriented industries such as the textiles and apparel and electrical and electronic industries were proved to be highly dependent on imported inputs. The figure shows that textiles products use 42.7 percent imported inputs in 1987 which had increased to 76.9 percent in 1991. An example of a main input produced locally is polyester fiber, which is produced from imported inputs and almost 96 percent of total inputs in the polyester fiber industry were imported.

Table 6.1: Share of Domestic and Imported Inputs (1983-2005)

Resource based Industries	Domestic Input (%) 1983	1987	1991	2000	2005	Imported Input (%) 1983	1987	1991	2000	2005
Meat and dairy products	85.86	84.53	80.81	73.99	69.5	14.14	15.47	19.19	26.01	30.5
Preserved food	90.03	86.81	88.09	701.16	70.5	9.97	13.19	11.91	29.84	29.5
Oils and fats	96.78	91.54	93.76	92.0	94.0	3.22	8.46	6.24	8.0	6.0
Grain mill products	70.91	72.88	60.46	68.83	66.5	29.09	27.12	39.54	31.17	33.5
Bakery, confectionary	80.73	83.41	81.03	53.62	96.1	19.27	16.59	18.97	46.38	3.9
Other foods	44.36	50.0	45.80	67.81	73.3	55.64	50.0	54.2	32.19	26.7
Animal feeds	44.01	44.74	32.58	30.99	82.9	55.99	55.26	67.42	69.01	17.1
Beverages	73.73	68.24	69.25	50.87	94.3	26.27	31.76	30.75	49.13	5.7
Tobacco	42.41	58.64	51.18	38.47	99.5	57.59	41.36	48.82	61.53	0.5
Wooden products	75.66	82.05	82.72	84.21	77.5	24.34	17.95	17.28	15.79	22.5
Furniture and fixtures	80.64	77.75	51.73	54.43	66.2	19.36	22.25	48.27	45.57	33.8
Paper and printing	49.41	47.33	44.19	59.87	95.2	50.59	52.67	55.81	40.13	4.8
Industrial chemicals	52.58	75.71	46.42	61.97	45.7	47.42	24.29	53.58	38.03	54.3
Paints and lacquers	48.84	47.07	41.48	60.59	71.5	51.16	52.93	58.52	39.41	28.5
Other chemical products	61.32	55.21	42.59	56.57	34.0	38.68	44.79	57.41	43.43	66.0
Petroleum and coal	53.51	70.88	86.46	61.94	76.0	46.49	29.12	13.54	38.06	24.0
Processed rubber	97.30	97.58	97.63	85.35	98.6	2.7	2.42	2.37	14.65	14.0
Rubber products	67.73	67.67	59.49	53.85	85.2	32.27	32.33	40.51	46.15	14.8
Plastic products	45.8	37.58	48.88	38.71	74.9	54.2	62.42	51.12	61.29	25.1
China, glass and clay	67.61	68.13	64.46	66.04	62.9	32.39	31.87	35.54	33.96	37.1
Cement, lime and plaster	77.94	74.41	81.59	67.10	93.5	22.06	25.59	18.41	32.9	6.5
Other non-metal mineral	67.72	77.81	70.73	70.76	90.8	32.28	22.19	29.27	29.24	9.2
Average	66.14	68.36	63.83	61.63	78.1	33.86	31.64	40.47	38.37	21.9
Non-resource based industries	**Domestic Input 1983**	**1987**	**1991**	**2000**	**2005**	**Imported Input 1983**	**1987**	**1991**	**2000**	**2005**
Textile products	64.91	57.27	23.02	46.76	54.5	35.09	42.73	76.98	53.24	45.5
Wearing apparel	42.96	38.22	24.21	49.0	64.9	57.04	61.78	75.79	51.0	35.1
Basic metal products	64.49	67.62	54.15	37.25	40.1	35.51	32.38	45.85	62.75	59.9
Other metal	53.25	51.71	57.53	47.99	71.7	46.75	48.29	42.47	52.01	28.3

products										
Non-electrical machinery	48.05	45.53	38.75	18.88	28.9	51.95	54.47	61.25	81.12	71.1
Electrical machinery	30.39	20.94	30.51	25.25	31.2	69.61	79.06	69.49	74.75	68.8
Motor vehicles	27.82	40.77	25.07	46.03	46.7	72.18	59.23	74.93	53.97	53.3
Other transport equipment	76.43	44.86	38.49	32.0	53.8	73.57	55.14	61.51	68.0	46.2
Other manufacturing	48.53	34.52	32.17	41.43	57.8	51.47	65.48	67.83	58.57	42.2
Average	49.27	48.60	36.17	41.86	50.0	50.73	51.40	59.53	58.14	50.0
	Domestic Input					**Imported Input**				
Non-manufacturing	**1983**	**1987**	**1991**	**2000**	**2005**	**1983**	**1987**	**1991**	**2000**	**2005**
Other sectors	67.84	70.75	71.47	64.28	86.2	32.16	29.25	28.53	35.72	13.8
Total Average	60.92	62.26	56.77	55.53	70.5	39.08	37.74	43.23	44.47	29.5

Source: Author's calculation based on data from the Department of Statistics, Malaysia (1983-2006)

The electrical and electronics industry are basically an assembling activity, and therefore the imported input contents are very high, accounting for 98 percent of the total inputs. Meanwhile domestic-oriented industries such as paper and paper products, chemical and chemical products metal products and transport and equipment industries also depend substantially on imported inputs. The Central Bank also reported that 90 to 95 percent of inputs in the chemical and chemical products industry are imported. The metal and metal products industry used imported inputs for 64 percent of its total inputs. The transport and equipment industry which was largely dependent upon imported electronics components parts had approximately 91 percent and the parts of complete break up (CBU) motor assembly had 40 to 50 percent of imported inputs content.

In 2005, although the domestic input average figure had increased to 78.1 percent in resources based industries and increased slightly to 50 percent in non-resources based industries, however, the pattern was still the same. On the other hand, the share of imported inputs data used by the resource based industries fell to 21.9 percent in 2005. The reduction in the usage of imported inputs in the resource based industries was related to various economic policies particularly on import substitution; intended to reduce dependency on importation of goods that have been continuously implemented by the government since the 1960s.

6.2.2 Ownership in the Manufacturing Sector

For a comparison of the imported inputs content between Malaysian and Foreign owned industries at sub-industries level, data were obtained from the Malaysian Department of Statistics. Table 6.2 below shows the comparative analysis of the imported inputs content by ownership between Malaysia and non-Malaysian firms in 2006.

Table 6.2: Inputs Content in Malaysian Industry by Type of Ownership (2006)

Industries	Malaysian Imported inputs (RM'000)	Malaysian Domestic inputs (RM'000)	Non-Malaysian Imported inputs (RM'000)	Non-Malaysian Domestic inputs (RM'000)
Production, processing and preserving of meat, fish, fruit, vegetables, oils and fats	1,213,948 (2.38)	43,003,083 (84.45)	482,515 (0.95)	6,220,298 (12.22)
Manufacture of dairy products	752,998 (27.81)	984,274 (36.35)	615,442 (22.73)	354,917 (13.11)
Manufacture of grain mill products, starches and starch product and prepared animal feeds	1,962,844 (43.76)	2,123,135 (47.33)	116,510 (2.60)	282,905 (6.31)
Manufacture of other food products	2,288,861 (34.51)	3,047,020 (45.94)	694,739 (10.47)	602,060 (9.08)
Manufacture of beverages	117,565 (13.94)	474,013 (56.13)	72,088 (8.54)	180,040 (21.34)
Manufacture of tobacco products	107,948 (8.60)	754,057 (60.11)	124,159 (9.90)	268,334 (21.39)
Spinning, weaving and finishing of textiles	237,585 (7.78)	251,472 (8.24)	1,010,216 (33.08)	1,553,943 (50.90)
Manufacture of other textiles	106,494 (22.84)	242,238 (51.95)	5,313 (1.14)	112,223 (24.07)
Manufacture of knitted and crocheted fabrics and articles	444,066 (61.44)	233,223 (32.27)	37,823 (5.23)	7,676 (1.06)
Manufacture of wearing apparel except fur apparel	716,122 (26.19)	1,166,850 (43.65)	574,868 (21.50)	215,492 (8.06)
Dressing and dyeing of fur; manufacture of articles of fur Tanning and dressing of leather; manufacture of luggage, handbags, saddle and harness and Manufacture of footwear	20,515 (7.53)	137,388 (50.46)	73,771 (27.10)	40,593 (14.91)
Sawmilling and planning of wood	47,919 (1.35)	3,366,551 (95.08)	48,023 (1.36)	78,369 (2.21)
Manufacture of products of wood, cork, straw and plaiting materials	371,079 (4.97)	5,886,811 (78.84)	134,106 (1.79)	1,075,143 (14.40)
Manufacture of paper and paper products	879,719 (18.14)	3,065,279 (63.22)	512,965 (10.58)	390,712 (8.06)
Publishing	286,760	1,163,171	Nil	31,029

	(19.36)	(78.54)		(2.10)
Printing and services activities related to printing	455,681 (23.35)	1,302,157 (66.74)	144,455 (7.40)	48,960 (2.51)
Reproduction of recorded media	1,994 (5.52)	34,120 (94.48)	-	-
Manufacture of refined petroleum products	81,458 (0.12)	50,155,539 (72.84)	11,612,704 (16.87)	7,006,233 (10.17)
Manufacture of basic chemicals	5,566,411 (21.86)	9,534,315 (37.45)	4,390,789 (17.25)	5,968,025 (23.44)
Manufacture of other chemical products	1,189,825 (21.92)	2,286,100 (42.11)	1,028,003 (18.93)	925,395 (17.04)
Manufacture of man-made fibers	1,313 (0.05)	3,194 (0.11)	1,617,932 (57.71)	1,181,365 (42.13)
Manufacture of rubber products	1,725,494 (9.59)	10,482,037 (58.27)	1,562,681 (8.69)	4,219,207 (23.45)
Manufacture of plastic products	2,133,490 (17.44)	727,636 (46.84)	2,395,187 (19.59)	1,972,247 (16.13)
Manufacture of glass and glass products	40,287 (4.09)	174,400 (17.69)	529,746 (53.74)	241,342 (24.48)
Manufacture of non-metallic mineral products n.e.c	614,004 (11.04)	3,931,296 (70.68)	331,135 (5.95)	686,012 (12.33)
Manufacture of basic iron and steel	5,708,906 (41.00)	6,736,400 (48.36)	794,405 (5.70)	688,946 (4.95)
Manufacture of basic precious and non-ferrous metals	1,245,150 (17.05)	1,215,444 (16.64)	3,869,696 (53.00)	972,491 (13.31)
Casting of metals	476,470 (18.53)	1,688,936 (65.68)	116,173 (4.52)	289,861 (11.27)
Manufacture of structural metal products, tanks, reservoirs and steam generators	251,987 (8.87)	2,078,989 (73.21)	243,881 (8.59)	265,001 (9.33)
Manufacture of other fabricated metal products; metal working service activities	2,069,301 (20.77)	4,642,714 (46.61)	1,322,098 (13.27)	1,927,836 (19.35)
Manufacture of general purpose machinery	392,229 (4.68)	1,246,456 (14.87)	2,344,553 (27.97)	4,398,056 (52.48)
Manufacture of special purpose machinery	507,903 (21.76)	898,197 (38.48)	519,066 (22.24)	408,924 (17.52)
Manufacture of domestic appliances n.e.c	765,603 (26.68)	890,027 (31.02)	552,341 (19.25)	661,338 (23.05)
Manufacture of office, accounting and computing machinery	722,548	881,748	37,416,566	11,763,806

	(1.42)	(1.74)	(73.68)	(23.16)
Manufacture of electrical motors, generators and transformer	81,716 (5.21)	311,825 (19.88)	649,786 (41.42)	525,367 (33.49)
Manufacture of electricity distribution and control apparatus	176,896 (10.86)	413,906 (25.42)	544,965 (33.47)	492,452 (30.25)
Manufacture of Insulated wire and cable	2,506,979 (41.47)	1,763,359 (29.17)	1,049,389 (17.36)	725,419 (12.00)
Manufacture of accumulators, primary cells and primary batteries	96,211 (17.32)	289,339 (52.10)	133,257 (23.99)	36,578 (6.59)
Manufacture of electric lamps and lighting equipment	56,596 (3.80)	125,109 (8.38)	940,899 (63.10)	368,606 (24.72)
Manufacture of other electrical equipment n.e.c	288,388 (32.79)	406,288 (46.19)	141,833 (16.13)	43,054 (4.89)
Manufacture of electronic valves and tubes and other electronic components	10,469,493 (15.69)	4,852,507 (7.27)	39,366,117 (58.99)	12,043,431 (18.05)
Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	1,005,943 (7.43)	1,422,372 (10.50)	6,928,309 (51.18)	4,181,288 (30.89)
Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods	1,295,911 (4.48)	1,130,999 (4.35)	10,144,143 (38.98)	13,454,483 (51.00)
Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments	65,425 (2.86)	612,261 (26.75)	1,031,628 (45.07)	579,521 (25.32)
Manufacture of optical instruments and photographic equipment	109,495 (3.45)	6,710 (0.21)	1,466,761 (46.15)	1,595,070 (50.19)
Manufacture of watches and clocks	-	169 (0.03)	358,229 (67.13)	175,228 (32.84)
Manufacture of motor vehicles and Manufacture of bodies (coachwork) for motor vehicles, trailers and semi-trailers	4,062,980 (30.82)	7,266,272 (55.13)	1,321,906 (10.03)	530,326 (4.02)
Manufacture of parts and accessories for motor vehicles and their engines	757,727 (23.13)	1,440,698 (43.99)	505,032 (15.42)	571,940 (17.46)
Building and repairing of ship and boats	532,654 (34.93)	899,291 (58.98)	63,281 (4.15)	29,301 (1.92)
Manufacture of aircraft and spacecraft	32,976 (13.47)	211,841 (86.53)	-	-
Manufacture of transport equipment n.e.c	457,476 (27.07)	630,597 (37.32)	125,668 (7.43)	476,145 (28.18)
Manufacture of furniture	801,630 (11.98)	4,814,180 (71.93)	429,840 (6.42)	647,100 (9.67)

Manufacturing n.e.c	870,606 (27.46)	1,875,146 (59.15)	190,525 (6.01)	234,099 (7.38)
Recycling of metal waste and scrap and Recycling of non-metal waste and scrap	48,104 (10.49)	178,812 (38.48)	-	231,797 (50.53)

Source: Author's calculation based on data from Departments of Statistics, Malaysia (2006)
Percentage figures in parenthesis

The figures show that 9 of the 54 sub-industries analyzed have an imported input content of more than 50 percent of the total, regardless of the ownership types of the sub-industries. The sub-industry with the highest imported input content is foreign-owned manufacture of office equipment, accounting and computing machinery (73.68 percent), followed by foreign-owned manufacture of watches and clocks (67.13 percent) and manufacture of electric lamps and lighting equipment. Imported input content is also very high in Malaysian-owned manufacture of knitted and crocheted fabrics and articles (61.44 percent). On the other hand, the sub-industries with the lowest imported input content (below 10 percent and 5 percent) are divided between Malaysian and Foreign owned industries. Sub-industries which have imported input contents below 5 percent and are classified as both Malaysian and foreign owned include the production, processing and preserving of meat, fish, fruit, vegetables, oils and fats industries, sawmilling and planning of wood industries and manufacture of products of wood, cork, straw and plaiting materials industries. The imported inputs content is also below 10 percent in manufacture of tobacco products, manufacture of rubber products and manufacture of structural metal products, tanks, reservoirs and steam generators for both Malaysian and foreign owned industries.

6.2.3 Analysis at Industry Level

Initial analysis will be focused at the industry level then followed by individual firm analysis. Both analyses include the static and dynamic model estimations.

6.2.3.1 Static Model Estimation

Similar to the analysis in the previous chapter, in the static model for the industry level analysis we are again interested in estimating the firm-specific effects and time-specific effects of the model. As such, the firm-specific effect (u_i) can represent any firm-specific characteristics such as firms' strategies, economies of scale and technological changes of the firms, changes in the size of the firm and educational and training attainment of the employees. Meanwhile the time-specific effects (λ_t) are to be estimated as coefficients which can be justified given events that are similar to the previous chapter as the time of analysis is almost similar. The results of the static estimated model pertaining to OLS, fixed effect, random effect and GLS models for the industry analysis are shown in Table 6.3 below.

Table 6.3: OLS, Fixed, Random and GLS Result

	Malaysian				**Non-Malaysian**			
Variables	**OLS**	**Fixed**	**Random**	**GLS**	**OLS**	**Fixed**	**Random**	**GLS**
Imported inputs	-0.019	-0.209*	-0.081*	-0.013	0.099*	0.053	0.091*	0.059*
	(-0.48)	(-3.53)	(-1.81)	(-1.31)	(3.09)	(1.61)	(2.97)	(4.02)
Capital Expenditure	0.907*	0.864*	0.928*	0.917*	0.754*	0.691*	0.718*	0.799*
	(19.91)	(8.61)	(16.46)	(66.20)	(21.23)	(19.50)	(21.38)	(49.39)
Research and Development Expenditure	0.026	0.063**	0.042*	0.019***	0.032**	-0.004	0.008	0.026*
	(1.14)	(2.04)	(1.66)	(4.67)	(2.76)	(-0.38)	(0.85)	(7.99)
Human Capital	0.136*	0.133	0.144*	0.076*	0.099*	0.089*	0.116*	0.058*
	(5.34)	(0.99)	(4.10)	(10.79)	(4.54)	(2.210	(3.62)	(5.78)
_cons	1.099*	3.867*	1.428*	1.300*	2.040*	3.780*	2.759*	2.100*
	(3.21)	(3.59)	(3.14)	(11.44)	(10.97)	(10.51)	(10.29)	(22.20)
F	493.08	33.03	-	-	1722.99	222.23	-	-
	(0.00)	(0.00)			(0.00)	(0.00)		
Chi^2	-	-	1041.67	16882.8	-	-	2008.67	18979.46
			(0.00)	(0.00)			(0.00)	(0.00)
r^2	0.8460	0.3002	-	-	0.9505	0.74267	-	-
r^2_a	0.8443	0.1752		-	0.9499	0.69672		-
Sigma_u	-	0.51111	0.27298	-	-	0.40588	0.30152	-
Sigma_e	-	0.60429	0.60429	-	-	0.19225	0.19225	-
rho[3]		0.41704	0.16948	-		0.81675	0.71096	-
White test	27.60	-		-	52.71			-
	(0.00)				(0.00)			
Wooldridge test	6.44	-		-	37.611			-
	(0.00)				(0.00)			
Hausman test		18.31				20.14		
		(0.00)				(0.00)		
N	364	364	364	364	364	364	364	364

Notes: * $p<0.10$ indicate the 10 percent or smaller significance levels
Figure in parentheses are t-statistics; [3]fraction of variance due to u_i

The value of goodness-of-fit measures (R^2) for both Malaysians and non-Malaysian industries are 0.846 and 0.951 respectively, which indicates a high correlation between variables in both models. The result of OLS regression shows that imported inputs content for industries owned by Malaysians have insignificant association in determining growth of the industries' output while holding all the other variables as the control variables in the estimation. However, the fixed effect model suggests that imported inputs have a statistically significant association at 90 percent confidence level or higher in determining growth of the industries' output, yet, the correlation is inversed. The results indicate that if imported inputs content increases by one percent, it would decrease the output in the Malaysian owned industries by 0.209 percent. Likewise, the random effect model also shows that imported input has a statistically significant association at 90 percent confidence levels or higher for Malaysian owned industries. However, the sign is again contradicts the hypothesis which assume that imported input content are good for the growth of the industry.

On the other hand, the result of OLS and random effect regression for industries owned by non-Malaysian shows that imported inputs have a positively statistically significant at the 90 percent confidence levels or higher in both models. The results suggest that if imported inputs content increases by one percent, it would increase the output in the non-Malaysian owned industries in the OLS estimation model by 0.099 percent and in the random effect estimation model, by 0.091 percent, respectively. Although the OLS estimation has a high correlation coefficient, a potential problem that may arise in both cases is an inefficient result attributable to heteroskedasticity and serial correlation. As such, our analysis includes the White general test for heteroskedasticity and the Wooldridge test for serial correlation to identify these problems.

The white test result produced chi^2 of 27.60 for Malaysia and 52.71 for non-Malaysia, meanwhile the Wooldridge test produced F value of 6.44 for Malaysia and 37.611 for non-Malaysia respectively. These results rejected the null hypothesis for both Malaysian and non-Malaysian industry since the p-value produced is smaller than 0.05 which means that heteroskedasticity and serial correlation exist in the models. Hence, the standard errors computed in the OLS estimation are biased and leads to bias in the confidence intervals and the test statistics. The overall statistics for Hausman test in both Malaysian and non-Malaysian industry case have produced a p-value smaller than 0.05 which leads to strong rejection of the null hypothesis that random effect provides consistent estimates and hence accepts the fixed effect model. However, with inclusion of time-specific effects and industry-specific effects, the result of fixed-effect (within) regression for non-Malaysian industries still shows that imported input is insignificant. We have run the GLS regression which is again robust to heteroskedasticity across panels and serial correlation within panels for comparison. The result after correcting for the above mentioned problems shows that imported inputs are again insignificant for Malaysian owned industries. Nevertheless, the result indicates that imported inputs in the non-Malaysian owned industries have a positive statistically significant association with the industries' growth at the 99 percent confidence level. Therefore, the results suggest that if imported inputs content increases by one percent, it would increase the output in the non-Malaysian owned industries by 0.059 percent.

6.2.3.2 Dynamic Model Estimation

Since the estimated model for the imported inputs issue also features a micro panel with a short time dimension, small number of year ($t_{n;nm}$ =7) and a larger panel dimension ($i_{n;nm}$=53), we have again used Arellano and Bond's difference generalized method of moments and Bonds and Bovers (1990) system generalized method of moments. The results are shown in Table 6.12 below. Theoretically, as suggested by Arellano and Bond (1991) and Arellano and Bover (1995) the two-step estimator in both difference and system generalized method of moments (GMM) estimation is more efficient than the first-step estimator. This is consistent with the estimated results which indicate that the two-step estimators for both models are statistically significant which means that both models are statistically fit. The regression result corresponding to the estimated p-value smaller than 0.05

revealed that two-step estimation results produced χ^2 values of 3075.57 and 2704.01 for Malaysian industries and 8569.68 and 1285591 for non-Malaysian industries, respectively.

Table 6.4: Difference and System GMM Result

Variable	Malaysian GMM Diff (one-step)	Malaysian GMM Diff (two-step)	Malaysian GMM Sys (one-step)	Malaysian GMM Sys (two-step)	Non-Malaysian GMM Diff (one-step)	Non-Malaysian GMM Diff (two-step)	Non-Malaysian GMM Sys (one-step)	Non-Malaysian GMM Sys (two-step)
Lag output	-0.031	0.010	0.433*	0.370*	0.118*	0.067*	0.235*	0.208***
	(-0.31)	(0.54)	(6.91)	(10.93)	(2.54)	(3.78)	(6.68)	(12.14)
Imported inputs	-0.099	0.019	-0.098	-0.033	0.147*	0.127*	0.226*	0.202***
	(-1.60)	(0.46)	(-1.44)	(-0.97)	(3.97)	(8.23)	(6.13)	(10.04)
Capital Expenditure	0.803*	0.720*	0.631*	0.640*	0.576*	0.638*	0.499*	0.539***
	(8.09)	(12.37)	(6.43)	(16.68)	(15.58)	(38.51)	(13.00)	(33.13)
Research and Development	0.053	0.043*	0.001	-0.009	0.019	0.013*	0.032*	0.029***
Expenditure	(1.53)	(6.79)	(0.04)	(-0.78)	(1.51)	(2.57)	(2.26)	(5.58)
Human Capital	-0.049	0.072	0.167*	0.156*	0.050	0.046*	-0.002	0.067**
	(-0.34)	(1.33)	(1.68)	(9.43)	(1.17)	(1.82)	(-0.05)	(2.32)
_cons	0.472*	3.327*	-0.252	-0.153	2.423*	2.648*	0.887*	0.833***
	(3.00)	(6.01)	(-0.23)	(-0.49)	(3.80)	(12.61)	(2.31)	(5.65)
Chi^2	117.75	3075.57	218.37	2704.01	825.45	8569.68	1739.46	12855.91
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hansen Test	20.234	14.434	100.72	34.74	36.481	11.294	78.44	19.73
	(0.123)	(0.418)	(0.00)	(0.02)	(0.00)	(0.663)	(0.00)	(0.411)
Arellano-Bond Test								
1st order	-	0.341	-	-1.676	-	-1.719	-	-1.929
		(0.733)		(0.094)		(0.085)		(0.054)
Arellano-Bond Test								
2nd order	-	-0.756	-	1.405	-	0.203	-	1.023
		(0.449)		(0.159)		(0.839)		(0.306)
N	260	260	312	312	260	260	312	312

Notes: * $p<0.10$ indicate the 10 percent or smaller significance levels
Hansen Test – test of overidentfying restrictions
Arellano-Bond Test – test for serial correlation in first and second order differenced errors
Figure in parentheses are t-statistics, except for Hansen test and Arellano-Bond test which are p-values.

The regression results for both two-step difference and system GMM models show that imported inputs are insignificant in explaining the growth of the Malaysian owned industries. On the other hand, in the non-Malaysian owned industries, the estimation results for both two-step difference and system GMM show that imported inputs have a positive statistically significant association at the 90 percent confidence level or higher. Therefore, the results suggest that if imported inputs content increases by one percent, it would increase the output in the non-Malaysian owned industries by 0.127 percent. Meanwhile in the two-step system GMM, the results suggest that if imported inputs content increases by one percent, it would increase the output in the non-Malaysian owned industries by 0.202 percent.

The empirical results of the Hansen specification test which determines the validity of the instrument adopted in the model show that for the Malaysian owned industries, only the difference GMM model has been correctly specified. The results which produced a chi^2 value of 14.434, failed to reject the null hypothesis since the p-value calculated is higher than 0.05 and indicates that the instruments developed in the model are valid. However, the results are on the contrary for two-step system GMM model. In like manner, the non-Malaysian owned industries suggest that the estimation for Hansen specification test shows that both two-step difference and system GMM models with chi^2 calculated 11.29 and 19.73 respectively failed to reject the null hypothesis, hence indicates that the instruments developed in both models are valid. Meanwhile, the serial correlation test failed to reject the null hypothesis of no first-order serial correlation for both Malaysian and non-Malaysian owned industries. The results also reject the null hypothesis of second-order serial correlation. The estimated p-values for testing serial correlation for both difference and system models at second-order test are higher than 0.05 which indicates that the models have been correctly specified because there is no serial correlation in the transformed residuals and the instruments (moment conditions) used in all models are valid.

6.2.4 Analysis at Firms' Level

6.2.4.1 Static Model Estimation

Similar to the issue pertaining to growth channels analysis and imported inputs at industry level, in the static model for firm's level analysis we are interested in estimating the individual-specific effects and time-specific effects of the model. The individual-specific effects (u_i) can represent any firm-specific characteristics and the time-specific effects (λ_t) are to be estimated as coefficients which had a long term effect on the output growth of the industries. The result of the static estimated model pertaining to OLS, fixed effect and random effect models for the firm analysis are shown in Table 6.5 below.

The value of goodness-of-fit measures (R^2) for OLS estimation in both models at 0.996 and 0.992 respectively indicates a high correlation between variables in the model. The White general test identifying for heteroskedasticity problem produced chi^2 of 503.29 for Malaysia owned firms and 209.05 for non-Malaysia owned firms, respectively. Meanwhile the Wooldridge test for serial correlation problems produced F value of 0.012 for Malaysia and 3.618 for non-Malaysia, respectively. The results in both Malaysian and non-Malaysian owned firms rejected the null hypothesis of homoskedasticity since the p-value produced is smaller than 0.05 which indicate that heteroskedasticity exist in the model. The results have also strongly rejected the null hypothesis of no first-order serial correlation in both Malaysian and non-Malaysian models.

Table 6.5: OLS, Fixed and Random Effect Result

Variables	Malaysian OLS	Malaysian Fixed	Malaysian Random	Non-Malaysian OLS	Non-Malaysian Fixed	Non-Malaysian Random
income	0.5992*	0.3905*	0.5545*	0.782*	0.1652*	0.5265*
	(25.5)	(12.56)	(22.05)	(42.3)	(5.27)	(20.34)
Sale	0.360*	0.4334*	0.3921*	0.189*	0.8035*	0.4254*
	(15.60)	(14.36)	(15.84)	(11.46)	(25.14)	(17.51)
Imported inputs	0.0152*	0.0408*	0.0189*	0.015*	0.0040	0.0198*
	(4.26)	(4.83)	(4.41)	(3.69)	(0.53)	(3.33)
Capital Expenditure	0.0039	0.0157*	0.0070*	0.010*	0.0144*	0.0133*
	(1.31)	(3.06)	(2.05)	(2.43)	(2.81)	(2.66)
Research and Development Expenditure	-0.0063*	0.0207*	-0.0073	-0.009*	-0.0019	-0.0076
	(-2.67)	(1.81)	(1.89)	(-2.60)	(-0.25)	(-1.41)
Human Capital	0.0361*	0.0761*	0.0428*	0.021*	0.0012	0.0241*
	(5.22)	(3.68)	(5.06)	(3.23)	(0.07)	(2.28)
_cons	0.106*	0.8944*	0.1520*	-0.017	0.2379	0.1338*
	(4.30)	(6.92)	(4.97)	(-0.35)	(1.55)	(1.76)
F	37249	888.64	-	15517.67	932.49	-
	(0.00)	(0.00)		(0.00)	(0.00)	
Chi^2	-	-	138331.28	-	-	30338.37
			(0.00)			(0.00)
r^2	0.9958	-	-	0.9917	-	-
r^2_a	0.9957			0.9916		
Sigma_u	-	0.16821	0.04702	-	0.23371	0.0916
Sigma_e	-	0.11934	0.11934	-	0.10153	0.10153
rho[3]	-	0.66518	0.13439	-	0.84123	0.4489
White test	503.29	-		209.05	-	
	(0.00)			(0.00)		
Wooldridge test	0.012	-		3.618	-	
	(0.00)			(0.00)		
Hausman test		114.72			517.26	
		(0.00)			(0.00)	
N	958	958	958	789	789	789

Notes: * p<0.10 indicate the 10 percent or smaller significance levels
Figure in parentheses are t-statistics; [3]fraction of variance due to u_i

The OLS regression results for firms owned by both Malaysian and non-Malaysian show that the imported inputs have a statistically significant association with the firms' growth at the 90 percent confidence level or higher. Therefore, the results suggest that if imported inputs content increases by one percent, it would increase the output in both firms owned by the Malaysian and non-Malaysian by 0.015 percent. The Hausman tests have also produced a p-value smaller than 0.05 which leads to strong rejection of the null hypothesis that random effect provides consistent estimates and hence accepts the fixed effect model. The fixed-effect regression controls for all time-invariant differences between the firms in the model:

therefore its estimated coefficients cannot be biased because of omitted time-invariant characteristics. The result of the fixed-effect (within) regression shows that imported input have a statistically significant association at the 90 percent confidence level or higher in firms owned by Malaysian. The empirical results suggest that if imported inputs content increases by one percent, it would increase the output in firms owned by the Malaysian by 0.041 percent. Again, since the estimated model features a micro panel with short time dimension, small number of year (t=7) and a larger panel dimension (i_m=300; i_{nm}=227), we have also used the method of Arellano and Bond's difference generalized method of moments (Difference GMM) and Bonds and Bovers (1990) system generalized method of moments (System GMM) to further analyze the data.

6.2.4.2 Dynamic Model Estimation

The results of the dynamic estimated model pertaining to both difference and system generalized method of moment models for Malaysian and non-Malaysian firms are shown in Table 6.6 below. The table below shows the result of one-step and two-step for both cases using difference and system GMM: however theoretically the two-step estimator in both models is more efficient than the first-step estimator. The result shows that the two-step estimations for both difference and system generalized method of moments (GMM) for Malaysia and non-Malaysia firms are statistically significant at the 95 percent confidence level with the p-value smaller than 0.05 and chi^2 test value as shown in the table respectively.

Table 6.6: Difference and System GMM Result

Variable	Malaysian GMM (one-step)	Malaysian GMM (two-step)	Malaysian GMM (one-step system)	Malaysian GMM (two-step system)	Non-Malaysian GMM (one-step)	Non-Malaysian GMM (two-step)	Non-Malaysian GMM (one-step system)	Non-Malaysian GMM (two-step system)
Lag output	0.2435***	0.1563**	0.147***	0.095**	0.0339	0.0406	0.019	0.021
	(4.34)	(2.30)	(5.87)	(2.39)	(1.08)	(1.47)	(1.12)	(0.99)
Income	0.4212***	0.3733**	0.421***	0.418***	0.129***	0.1806***	0.231***	0.220**
	(8.02)	(2.81)	(9.11)	(3.34)	(4.37)	(3.43)	(8.07)	(3.01)
Sale	0.2554***	0.4087**	0.272***	0.414***	0.8403***	0.7734***	0.732***	0.735***
	(4.82)	(2.94)	(5.75)	(3.23)	(27.32)	(12.72)	(24.56)	(8.76)
Imported inputs	0.0849***	0.0656**	0.666***	0.051**	0.0159*	0.0162**	0.028***	0.018**
	(5.19)	(2.23)	(4.84)	(2.21)	(1.81)	(2.82)	(3.18)	(2.60)
Capital Expenditure	0.0197**	0.0176*	0.021**	0.018**	0.0240***	0.0236***	0.027***	0.024***
	(2.17)	(1.78)	(2.52)	(2.03)	(4.34)	(3.19)	(4.84)	(3.52)
Research and Development Expenditure	0.0272	0.0177	0.018	0.009	0.0058	0.0061	-0.027**	0.004
	(1.40)	(0.97)	(1.12)	(0.69)	(0.62)	(0.13)	(-3.12)	(0.57)
Human Capital	0.1552***	0.0440	0.144***	0.022	-0.007	-0.0111	-0.023	-0.020
	(4.33)	(0.81)	(4.61)	(0.57)	(-0.34)	(-0.56)	(-1.19)	(-1.20)
_cons	-0.7852	-0.2639	0.196	0.071	-0.3115	-0.218	-0.007	0.019
	(-1.42)	(-0.45)	(1.10)	(0.33)	(-0.85)	(-0.70)	(-0.04)	(0.10)
Chi^2	1308.96	930.18	4136.44	3038.72	4678.90	6385.34	6578.11	10676.36
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hansen Test	18.379	8.7209	33.508	11.926	20.717	8.9015	139.053	11.079
	(0.031)	(0.463)	(0.00)	(0.534)	(0.014)	(0.446)	(0.00)	(0.604)
Arellano-Bond 1^{st} order	-	-2.2794	-	-2.110	-	-2.9724	-	-2.883
		(0.023)		(0.035)		(0.003)		(0.004)
Arellano-Bond 2^{nd} order	-	1.8845	-	1.762	-	0.3201	-	0.2193
		(0.059)		(0.078)		(0.749)		(0.826)
N	636	636	799	799	518	518	662	662

Notes: * $p<0.10$ indicate the 10 percent or smaller significance levels
Hansen Test – test of overidentfying restrictions and Arellano-Bond Test – test for serial correlation in first and second order differenced errors
Figure in parentheses are t-statistics, except for Hansen test and Arellano-Bond test which are p-values.

The two step difference GMM estimation results suggest that if imported inputs content increases by one percent, it would increase the output in Malaysian and non-Malaysian owned firms by 0.066 percent and 0.016 percent, respectively. Meanwhile, the regression results for two-step system GMM suggest that if imported inputs content increases by one percent, it would increase the output in firms owned by Malaysians and by non-Malaysians by 0.051 percent and 0.018 percent, respectively. All the estimated coefficients in both difference and system GMM models show that imported inputs have a statistically significant association in determining the growth of output whether for Malaysian or non-Malaysian owned firms. Similar to the analysis at the industry level the results of the specification tests and the serial-correlation tests at firms' level show that all the estimated models both in Malaysian owned and non-Malaysian owned firms have been correctly specified.

The Hansen test for over identifying restrictions in the difference GMM model for both Malaysian and non-Malaysian firms produced calculated χ^2 8.72 and 8.90, respectively failed to reject the null hypothesis since the p value calculated is higher than 0.05. The test which identified the validity of instrument adopted in the model indicates that the instruments developed in both models are valid. Meanwhile the Arellano-Bond test for serial correlation in both models also failed to reject the null hypotheses of first and second-order serial correlation which indicates a correct estimation procedure. The p-value of the second-order test which test for serial correlation for both Malaysian and non-Malaysian models is higher than 0.05, hence we conclude that there is no serial correlation in the transformed residuals, and the instruments (moment conditions) used in the models are valid. The result of the over identification restrictions and serial correlation tests are similar with respect to the two-step system GMM model for both Malaysian and non-Malaysian models.

6.2.5 Trade Liberalisation Impact on Imported Inputs

Our study has included the analysis on the effect of trade liberalisation on the imported input content. Generally liberalisation is implemented by reducing tariff and non-tariff barriers and relaxing exchange controls. In our study, the trade liberalization estimation is proxies by tariffs and non-tariff barriers. For comparison we have also estimated another model using the freedom to trade internationally index which is one of the components for index of economic freedom. The other components are included in the model as control variables. The two-step GMM estimation results for the trade liberalization and the freedom to trade internationally effect on imported inputs in Malaysian and non-Malaysian industries and firms are shown in Table 6.7 below.

Table 6.7: Difference and System GMM Result for Trade Liberalisation

Variable	Malaysian Industry (n=53) GMM (Diff)	Malaysian Industry (n=53) GMM (System)	Malaysian Firm (n=300) GMM (Diff)	Malaysian Firm (n=300) GMM (System)	Non-Malaysian Industry (n=53) GMM (Diff)	Non-Malaysian Industry (n=53) GMM (System)	Non-Malaysian Firm (n=227) GMM (Diff)	Non-Malaysian Firm (n=227) GMM (System)
Trade Liberalisation:								
Lag imported input	0.19*	0.50*	0.31	0.66*	0.04	0.53*	0.297*	0.56*
	(5.38)	(24.8)	(1.11)	(16.3)	(1.08)	(12.9)	(2.48)	(6.84)
Tariff	0.208*	0.09*	0.01	-0.02	0.141	0.06	0.133*	0.124*
	(2.00)	(2.03)	(0.26)	(-0.58)	(1.33)	(0.95)	(1.89)	(1.85)
Non-tariff	0.055	0.11*	0.06*	0.03	0.02*	0.07*	0.017	0.008
	(0.91)	(2.48)	(2.09)	(1.05)	(2.05)	(2.43)	(0.36)	(0.17)
Ratio of Domestic Investment to	0.25*	0.36*	0.208	0.68*	0.07	0.132	0.015	0.009
GDP	(2.18)	(4.20)	(1.21)	(5.46)	(0.81)	(1.15)	(0.34)	(0.12)
Inflation rate	0.18	0.195*	0.07	0.15*	0.138*	0.207*	0.161*	0.28*
	(0.67)	(2.54)	(0.92)	(3.32)	1.87	(2.22)	(1.59)	(2.68)
_cons	6.86*	3.86*	3.79*	0.82	8.96*	0.52	3.421*	2.09*
	(8.4)	(5.05)	(2.02)	(1.25)	(11.43)	(1.01)	(0.00)	(2.15)
Chi^2	79.36	1433.2	9.58	378.25	14.68	397.25	28.68	100.87
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hansen Test	20.51	18.28	16.66	18.23	20.08	26.73	15.23	23.38
	(0.02)	(0.08)	(0.00)	(0.00)	(0.07)	(0.03)	(0.00)	(0.06)
Arellano-Bond Test 1st order	-3.02	-3.21	-1.12	-5.30	-4.63	-3.28	-3.07	-5.33
	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Arellano-Bond Test 2nd order	-0.73	-0.61	-1.15	-0.44	-0.081	0.28	-0.79	-0.58
	(0.58)	(0.42)	(0.24)	(0.70)	(0.76)	(0.55)	(0.17)	(0.36)
N	53	53	300	300	53	53	227	227
Index of Economic Freedom:								
Lag imported input	0.168*	0.494*	0.252	0.845*	-0.064	0.744*	0.336*	0.622*
	(5.75)	(31.27)	(1.45)	(17.67)	(-1.03)	(21.84)	(2.41)	(9.20)
Size of government	-0.129	-0.078	-0.025	-0.039	0.250*	-0.084	0.109	0.114
	(-0.91)	(-0.53)	(-0.28)	(-0.40)	(2.52)	(-0.09)	(1.13)	(1.09)

Legal structure and security of property	0.355*	0.244*	0.139*	0.119	0.116*	0.249*	0.127	0.108
	(3.78)	(2.37)	(2.09)	(1.50)	(1.80)	(3.51)	(1.64)	(1.31)
Access to sound money	0.029	-0.017	-0.035	0.029	0.331*	0.566*	0.075	0.145
	(0.17)	(-0.10)	(-0.26)	(0.20)	(2.72)	(3.94)	(0.50)	(0.92)
Freedom to trade internationally	0.270*	0.174			0.208*	0.431*		
	(2.18)	(1.38)	omitted	omitted	(3.86)	(5.61)	omitted	omitted
Regulation of capital labor and business	-0.074	-0.089	-0.019	-0.053*	-0.086*	-0.315*	0.051	0.028
	(-0.67)	(-0.88)	(-0.69)	(-1.81)	(-1.88)	(-4.69)	(1.34)	(0.71)
_cons	7.605	4.906*	5.06*	0.756	8.530*	-2.406*	3.746*	0.955
	(5.08)	(4.62)	(2.96)	(0.64)	(6.71)	(-1.83)	(2.13)	(0.75)
Chi^2	79.87	1470.21	17.45	341.46	50.29	871.19	44.93	131.32
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hansen Test	16.463	22.552	11.809	22.108	16.613	21.886	3.406	9.011
	(0.29)	(0.26)	(0.22)	(0.05)	(0.28)	(0.29)	(0.95)	(0.77)
Arellano-Bond Test								
1st order	-3.195	-3.158	-1.763	-5.439	-1.789	-2.930	-2.999	-5.390
	(0.00)	(0.00)	(0.08)	(0.00)	(0.07)	(0.00)	(0.00)	(0.00)
Arellano-Bond Test								
2nd order	-0.758	-0.634	-1.385	-0.493	-0.697	0.376	-1.076	-0.696
	(0.45)	(0.53)	(0.17)	(0.62)	(0.49)	(0.71)	(0.28)	(0.49)
N	53	53	300	300	53	53	227	227

Notes: * * p<0.10 indicate the 10 percent or smaller significance levels

Hansen Test – test of overidentfying restrictions and Arellano-Bond Test – test for serial correlation in first and second order differenced errors

Figure in parentheses are t-statistics, except for Hansen test and Arellano-Bond test which are p-values.

STATA omitted the variables during the estimation process because of collinearity

6.2.5.1 Trade Liberalisation Impact at Industries' Level

The figures in table 6.7 above indicate results for both Malaysian and non-Malaysian owned industries. The estimation results for two-step difference GMM for Malaysian owned industries shows that both the tariff and the freedom to trade internationally variables have a statistically significant association with the imported inputs content at the 90 percent confidence level or higher. Therefore, the findings suggest that if the tariff index increases by one point, it would increase the imported input content by 0.208 percent. Meanwhile if the freedom to trade internationally index increases by one point, it would increase the imported input content by 0.27 percent. Similarly, the results for two-step system GMM estimation for Malaysian owned industries suggest that both tariff and non-tariff variables have a statistically significant association at the 90 percent confidence level or higher. The results suggest that if the tariff and non-tariff index increases by one point, both would increase the imported input content by 0.09 percent and 0.11 percent, respectively.

On the other hand, the results for two-step difference GMM for non-Malaysian owned industries suggest that the non-tariff variable has a statistically significant association at the 90 percent confidence level or higher. Similarly, the freedom to trade internationally also has a statistically significant association at the 90 percent confidence level or higher. Therefore, the findings suggest that if the non-tariff index increases by one point, it would increase the imported input content by 0.02. Comparatively, if the freedom to trade internationally index increases by one point, it would increase the imported input content by 0.208 percent. Likewise, the results for two-step system GMM estimation for non-Malaysian owned industries suggest that both the non-tariff and freedom to trade internationally indexes have a statistically significant association at the 90 percent confidence level or higher. Therefore, the results suggest that if the non-tariff variable increases by one point, it would increase the imported input content by 0.07 percent. Accordingly, if the freedom to trade internationally index increases by one point, it would increase the imported input content by 0.431 percent.

6.2.5.2 Trade Liberalisation Impact at Firms' Level

Again, figures in table 6.7 above indicate results for both Malaysian and non-Malaysian owned firms. The results for two-step difference GMM estimation for firms owned by Malaysian suggest that the non-tariff variable has a statistically significant association at the 90 percent confidence level or higher. The results indicate that if the index increases by one point, it would increase the imported inputs content by 0.06 percent. On the other hand, the two-step system GMM estimations suggest that none of the variables are significant. The results for both two-step difference and two-step system GMM estimations for non-Malaysian owned firms suggest that only the tariff variable has a statistically significant association at the 90 percent confidence level or higher. Therefore, if the index increases by one point, it would increase the imported inputs content by 0.133 percent and 0.124 percent, respectively.

The Hansen specification test which determines the validity of instruments adopted in the model shows that all the models estimated for difference and system GMM have been correctly specified. The Hansen test for over identifying restrictions of these models failed to reject the null hypothesis since the p-value calculated is higher than 0.05. As such, the results indicate that the instruments developed in all the models are valid. Meanwhile the result of over identification restrictions and serial correlation test for models developed for the industries and firms owned by Malaysian failed to reject the null hypotheses of no first-order and no second-order serial correlation. Therefore, the results indicate that all the models have been correctly specified because there is no serial correlation in the transformed residuals and the instruments (moment conditions) adopted in the models are valid.

6.3 Conclusion

This study has been set out to provide empirical evidence of imported inputs influence on industry and firm growth in Malaysia during the period from 2000 to 2006. The analysis for this chapter is in two categories, analysis at industry level and at firms' level. The industries and firms are classified into two types of ownership; Malaysian and non-Malaysian owned. We have also analyzed the influence of imported inputs use in selected export-oriented industries. These industries are wood products, textiles and apparel products, petroleum and fuel products, rubber products, machinery products, electrical and electronic products, leather products and scientific and measuring equipments. Again, we have adopted both static and dynamic estimation techniques in order to make sure that we obtain the most convincing results.

During the period studied, the results suggest that among 54 sub-industries analyzed, nine foreign-owned sub-industries have the highest imported input content. Among others, these sub-industries include manufacture of office equipment, accounting and computing machinery with approximately 73.68 percent of imported content and followed by manufacture of watches and clocks with approximately 67.13 percent. Imported input content is also very high in Malaysian-owned manufacture of knitted and crocheted fabrics and articles with approximately 61.44 percent. On the other hand, the sub-industries with the lowest imported input content of below 5 percent are divided between Malaysian and foreign-owned industries. Among others, these sub-industries include the production, processing and preserving of meat, fish, fruit, vegetables, oils and fats industries, sawmilling and planning of wood industries and manufacture of products of wood, cork, and plaiting materials industries.

Regarding the analysis at industry level, the OLS, GLS, two-step difference and system GMM estimation results suggest that imported input content does not play a significant role in determining the growth of the industries owned by Malaysians. Meanwhile, the results in both fixed and random effect models in the static model estimation show that the relationship between these variables is the inverse which is against the hypothesis proposed. Meanwhile, our findings for industries owned by non-Malaysian show that imported inputs content has a significant role in determining the growth of the industries. All estimations either in the static or dynamic models indicate a positively statistically significant relationship in determining the growth of the revenue. The results of the OLS and the random effect estimation show that an increase by one percent in imported inputs content would increase the revenue by 0.099 percent and 0.091 percent, respectively. Similarly, the results for both two-step difference and system GMM suggest that an increase by one percent in imported inputs content would increase the revenue by 0.127 percent and 0.202 percent, respectively.

Looking at the firms' level analysis, the results for OLS, fixed effect, two-step difference and system GMM estimation also show that imported inputs in both Malaysian and non-Malaysian firms is positively associated with their revenue growth. As such, the OLS and fixed effect results suggest that an increase by one percent in the imported inputs content would increase the revenue in firms owned by Malaysians and non-Malaysians by 0.015 percent and 0.041 percent, respectively. An increase by one percent in imported inputs content in two-step difference GMM would increase the revenue in Malaysian and non-Malaysian owned firms by 0.066 percent and 0.016 percent, respectively. Meanwhile, an increase by one percent in imported inputs content in two-step system GMM would increase the firms' revenue in Malaysian and non-Malaysian owned firms by 0.051 percent and 0.018 percent, respectively.

Regarding the analysis for trade liberalisation, our findings suggest that both tariff and non-tariff indexes have a significant association with the content of imported inputs in industries owned by Malaysian. However, for industries owned by non-Malaysian, only non-tariff variables show a positive relationship with the content of imported inputs. Meanwhile, at firms' level, the results suggest a contrary association between firms owned by Malaysian and non-Malaysian. For Malaysian-owned firms, trade liberalization has a big effect on the content of imported inputs but this doesn't translate into much growth. Meanwhile for non-Malaysian-owned firms, there is a smaller effect on the content of imported inputs, but it is better at raising growth. Our estimations using the freedom to trade internationally variable shows that the variable has a positive relationship with the content of imported inputs in the industries owned by both Malaysians and non-Malaysians.

Next, chapter seven will discuss in detail intra industry trade between Malaysian with its main trading partners. It will also explain about the country-specific determinants which determine the share of this trade for manufactured goods products and selected export-oriented products industries.

CHAPTER SEVEN

INTRA INDUSTRY TRADE DETERMINANTS

7.1 Introduction

Chapter seven presents the analysis and results pertaining to intra industry trade determinants. Based on the discussion presented in the hypothesis development sub-section on page 162 to 169 in chapter four, ten hypotheses have been developed to investigate these determinants. The hypotheses were based on ten selected country-characteristics determinants; difference in economy size, average economy size of trading countries, foreign direct investment inflows, distance, trade imbalance, trade orientation, the existence of a common border and economic integration. These hypotheses are:

i. The higher the average economic size of two trading countries, the higher the share of intra-industry trade.
ii. The greater the differences in the economic size of two trading countries, the lower the share of intra-industry trade.
iii. The greater the lowest value of gross domestic product of two trading countries, the higher the share of intra-industry trade.
iv. The greater the highest value of gross domestic product of two trading countries, the lower the share of intra-industry trade.
v. The higher the foreign direct investment inflows, the higher the share of intra-industry trade.
vi. The higher the distance, the lower the share of intra-industry trade.
vii. The higher the trade imbalance, the lower the share of intra-industry trade.
viii. The higher the trade orientation, the higher the share of intra-industry trade.
ix. The existence of a common border between two trading partners raises the share of intra-industry trade.
x. The more integrated the two trading partners, the higher the share of intra-industry trade.

The analysis focuses mainly on intra-industry trade between Malaysia and fifteen trading partners namely the United States, the United Kingdom, Japan, Singapore, Republic of China, Republic of Korea, Philippines, Thailand, Hong Kong, Germany, Netherlands, Australia, India, Viet Nam and Pakistan. The analysis is based on the actual data of intra-industry trade in Malaysia's manufacturing sector for 5 years from 2005-2009 and the products are classified according to 3-digit SITC codes.

The next sub-section of the chapter presents the findings which will be divided into three parts. The first part explains several issues related to intra-industry trade patterns which include comparisons between the indices for manufactured goods and total products, the indices in manufactured goods between Malaysia and its selected trading partners and lastly the indices of orientation with its trading partner. The period of analysis is from 2005 to 2009. Meanwhile the second part describes the analysis of country-characteristics determinants at industry level and the last part of the findings presents the analysis of country-characteristics determinants at selected individual export-oriented industry level. Similar to the previous two chapters, the data used in this analysis also depicted micro-panel data characteristics. Therefore our analysis has included both the static and dynamic model estimations and used similar tests to identify for heteroskedasticity, serial correlation problems and the over identifying restrictions condition.

7.2 Findings and Discussion

Our study has extended the analysis of the Grubel and Lloyd intra-industry trade for Malaysian manufactured goods as pointed by Ariff (1991) in previous chapter 3. For further examination we have calculated the indexes for total products as comparison to the indexes for manufactured goods. The period analyzed is from 1995 to 2009 and these results are presented in Table 7.1 below.

Table 7.1: Intra Industry Trade Indices for Manufactured Goods and Total Products (1995 – 2009)

Year / Country	Manufactured Goods				Total Products			
	1995 (%)	2000 (%)	2005 (%)	2009 (%)	1995 (%)	2000 (%)	2005 (%)	2009 (%)
United States	64	57	45	57	66	59	46	61
Singapore	90	97	97	92	92	95	95	96
Japan	50	86	85	83	77	98	92	87
Republic of China	94	67	72	85	76	64	69	76
Association of South-East Asian Nations (ASEAN)	94	97	99	98	98	97	99	98
Newly Industrialized Economies (NIEs)	95	98	98	95	99	96	95	92
European Union (EU)	98	67	72	80	92	64	70	76
Australia	80	29	23	26	91	69	58	58
World	99	83	77	81	94	81	76	79

Source: Author's calculation based on UNCTAD database (1995-2009)

The figure shows the intra-industry trade indexes calculated for trade of manufactured goods (SITC 5 to 8) and for trade of total products. Similar to the finding by Ariff (1991), our analysis indicated significant intra-industry trade indexes between Malaysia and its major partners such as the countries in ASEAN including Singapore and Newly Industrialized Economies (NIEs) which recorded indexes above 90 percent for both manufactured goods and total products between 1995 and 2009. Intra-industry trade indexes between Malaysia and Japan also show an increasing trend of above 50 percent for both products. Further examination of the manufactured goods intra-industry trade between Malaysia and her major trading partners is presented in Table 7.2 below.

Table 7.2: Intra Industry Trade in Manufactured Goods with Major Trading Partners (1995-2009)

Country / Year	1995 (%)	2000 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)
World	**99**	**83**	**77**	**79**	**82**	**83**	**81**
Australia	80	29	23	24	28	26	26
Rep. of China	94	67	72	77	85	90	85
Germany	94	73	95	98	99	96	91
Rep. of Hong Kong	62	57	51	56	60	61	38
India	78	63	61	53	49	57	98
Indonesia	71	74	76	79	86	89	90
Japan	50	86	85	86	79	81	83
Rep. of Korea	63	98	85	83	81	82	93
New Zealand	64	24	23	22	23	16	26
Netherlands	54	32	19	20	19	18	22
Philippines	37	90	69	77	82	89	96
Singapore	90	97	97	94	93	94	92
China Province of Taiwan	88	89	96	89	85	82	91
Thailand	74	91	91	90	93	99	93
United Kingdom	84	51	62	57	64	71	79
United States	64	57	45	48	49	57	57
Viet Nam	42	66	42	45	41	50	56

Source: Author's calculation based on UNCTAD database (1995-2009)

The data in table 7.2 suggest that between 1995 and 2009, Malaysia maintained a strong and continuous intra-industry trade trend with countries such as Thailand, Rep. of China, China Province of Taiwan, Singapore, Indonesia, Japan, Rep. of Korea, Philippines and Germany. The intra-industry trade between Malaysia and these countries show indexes above 70 percent per annum between 1995 and 2009. Our study also presents the intra-industry trade index by orientation of industries between Malaysia and her major trading partners such as Republic of China, Singapore, Japan and the United States for further analysis and understanding of the trade flow. The figures are shown in Table 7.3 below.

Table 7.3: Intra Industry Trade Indices by Orientation with Major Trading Partner (2005 -2009)

Country Industries	2005 Rep. of China (%)	Singapore (%)	Japan (%)	United States (%)	2009 Rep. of China (%)	Singapore (%)	Japan (%)	United States (%)
Export Oriented:								
Electrical and Electronic Products	52	97	89	40	51	97	87	52
Rubber Products	66	80	79	19	28	71	82	71
Wood and wood products	27	29	0.6	3.7	81	23	0.2	8.3
Textiles and wearing apparel	43	82	89	52	20	88	83	90
Petroleum and fuels product	70	72	0.5	10	7.9	98	2.2	33
Machinery and equipment	56	98	93	43	58	92	95	56
Scientific instruments	44	99	87	93	48	66	64	79
Domestic Oriented:								
Food products, beverages and tobacco	11	79	51	28	58	63	67	16
Paper and paper products	81	87	43	45	29	85	51	55
Plastic products	18	43	88	46	31	39	85	25
Chemical and chemical products	67	69	87	94	90	55	88	87
Transport equipment	85	86	4.5	41	86	94	4.5	89
Basic metal and fabricated metal products	55	63	2.7	19	21	82	1.6	70
Non-metallic mineral products	44	99	71	91	15	40	67	37

Source: Author's calculation based on UNCTAD database (2005-2009)

The figures indicates that intra-industry trade with the Republic of China in 2005 was mainly in the domestic-oriented industries especially in paper and paper products, followed by transport equipment and chemical and chemical products. Meanwhile in 2009 the intra-industry trade is mainly in wood and wood products followed by machinery and equipment products. The trade also existed in domestic-oriented industries which consist of chemical and chemical products followed by transport equipment and food products, beverages and tobacco. On the other hand, intra-industry trade with Singapore in 2005 was strong in all of the industries whether domestic-oriented or export-oriented. The lowest percentage is in wood and wood products. In 2009 the percentage remained almost the same with a lower intra-industry trade percentage in the wood and wood products for export-oriented industries and non-metallic mineral products and plastic products for domestic-oriented industries.

Intra-industry trade with Japan in 2005 recorded a high percentage in both the export-oriented industries and domestic-oriented industries. In export-oriented industries the highest percentage is recorded in machinery and equipment followed by electrical and electronic products, textiles and wearing apparel, scientific instruments and rubber products. Meanwhile in domestic-oriented industries the highest percentage is in plastic products, followed by chemical and chemical products, non-metallic mineral products and food products, beverages and tobacco, In 2009 the highest percentage recorded in the export-oriented industries was in machinery and equipment, electrical and electronic products, textiles and wearing apparel and rubber and rubber products. As for domestic-oriented industries the highest percentage exist in the chemical and chemical products, plastic products, non-metallic mineral products, food products, beverages and tobacco and paper and paper products.

Malaysia's intra-industry trade with the United States in 2005 was mainly in the domestic-oriented industries. The industries include chemical and chemical products and non-metallic mineral products. However, the percentage was also high in export-oriented industries, especially in scientific instruments. Meanwhile in 2009 the intra-industry trade was mainly in transport equipment, followed by chemical and chemical products, basic metal and fabricated metal products and paper and paper products for the domestic-oriented industries. In the export-oriented industries it exists mainly in textiles and wearing apparel, followed by scientific instruments, rubber products and machinery equipment.

In the next sub-chapter we will be discussing the analysis and findings of the country-specific determinants for the intra-industry trade as described in the earlier chapter. The discussion of static and dynamic models will be focused on two different cases which refer firstly to the aggregate level or manufactured goods level analysis and secondly to the selected export-oriented sub-industries. These export-oriented sub-industries include rubber products, wood products, textiles and wearing apparel, electrical and electronics products, and petroleum and fuel products.

7.2.1 Analysis at Industry Level

7.2.1.1 Static Model Estimation

The initial analysis is related to the analysis at the industry level manufactured goods. The manufactured goods were observed at SITC 5 to 8 less SITC 68 and SITC 667[53] where SITC 68 refers to non-ferrous metal products and SITC 667 refers to pearls and precious stone products**.** According to the SITC classification, SITC 68 and SITC 667 products are not included in the manufactured goods products as they were classified as primary good products. Table 7.4 below shows the results of the static model. From the summary statistics produced in each case, all the variables except foreign direct investment inflows have more variation across individuals (between variations) than over time (within variation): the time-invariant regressors such as Border and ASEAN have zero within variation.

Table 7.4: OLS, Fixed, Random and GLS Result

Variable	OLS	Fixed	Random	GLS
Difference GDP	-0.0453*	-0.0189	-0.038*	-0.0279
	(-1.73)	(-1.01)	(-2.10)	(-1.51)
Average GDP	-0.0508	0.0041	-0.0308	-0.0454*
	(-1.63)	(0.18)	(-1.34)	(-2.58)
Minimum GDP	0.2856	-0.2139	0.1604	0.30665*
	(1.33)	(-0.78)	(0.96)	(2.44)
Maximum GDP	-0.1817*	0.1144	-0.0474	-0.1741*
	(-2.48)	(0.24)	(-0.38)	(-3.38)
Distance	-0.0957*	-0.4253	-0.1069*	-0.0675*
	(-5.18)	(-1.01)	(-2.74)	(-4.92)
FDI Inflow	0.0575*	0.016	0.017	0.0217*
	(2.72)	(1.07)	(1.06)	(1.91)
Trade Imbalance	-0.4423*	-0.1559	-0.3077*	-0.5053*
	(-7.73)	(-1.28)	(-3.46)	(-10.92)
Trade Orientation	-0.0055	-0.1231	-0.0091	-0.0112
	(-0.45)	(-1.21)	(-0.41)	(-1.30)
Border	0.517*	omitted	0.4164*	0.5652*
	(7.16)		(2.62)	(9.39)
ASEAN	-0.1931*	omitted	-0.1407	-0.2176*
	(-3.16)		(-1.07)	(-5.28)
_cons	-0.9660	-7.1238	-1.3083	-0.3580
	(-2.51)	(-0.90)	(-1.69)	(-1.27)
F	33.26	3.02	-	
	(0.00)	(0.00)		
Chi^2			70.36	810.44
			(0.00)	(0.00)
r^2	0.8386	0.3176		
r^2_a	0.8134	0.0289		
Sigma_u		0.4789	0.1019	
Sigma_e		0.0673	0.0674	
rho[3]		0.9806	0.6961	
White test (chi^2)	70.83			
	(0.12)			
Wooldridge test (F)	8.546			
	(0.01)			
Hausman		16.06		
		(0.04)		
N	75	75	75	75

Notes: * p<0.10 indicate the 10 percent or smaller significance levels
Figure in parentheses are t-statistics; [3]fraction of variance due to u_i
STATA omitted the variables during the estimation process because of collinearity

The results for the manufactured goods analysis show that from the OLS regression estimation, a majority of the explanatory variables have a statistically significant association with the share of intra-industry trade in the manufactured goods at the 90 percent confidence level or higher, except for average gross domestic products, minimum value of gross domestic products and trade orientation. All estimations produced sign as hypothesized except for difference dross domestic products and asean. Therefore, the OLS results suggest that if difference in gross domestic products or maximum value of gross domestic products increase by one percent, they would decrease the share of intra-industry trade by 0.045 percent and 0.182 percent, respectively. Meanwhile, if distance or trade imbalance increased by one percent, they would decrease the share of intra-industry trade in the manufactured goods by 0.096 and 0.442 percent, respectively. On the contrary, if foreign direct investment and the existence of a common border increase by one percent, they would increase the trade share by 0.058 percent and 0.518 percent, respectively. Whereas, the participation of Malaysia and trading partners in the Association of South-East Asian Nations integration would decrease the share by 0.193 percent.

The value of goodness-of-fit measures (R^2) for OLS estimation is 0.839 which indicates a high correlation between variables in the model. However, as mentioned earlier a potential problem that may arise in cross-sectional and time-series model is an inefficient result attributed to heteroskedasticity and serial correlation. The test to identify these problems is again conducted in STATA using White's general test for heteroskedasticity and the Wooldridge test for serial correlation. The white test produced a chi^2 of 70.83 and failed to reject the null hypothesis of homokedasticity since the p-value produced is larger than 0.05. On the other hand, the Wooldridge test produced an F value of 8.55 and rejected the null hypothesis of the test since the p-value produced is smaller than 0.05.

The OLS coefficients estimate leads to bias in the confidence intervals and the test statistics as the regression does not take into account the unobserved factors for country and time characteristics that are correlated with variables included in the regression. Fixed-effect models are designed to study the causes of these changes. Theoretically, the fixed effect regression controls for all time-invariant differences between the countries in the model, hence the estimated coefficient of the fixed-effects model cannot be biased because of omitted time-invariant characteristics. Under the null hypothesis, the Hausman test assumes random effect estimators are fully efficient. However, the overall statistics for Hausman test of the manufactured goods has produced a p value smaller than 0.05 which leads to strong rejection of the null hypothesis that random effect provides consistent estimates and hence accepts the fixed effect model. The fixed effect regression results show that none of the variables is statistically significant.

Again, we have also run the GLS regression for comparison. The results indicate that a majority of the variables have a statistically significant association at the 90 percent confidence level or higher, except for difference in gross domestic products and trade orientation. These variables' directions are similar to the direction produced in the OLS models. Therefore, the GLS results suggest that if average gross domestic products or maximum value of gross domestic products increase by one percent, they would decrease the share of intra-industry trade by 0.045 percent and 0.174 percent, respectively. Meanwhile, if distance or trade imbalance increased by one percent, they would decrease the share of the trade in the manufactured goods by 0.068 and 0.505 percent, respectively. On the contrary, if the existence of a common border increases by one percent, it would increase the trade share by 0.565 percent. Meanwhile, the participation of Malaysia and trading partners in the Association of South-East Asian Nations integration would decrease the share by 0.218 percent.

7.2.1.2 Dynamic Model Estimation

Since the intra-industry trade analysis features a micro panel with short time dimension, small number of years (t= 5) and a larger country-panel dimension (i= 15), the estimated result of static model such as OLS, Fixed Effect and Random Effect estimations are assumed to be biased and inconsistent. The solution proposed to correct for the problem of endogeneity is again to use the Arellano-Bond (1991) difference GMM estimation and the Blundell and Bond (1995) and Blundell and Bover (1998) system GMM estimation. Table 7.5 below shows the results of the dynamic models' estimation using these methods.

Table 7.5: Difference and System GMM Result

Variables	**GMM (one-step difference)**	**GMM (two-step difference)**	**GMM (one-step system)**	**GMM (two-step system)**
Lag intra-industry Trade	0.4858	0.5745	0.3578	-0.2712
	(0.46)	(1.10)	(0.63)	(-0.44)
Difference GDP	0.0122	-0.0001	0.0126	-0.0389
	(0.41)	(-0.01)	(0.42)	(-1.44)
Average GDP	0.0139	0.0018	0.0132	-0.0379
	(0.44)	(0.17)	(0.42)	(-1.35)
Minimum GDP	-0.1676	0.2121	-0.1782	1.9555
	(-0.47)	(0.53)	(-0.51)	(1.60)
Maximum GDP	0.6522	0.1901	0.6112	-0.9375
	(0.93)	(0.47)	(0.95)	(-1.10)
Distance	-0.0660	-0.0261	-0.1433	0.4694
	(-0.10)	(-0.08)	(-0.36)	(0.77)
FDI Inflow	0.0028	0.0053	0.0038	0.0099
	(0.14)	(0.84)	(0.20)	(1.38)
Trade Imbalance	-0.4509*	-0.4143*	-0.4389*	-0.2215
	(-2.53)	(-2.95)	(-2.78)	(-1.23)
Trade Orientation	-0.0611	-0.0129	-0.079	-0.2191
	(-0.34)	(-0.13)	(-0.60)	(-1.52)
Border	omitted	omitted	-0.5790	0.8104
			(-0.38)	(0.69)
ASEAN	omitted	omitted	-0.2561	-0.5579
			(-0.81)	(-0.78)
_cons	-1.3928	-0.4000	-1.3928	11.916
	(-0.12)	(-0.07)	(-0.31)	(0.93)
Chi^2	23.74	2233.45	60.49	947.13
	(0.00)	(0.00)	(0.00)	(0.00)
Hansen Test	14.20	5.873	13.359	3.924
	(0.02)	(0.3188)	(0.04)	(0.53)
Arellano-Bond Test	-		-	
1st order		0.1173		1.598
		(0.90)		(0.11)
Arellano-Bond Test	-		-	
2nd order		-0.5609		-0.6245
		(0.57)		(0.53)
N	45	45	60	60

Notes: * p<0.10 indicate the 10 percent or smaller significance levels
Hansen Test – test of overidentfying restrictions
Arellano-Bond Test – test for serial correlation in first and second order differenced errors
Figure in parentheses are t-statistics, except for Hansen test and Arellano-Bond test which are p-values.
STATA omitted the variables during the estimation process because of collinearity

As mentioned in the earlier chapters, the two-step estimator in the generalized method of moments (GMM) estimation is more efficient as compared to the first-step estimator theoretically. The results show that two-step estimations which produced a p-value smaller than 0.05 with chi^2 test value of 2233.45 and 947.13 respectively for both difference and system models are statistically fit. The estimated result of the two-step estimator for difference GMM show that only trade imbalance has a statistically significant association with the share of intra-industry trade in manufactured goods at the 90 percent confidence level with the sign as hypothesized. On the other hand, the two-step estimator for system GMM shows that none of the variables is statistically significant. Therefore, the result suggests that if trade imbalance increased by one percent, it would decrease the share of intra-industry trade by 0.414 percent in the difference GMM model.

The Hansen specification test which determines the validity of instrument adopted in the model shows that the two-step difference GMM model has been correctly specified. The Hansen test for over identifying restrictions of produced a chi^2 calculated 5.873 failed to reject the null hypothesis since the p-value calculated is higher than 0.05. This indicates that the instruments developed in the model are valid. The result of the over identification restrictions and auto-correlation tests for difference GMM models also failed to reject the null hypotheses of no first-order or second-order serial correlation in the transformed residuals, and the instruments (moment conditions) used in both models are valid. The results indicate that the model has been correctly specified. The results for OLS and GLS model suggest that each of the gross domestic products variables has a statistically significant relationship with the share of intra-industry trade in the manufactured goods at least once. Meanwhile the other country-characteristics variables indicate similar relationship except for trade orientation. On the other hand, the results for two-step difference GMM estimation show that only trade imbalance has a statistically significant association with the share of intra-industry trade in Malaysian manufactured goods.

7.2.2 Analysis at Individual Industry Level

For individual industry analysis our study has selected five export-oriented industries. These industries are the main industries which have contributed to the growth of the manufacturing sector specifically. These export oriented industries are rubber and rubber products, wood products, textiles and wearing apparel, electrical and electronics products and petroleum and fuel products. Similar to the manufactured good analysis, the time-invariant regressors such as border and ASEAN for all these sub-industries have zero within variation and a majority of the variables except foreign direct investment inflows have more variation across individuals (between variations) than over time (within variation). Similar to previous analysis, our results will be divided into static and dynamic analysis.

7.2.2.1 Static Model Estimation

The results for static manufactured goods analysis are shown in Table 7.6 below.

Table 7.6: OLS, Fixed, Random and GLS Result

Variable / Industry	Difference GDP(dgdp)	Average GDP (agdp)	Minimum GDP (mingdp)	Maximum GDP (maxgdp)	Distance (dist)	FDI Inflow (fdi)	Trade Imbalance (timb)	Trade Orientation (to)	Border (Border)	ASEAN (Asean)	F / Chi^2	r^2	H-test	N
Rubber														
	-0.031	-0.062	0.239	-0.735*	-0.151*	0.037	-0.425*	0.035*	0.007	0.298*	17.61	0.734		
OLS	(-0.77)	(-1.29)	(0.73)	(-6.49)	(-5.32)	(1.04)	(-4.90)	(1.87)	(0.07)	(3.17)	(0.00)			75
	-0.036	-0.031	0.842*	-0.899	0.004	0.019	-0.502*	-0.162	omitted	omitted	1.98			
Fixed	(-1.13)	(-0.79)	(1.83)	(-1.11)	(0.01)	(0.69)	(-2.46)	(-0.94)			(0.06)		2.48	75
	-0.020	-0.029	0.413	-0.822*	-0.146*	0.015	-0.453*	0.029	0.086	0.232	36.00		(0.96)	
Random	(-0.74)	(-0.84)	(1.57)	(-3.72)	(-2.02)	(0.55)	(-3.10)	(0.72)	(0.29)	(0.94)	(0.00)			75
	-0.045	-0.006	0.224	-0.653*	-0.151*	-0.004	-0.468*	0.026	-0.031	0.298*	353.91			
GLS	(-1.64)	(-1.43)	(1.21)	(-6.44)	(-6.40)	(-0.22)	(-5.61)	(1.91)	(-0.27)	(3.14)	(0.00)			75
Wood														
	0.009	0.012	-0.523*	0.584*	0.014	0.076*	-0.057	-0.025	-0.133	0.159*	11.79	0.648		
OLS	(0.29)	(0.31)	(-1.89)	(6.14)	(0.59)	(2.53)	(-0.78)	(-1.57)	(-1.41)	(2.02)	(0.00)			75
	0.037	0.079*	-1.342*	-0.144	-1.253*	0.017	0.186	0.079	omitted	omitted	2.47			
Fixed	(1.40)	(2.35)	(-3.44)	(-0.21)	(-2.10)	(0.69)	(1.08)	(0.55)			(0.02)		0.28	75
	0.013	0.055*	-0.620*	0.736*	0.002	0.021	0.020	-0.020	-0.250	0.199	29.37		(1.00)	
Random	(0.52)	(1.78)	(-2.77)	(4.27)	(0.04)	(0.88)	(0.17)	(-0.64)	(-1.13)	(1.08)	(0.00)			75
	0.005	0.013	-0.399*	0.463*	-0.004	0.024*	0.013	-0.013	-0.144*	0.188*	163.48			
GLS	(0.97)	(0.36)	(-3.22)	(6.89)	(-0.23)	(3.00)	(0.31)	(-0.96)	(-2.80)	(5.86)	(0.00)			75
Textiles														
	-0.009	-0.071	-0.177	-0.490*	-0.097*	0.009	0.261*	0.048*	0.009	0.109	2.92	0.314		
OLS	(-0.18)	(-1.25)	(-0.45)	(-3.66)	(-2.90)	(0.23)	(2.54)	(2.17)	(0.07)	(0.98)	(0.00)			75
	0.024	-0.029	-0.113	0.231	0.280	-0.005	-0.700*	-0.009	omitted	omitted	2.29		10.45	
Fixed	(0.73)	(-0.70)	(-0.23)	(0.27)	(0.37)	(0.17)	(-3.22)	(-0.05)			(0.03)		(0.24)	75
	0.025	-0.031	0.007	-0.372	-0.012	0.010	-0.274*	0.043	0.030	-0.027	11.94			
Random	(0.79)	(-0.79)	(0.02)	(-1.51)	(-0.15)	(0.33)	(-1.67)	(0.94)	(0.09)	(-0.10)	(0.28)			75
	0.007	0.013	0.285	-0.483*	-0.028	-0.012	0.148	0.047*	0.201	-0.068	25.82			
GLS	(0.28)	(0.47)	(1.15)	(-3.51)	(-0.61)	(-0.65)	(1.24)	(1.91)	(0.87)	(-0.38)	(0.00)			75
Electrical and Electronics														
	-0.074*	-0.074*	-0.020	-0.260*	-0.137*	0.052*	-0.548*	0.059*	0.528*	-0.175*	33.71	0.840		
OLS	(-2.24)	(-1.86)	(-0.07)	(-2.79)	(-5.89)	(1.74)	(-7.68)	(3.85)	(5.74)	(-2.27)	(0.00)			75
	-0.018	0.009	-0.441*	-0.828*	-0.993*	0.007	-0.056	0.159*	omitted	omitted	3.38		42.56	
Fixed	(-1.28)	(0.51)	(-2.18)	(-2.33)	(-3.20)	(0.56)	(-0.62)	(2.11)			(0.00)		(0.00)	75
	-0.029*	0.0008	-0.089	-0.148	-0.211*	0.007	-0.179*	0.085*	0.322	-0.047	47.10			
Random	(-2.14)	(0.05)	(-0.59)	(-0.96)	(-3.47)	(0.52)	(-2.12)	(2.51)	(1.28)	(-0.22)	(0.00)			75
	-0.031	-0.027	0.110	-0.238*	-0.104*	0.008	-0.605*	0.059*	0.523*	-0.195*	865.92			

GLS	(1.53)	(-1.48)	(1.42)	(-3.51)	(-6.55)	(0.85)	(-12.65)	(5.25)	(6.16)	(-3.07)	(0.00)			75
Petroleum														
	-0.013	-0.010	-0.412	0.078	-0.113*	-0.048	0.098	0.050*	-0.239*	0.462*	5.52	0.463		
OLS	(-0.26)	(-0.18)	(-1.04)	(0.57)	(-3.31)	(-1.11)	(0.93)	(2.22)	(-1.77)	(4.07)	(0.00)			75
	-0.075*	-0.066	0.142	-1.916*	-1.129	-0.061	-0.079	0.049	omitted	omitted	1.14		5.59	
Fixed	(-1.70)	(-1.17)	(0.22)	(-1.68)	(-1.13)	(-1.52)	(-0.27)	(0.20)			(0.35)		(0.69)	75
	-0.040	-0.022	-0.342	-0.038	-0.109	0.063	0.012	0.043	-0.132	0.399	13.91			
Random	(-1.03)	(-0.44)	(-0.99)	(-0.16)	(-1.48)	(-1.63)	(0.07)	(1.01)	(-0.44)	(1.62)	(0.18)			75
	0.0014	-0.042	-0.062	0.026	-0.122*	0.006	0.205*	0.036*	-0.211	0.475*	81.55			
GLS	(0.11)	(-0.81)	(-0.30)	(0.22)	(-3.96)	(0.31)	(2.56)	(1.67)	(-1.63)	(3.76)	(0.00)			75

Notes: * $p<0.10$ indicate the 10 percent or smaller significance levels
Figure in parentheses are t-statistics; [3]fraction of variance due to u_i
STATA omitted the variables during the estimation process because of collinearity

The value of goodness of fit measurement (R^2) for the estimation of rubber products and wood products industries which was approximately 0.734 and 0.648 respectively indicates a quite high correlation between the variables in the OLS models. Similarly, the value for petroleum and fuel products industry which was approximately 0.463 also indicates a medium correlation between variables in the models. On the contrary, the value estimated for textiles and wearing apparel industry which was approximately 0.314 indicates a weak correlation between the variables. In spite of the above results, the value of goodness of fit measurement for electrical and electronic products which was approximately 0.840 indicates a strong correlation between variables in the models. The White general test result for all industries analyzed failed to reject the null hypothesis of homokedasticity in the suggested models since the p-value estimated in each model is larger than 0.05. Meanwhile, the Wooldridge test for serial correlation for the wood, textiles and petroleum industries show that the results rejected the null hypothesis of no first-order serial correlation in the model estimated when the p-value calculated produced a value smaller than 0.05.

For comparison, our study applied the Hausman test to determine whether to choose either fixed or random effect estimation in the static estimation. The overall statistics of Hausman test for rubber, textiles and petroleum products industries yields a p-value larger than 0.05 hence failed to reject the null hypothesis that random effect provides consistent and efficient estimates. However, the random effect regression results for petroleum industries show that none of the variables is statistically significant. Contrarily, the overall statistics of Hausman test for wood and electrical and electronic products yields a p-value smaller than 0.05 hence reject the null hypothesis and accept the fixed effect regression results. Again, we have also run the GLS regression for comparison.

Our finding shows that each of the country-characteristics variables is statistically significant at least once in any of the estimations technique tested in the static model estimations. All the gross domestic products variables have a statistically significant association with the share of intra-industry trade at the 90 percent confidence level or higher, in the rubber, wood, electrical and electronic and textiles products industries. Similarly, the other country-characteristics variables also have a statistically significant association with the trade share at the 90 percent confidence level or higher. One of the results that should be pointed out is related to the maximum value of gross domestic products which is significant in almost all estimation techniques applied for all industries. The results suggest that if the maximum value of gross domestic products increases by one percent, it would decrease the share of intra-industry trade in rubber, textiles and electrical and electronic products industries by 0.735 percent, 0.490 percent and 0.260 percent, respectively, according to the OLS estimations. Similarly, if the maximum value increases by one percent, it would decrease the share of the trade in the rubber, textiles and electrical and electronic products industries by 0.653 percent, 0.483 percent and 0.238 percent, respectively, according to the GLS estimations.

Another similar result is pertaining to distance which also has a statistically significant association in almost all estimation techniques applied in the static model. The results suggest that if the distance increases by one percent, it would decrease the share of intra-industry trade in rubber, textiles, petroleum and electrical and electronic products industries by 0.151 percent, 0.097 percent, 0.113 percent and 0.137 percent, respectively, according to the OLS estimations. Likewise, if distance increases by one percent, it would decrease the share of the trade in the rubber, petroleum and electrical and electronic products industries by 0.151 percent, 0.122 percent and 0.104 percent, respectively, according to the GLS estimations. In conjunction with our findings for manufactured goods at aggregate industry level, trade imbalance also indicate a similar result at the individual industry level. This explanatory variable again show a statistically significant association in almost all estimation techniques applied in the rubber and electrical and electronic products industries. Our findings show that if trade imbalance increase by one percent, it would decrease the share of intra-industry trade in rubber and electrical and electronic products industries by 0.425 percent and 0.548 percent, respectively, according to the OLS estimations. Meanwhile, if trade imbalance increase by one percent, it would decrease the share of the trade in rubber and electrical and electronic products industries by 0.468 and 0.605 percent, respectively, according to the GLS estimations.

7.2.2.2 Dynamic Model Estimation

The results for dynamic individual analysis are shown in Table 7.7 below. Similar to the previous section, for the analysis purposes, both difference and system Generalized Method of Moment (GMM) estimations are introduced to solve the biases that exist in the static model. These biases are associated with the fixed effects in the short panel and were also due to the presence of a lagged dependent variable in the model.

Table 7.7: Difference and System GMM Result

Variable Industry	Lag IIT (liit)	Difference GDP (dgdp)	Average GDP (agdp)	Minimum GDP (mingdp)	Maximum GDP (maxgdp)	Distance (dist)	FDI Inflow (fdi)	Trade Imbalance (timb)	Trade Orientation (to)	Border (Border)	ASEAN (Asean)	Chi^2	Hansen Test	A-B Test	N
Rubber															
GMM (one-step difference)	-0.568 (-0.84)	0.031 (0.51)	-0.053 (-1.05)	0.886 (1.55)	-1.279 (-1.00)	-0.227 (-0.23)	0.005 (0.14)	-0.557 (-1.43)	-0.162 (-0.87)	omitted	omitted	7.83 (0.55)	4.608 (0.46)	-	45
GMM (two-step difference)	-0.531* (-2.15)	0.039 (0.80)	-0.039* (-3.17)	1.15* (1.82)	-0.898 (-1.05)	0.005 (0.01)	-0.004 (-0.45)	-0.619* (-2.95)	-0.258 (-1.05)	omitted	omitted	1318 (0.00)	3.851 (0.57)	0.2683 (0.78) -1.015 (0.31)	45
GMM (one-step system)	-0.637 (-0.92)	0.039 (0.65)	-0.054 (-1.05)	0.611 (1.24)	-1.963* (-1.87)	-0.972* (-1.79)	0.012 (0.30)	-0.574 (-1.44)	-0.096 (-0.55)	-0.699 (-0.84)	4.017* (2.49)	27.91 (0.00)	4.891 (0.55)	-	60
GMM (two-step system)	-0.727 (-1.56)	0.062 (0.75)	-0.030 (-1.59)	-0.368 (-0.21)	-1.403 (-0.80)	-1.378 (-0.89)	0.118 (0.46)	-0.648* (-2.80)	-0.075 (-0.33)	-2.262 (-0.78)	6.513 (0.99)	1864.66 (0.00)	2.69 (0.84)	0.1568 (0.87) -1.001 (0.31)	60
Wood															
GMM (one-step difference)	0.417* (1.99)	0.006 (0.22)	0.017 (0.52)	-0.055 (-0.13)	0.112 (0.19)	-0.126 (-0.24)	-0.006 (-0.33)	0.020 (0.14)	-0.062 (-0.59)	omitted	omitted	14.992 (0.09)	13.061 (0.02)	-	45
GMM (two-step difference)	0.453* (10.84)	0.017* (2.29)	0.018* (5.93)	0.453 (1.35)	-0.133 (-0.37)	-0.155 (-0.89)	-0.003 (-0.71)	-0.022 (-0.37)	-0.089* (-4.26)	omitted	omitted	42362.63 (0.00)	6.97 (0.22)	1.389 (0.16) -0.997 (0.31)	45
GMM (one-step system)	0.467* (2.40)	0.005 (0.19)	0.011 (0.36)	0.072 (0.20)	0.383 (0.94)	0.187 (1.41)	-0.007 (-0.43)	0.008 (0.06)	-0.089 (-0.92)	-0.243 (-0.57)	-0.228 (-0.50)	66.31 (0.00)	12.53 (0.05)	-	60
GMM (two-step system)	0.406* (3.95)	0.016* (2.07)	0.015* (4.34)	0.091 (0.20)	0.409* (2.14)	0.175 (1.14)	-0.0029 (-0.52)	-0.028 (-0.61)	-0.047 (-0.84)	-0.220 (-0.68)	-0.645 (-1.50)	8510.94 (0.00)	3.783 (0.71)	1.125 (0.26) -0.89 (0.37)	60
Textiles															
GMM (one-step difference)	0.070 (0.22)	0.072 (1.42)	0.008 (0.22)	-0.061 (-0.15)	-0.663 (-0.79)	-0.729 (-1.05)	-0.001 (-0.04)	-0.308 (-1.20)	-0.031 (-0.25)	omitted	omitted	14.96 (0.00)	5.322 (0.37)	-	45
GMM (two-step difference)	-0.031 (-0.19)	0.099* (4.66)	0.021* (2.28)	0.003 (0.01)	0.072 (0.11)	-0.180 (-0.36)	0.006 (0.49)	-0.382* (-2.19)	-0.053 (-0.50)	omitted	omitted	4948.15 (0.00)	3.958 (0.55)	-0.054 (0.95) 1.077 (0.28)	45

GMM (one-step system)	-0.041 (-0.14)	0.085* (1.71)	0.005 (0.13)	0.016 (0.04)	-0.058 (-0.15)	-0.167* (-2.18)	-0.0006 (-0.02)	-0.401* (-1.70)	-0.087 (-0.82)	-2.877 (-0.97)	-2.468 (-0.68)	170.16 (0.00)	5.455 (0.48)	-	60
GMM (two-step system)	0.1913 (-1.03)	0.087* (3.00)	0.001 (0.07)	0.362 (0.66)	-2.883 (-1.02)	-2.013 (-1.09)	0.018 (1.30)	-0.309 (-1.16)	0.061 (0.31)	3.647 (0.13)	4.485 (0.13)	2755.22 (0.00)	2.617 (0.85)	1.145 (0.25) 1.556 (0.11)	60
Electrical & Electronics															
GMM (one-step difference)	-0.768 (-0.93)	-0.017 (-0.55)	0.008 (0.28)	-0.422 (-1.42)	-0.564 (-0.91)	-1.001* (-1.79)	-0.003 (-0.16)	-0.235* (-1.71)	0.167* (1.80)	omitted	omitted	14.72 (0.09)	5.453 (0.36)	-	45
GMM (two-step difference)	0.114 (0.16)	0.004 (0.19)	0.009 (1.01)	-0.451* (-1.70)	-0.445 (-0.93)	-0.655 (-1.56)	0.006 (1.24)	-0.286* (-3.58)	0.227* (2.29)	omitted	omitted	93.31 (0.00)	6.210 (0.28)	-2.572 (0.01) 0.567 (0.57)	45
GMM (one-step system)	0.026 (0.05)	0.003 (0.10)	0.015 (0.60)	-0.394 (-1.41)	0.139 (0.42)	-0.276 (-1.53)	0.001 (0.07)	-0.301* (-2.49)	0.120 (1.49)	0.426 (0.42)	-0.166 (-0.17)	123.16 (0.00)	7.968 (0.24)	-	60
GMM (two-step system)	1.461* (2.08)	0.032 (1.04)	0.023* (2.59)	-0.625* (-1.97)	0.369 (0.85)	0.109 (0.32)	0.010 (1.52)	-0.280* (-1.70)	0.142 (1.64)	-1.176 (-0.96)	1.932 (1.47)	213.36 (0.00)	5.485 (0.48)	-1.562 (0.11) 1.406 (0.15)	60
Petroleum															
GMM (one-step difference)	0.687* (3.64)	-0.036 (-0.63)	-0.046 (-0.80)	-0.018 (-0.03)	-1.766 (-1.33)	-1.292 (-1.19)	0.056 (1.33)	-0.176 (-0.54)	0.044 (0.20)	omitted	omitted	18.00 (0.03)	8.283 (0.14)	-	45
GMM (two-step difference)	0.668* (11.3)	-0.020* (-1.74)	-0.023 (-1.12)	0.565* (1.70)	-0.656 (-1.00)	-0.209 (-0.41)	0.048* (2.06)	-0.249* (-2.64)	-0.159 (-1.29)	omitted	omitted	1042.77 (0.00)	6.049 (0.30)	-1.809 (0.07) 0.017 (0.98)	45
GMM (one-step system)	0.629* (3.45)	-0.042 (-0.74)	-0.054 (-0.93)	0.285 (0.46)	-0.618 (-0.68)	-0.109 (-0.26)	0.046 (1.11)	-0.199 (-0.62)	-0.015 (-0.07)	0.539 (0.64)	-0.034 (0.06)	39.21 (0.00)	9.213 (0.16)	-	60
GMM (two-step system)	0.538* (5.83)	-0.028 (-1.55)	-0.057* (-2.15)	-0.013 (-0.03)	-0.719 (-0.97)	-0.541 (-0.94)	0.060* (2.82)	0.540 (1.14)	-0.037 (-0.29)	-2.108 (-0.94)	2.414 (1.16)	279.08 (0.00)	3.146 (0.79)	-1.439 (0.15) 0.1984 (0.84)	60

Notes: * $p<0.10$ indicate the 10 percent or smaller significance levels
Hansen Test – test of overidentfying restrictions and Arellano-Bond (A-B) Test – test for serial correlation in first and second order differenced errors
Figure in parentheses are t-statistics, except for Hansen test and Arellano-Bond test which are p-values.
STATA omitted the variables during the estimation process because of collinearity

Table 7.7 above shows the result for difference and system GMM estimations for the industries which have been selected for analysis. The results for two-step estimations in both difference and system models for the industries produced a p-value smaller than 0.05 which show that the models developed are statistically fit. Similar to the static model results, our dynamic estimations show that each of the country-characteristics variables tested is statistically significant at least once in any of the estimations technique used. The chi^2 test values produced for both GMM estimations for each of the individual industry are as presented above.

In the dynamic models, all the gross domestic products variables have a statistically significant association with the share of intra-industry trade at the 90 percent confidence level or higher, at least once, in all the industries tested. Similarly, a majority of the country-characteristics variables except for border also have a statistically significant association with the trade share at the 90 percent confidence level or higher. One of the findings for gross domestic products variables that should be highlighted is related to the average gross domestic product which is significant in both two-step difference and system GMM estimation techniques in a majority of the industries tested. Therefore, the results suggest that if the average gross domestic product increases by one percent, it would increase the share of intra-industry trade in wood and textiles products industries by 0.018 percent and 0.021 percent, respectively, according to the two-step difference GMM estimations. Similarly, if the variable increases by one percent, it would increase the share of the trade in the wood and electrical and electronic products industries by 0.015 percent and 0.023 percent, respectively, according to the two-step system GMM estimations.

Trade imbalance and foreign direct investment also have a statistically significant association with the trade at the 90 percent confidence levels or higher with sign as hypothesized in a majority of the industries tested. With respect to our findings for manufactured goods at aggregate industry level, trade imbalance again indicates similar results at the individual industry level. Therefore, our findings suggest that if trade imbalance increases by one percent, it would decreases the share of intra-industry trade in rubber, textiles, electrical and electronic and petroleum and fuel products industries by 0.619 percent, 0.382 percent, 0.286 percent and 0.249 percent, respectively, according to the difference GMM estimations. Meanwhile, if trade imbalance increase by one percent, it would decrease the share of the trade in rubber and electrical and electronic products industries by 0.648 percent and 0.280 percent, respectively, according to the system GMM estimations.

The previous value of the intra-industry trade share has a statistically significant association with the trade at the 90 percent confidence level or higher with sign as expected in the wood, electrical and electronics and petroleum and fuel products industries. The results suggest that if the previous value of the intra-industry trade share increases by one percent, it would increase the intra-industry trade in the wood and petroleum and fuel products industries by 0.453 percent and 0.687 percent, respectively, according to the two-step difference GMM estimations. Similarly, if the previous value of the trade share increases by one percent, it would increase the share of the trade in the wood, electrical and electronic, and petroleum and fuel products industries by 0.406 percent, 1.46 percent and 0.538 percent, respectively, according to the two-step system GMM estimations.

The Hansen specification test which determines the validity of the instruments adopted in the model show that both the difference and system GMM models have been correctly specified. The results for over identifying restrictions of both models for all the industries analyzed, fail to reject the null hypothesis since the p-value calculated is higher than 0.05. The corresponded chi^2 value for all the industries is presented in table 7.7 above. This indicates that the instruments developed in both models are valid. The result of the auto-correlation test for both models also failed to reject the null hypothesis of no first-order or second-order serial correlation in the transformed residuals and the instruments (moment conditions) used in both models are valid. The result indicates that the models have been correctly specified.

7.3 Conclusion

The study in this chapter has been set out to provide empirical evidence of intra industry trade determinants between Malaysia and its trading partners during the period from 2005 to 2009. The analysis is classified in two categories, analysis of aggregate output for manufactured goods and of individual industry output, particularly export-oriented industries. For the estimation ten country-specific determinants were selected. These determinants are market sizes of the two countries trading, differences/similarity in economic size, the lowest and higher value of gross domestic products (to capture the relative size effect), foreign direct investment inflows, distance, trade imbalance, trade orientation, the existence of a common border and economic integration. The trading partner countries are the United States, the United Kingdom, Japan, Singapore, Republic of China, Republic of Korea, Philippines, Thailand, Hong Kong, Germany, Netherlands, Australia, India, Viet Nam and Pakistan. Meanwhile the export-oriented industries are wood products, textiles and apparel products, petroleum and fuel products, rubber products and electrical and electronic products. Similar to the previous two chapters, we have also adopted the static and dynamic estimation techniques for this chapter.

Our study firstly analyzes the determinants for intra industry trade in manufactured goods. During the period studied, the OLS and GLS estimations in the static model results suggest that majority of the country specific determinants, for example foreign direct investment inflows, sharing of common border, distance and trade imbalance determine the share of intra-industry trade. Therefore, the results show that an increase by one percent in foreign direct investment and the existence of a common border would increase the trade share by 0.058 percent and 0.518 percent, respectively. Meanwhile, an increase by one percent in distance or trade imbalance would decrease the share of intra-industry trade by 0.096 percent and 0.442 percent, respectively. In the GLS estimation the result show that an increase by one percent in the foreign directs investment inflows and the existence of a common border would increase the trade share by 0.0217 percent and 0.565 percent, respectively. On the other hand, an increase by one percent in distance and trade imbalance would decrease the trade share by 0.068 and 0.505 percent, respectively. In dynamic model estimation, the two-step difference GMM results show that only trade imbalance is significant in determining the trade share. Therefore an increase by one percent in trade imbalance would decrease the trade share by 0.414 percent. On the other hand, the two-step system GMM shows that none of the variables is statistically significant.

Regarding the results for individual industry, analysis show that each of the country-characteristics determinants is statistically significant at least once in any of the estimations technique tested in the static model estimations. Similar to the previous result when analyzing manufactured goods, distance and trade imbalance are also significant in determining the share of the intra industry trade in the static model. Therefore, the results show that a one percent increase in distance would decrease the share of intra-industry trade in rubber, textiles, petroleum and electrical and electronic products industries by 0.151 percent, 0.097 percent, 0.113 percent and 0.137 percent, respectively, according to the OLS estimations. In contrast, an increase by one percent in distance would decrease the trade share in the rubber, petroleum and electrical and electronic products industries by 0.151 percent, 0.122 percent and 0.104 percent, respectively, according to the GLS estimations. The results also show that an increase by one percent in trade imbalance would decrease the trade share in rubber and electrical and electronic products industries by 0.425 percent and 0.548 percent, respectively, according to the OLS estimations. Meanwhile, an increase by one percent in trade imbalance would decrease the trade share in rubber and electrical and electronic products industries by 0.468 and 0.605 percent, respectively, according to the GLS estimations.

In the dynamic estimation, trade imbalance again indicates similar results at the individual industry level. Therefore the results show that an increase by one percent in trade imbalance would decreases the share of intra-industry trade in rubber, textiles, electrical and electronic and petroleum and fuel products industries by 0.619 percent, 0.382 percent, 0.286 percent and 0.249 percent, respectively, according to the difference GMM estimations. Similarly, an increase by one percent in trade imbalance would decrease the trade share in rubber and electrical and electronic products industries by 0.648 percent and 0.280 percent, respectively, according to the system GMM estimations. A thorough discussion regarding results and findings related to issues in Chapter Five, Six and Seven, plus a conclusion, policy implication and recommendations are provided in the last chapter; Chapter Eight.

CHAPTER EIGHT

CONCLUSION

8.1 Introduction

Malaysia's success has been claimed to be attributed to several factors including the adoption of export oriented policies which have been closely related to the massive inflows of foreign direct investment into the country. Specific incentives for export oriented industries have been provided by the government since the 1960s. Theoretical and empirical evidence has always pointed out that exports have led economic growth. The effect of foreign direct investment on growth has been debated extensively in the economic literature. Since the early 1980s, many developed and developing countries have lifted a lot of the restrictions imposed on the foreign capital inflows. The reason for the increased efforts to attract more foreign direct investment stems from the expectations that the foreign investment has several positive effects which include productivity gains, transfer of new technology and technical know-how in the local market, the introduction of new processes and management techniques, employee training and international production networks.

Although the theoretical literature predicts that foreign direct investment inflows bring enormous benefits to the host country, empirical studies on the FDI-growth relationship have reported conflicting results. Some studies have found that foreign direct investment exerts a positive growth effect on the recipient countries while others have discovered no such evidence or even a negative effect on growth. One of the factors identified was the absorptive capacity of the host countries and this appears to be the key explanation for the weak FDI-growth relationship. The argument is that the growth effect of foreign investment may not be strong in countries with low or poor absorptive capacity. On the other hand several factors which are important for foreign investment spillovers include factors such as the quality of human capital, the development of financial markets and trade policy.

The Malaysian industrialization strategy has experienced frequent changes and alterations throughout the years. This has resulted in significant changes in the structure of the economy. The economy has been transformed from a primary-commodity-dominated economy to one which depends on the manufacturing sector for its growth. The manufacturing sector has played an important role in the rapid increase of gross domestic product growth and export earnings in the country since independence. However, the apparent transformation of the economy from one based on primary commodities to one based on manufactures has not solved the structural weaknesses that remain. These structural weaknesses have changed over the years. The economy has in effect switched from dependency on two major primary commodities to dependency on two main manufacturing industrial sub-sectors, namely the textile and apparel, and electrical and electronics industries, as a source of foreign exchange. The nature of the dependency has also changed from reliance on consumer goods imports into a dependency on imported intermediate and capital inputs. Most economists in Malaysia have argued that the structural weaknesses developed as a result of the protection system practised by the Malaysian government. Although the government admitted that the weaknesses in the manufacturing sector have been recognized and further actions had been taken to solve these problems; for example through promoting industries producing intermediate goods (the heavy industrialization program); there are more rooms for changes.

8.2 Limitations of Study

The availability of data collected from different sources which have limited the years and scope of study is the main limitation of our study. As for growth channel analysis, data gathered from Malaysian Department of Statistics at firms' level which include output, gross fixed capital formation, and human capital attainment is available from 1999 to 2006 while most of the relevant data is missing for year 1998 where the Asian economic crisis occurred. We have managed to obtain data at sub-industries for the period from 1987 until 2006. However, after 2006 the data are considered as “Private & Confidential” and the department are reluctant to open it to the public. The other data such as foreign direct investment, government consumption and merchandise trade, downloaded from the World Bank, are available as far back as 1960. Another set of data with the same accessibility problem is related to the imported inputs analysis. Due to unavailability and inconsistency in data recording we are only able to obtain the data related to imported inputs content from 2000 until 2006 for which these data are available is similar with respect to industry and firms level. Again, later data are considered as “Private & Confidential” and the department are reluctant to open it to the public.

The initial data collection process for the changes in tariffs on commodities was unsuccessful since the Malaysian Royal Customs has shown inconsistent data recording and compiling of these changes. Furthermore after requesting and waiting for more than five months, only then we were confirm the unavailability of certain data for calculating the trade liberalization index; for example those which are related to the cost of each input component at every industry and at firm level and the level of tariff imposed on intermediate goods and finished goods; these data were intended to generate the index of trade openness at the industry and firm level specifically to examine the effects of tariff on imported inputs. The unavailability was due again to the private and confidential policy and the instruction came from the Malaysian authority. Therefore, to estimate the effect of tariff and non-tariff barriers, the study employed a tariff and non-tariff index provided by the Fraser Institute.

A further limitation of this paper pertains to the classification of industries using three digits Standard Industrial Trade Classification (SITC) aggregated data level especially related to the growth channels analysis and part of the intra-industry trade analysis. This has reduced the number of observations and characteristics of the sub-industries within the broad classifications and was the major drawback of the analysis related to the above mentioned issue. All of the above mentioned scenarios have created huge problems in preparing the thesis. The analysis from all aspects has to be conducted to suit the availability of each data involved. By and large, the analysis for panel data was mainly conducted only from 1999 until 2006 except for the causality relationship analysis where the time series data has been extended from 1987 to 2006. As for intra-industry trade section, the use of 3-digit SITC level data also depicts a drawback related to the in-depth of the analysis available. Instead of using this level of aggregation, perhaps a more detail aggregation such as at 6 or 9-digit level would be suitable in describing the analysis of intra-industry trade pattern and orientation for the selected goods as mentioned in chapter seven, however, such aggregation would creates problems in selecting the appropriate country-characteristics determinants for the rest of the sub-chapter analysis.

Another limitation of our study is pertaining to the methodology used in our analysis. We have consistently used the OLS, Fixed and Random Effects besides GLS estimation in the static model, with two-step difference and system GMM in the dynamic model. There are massive methodologies available to analyze panel data in order to capture the maximum effect of a relationship pertaining to an issue. As the nature our data is micro-panel, it has prohibited us to use wider methodological approaches. However, we perceived that our findings still contribute to the existing empirical literatures.

8.3 Conclusion

The findings at aggregate industry level suggest that growth channels such as fixed capital formation and human capital are always statistically significant regardless of the test applied. The significance of fixed capital formation during the period analyzed from 1999 to 2006 is consistent with the strong and cumulative saving and investment condition in Malaysia from the 1960s until present, which have had a significant and long term effect on capital formation. The hypothesis that human capital is an important determinant on the long continuous growth of the manufacturing sector is consistent with the findings about the effect of the human capital channel in our analysis.

As for the foreign direct investment channel, it is statistically significant in the static model but less significant in the dynamic model which indicates that the estimation was unable to produce strong support for the hypothesis that foreign direct investment had a significant relationship with the output. Our findings also doesn't reflect the heavy emphasize made by the government in attracting foreign investment inflows into the countries which was implemented through various incentives and strategies, and was further supported by massive infrastructures developments. On the other hand, it might suggest that Malaysian manufacturing industries and firms have had problems in absorbing the transfer of technology (through FDI) due to lack of research and development allocation and less innovation which has impeded the growth of the sector. This is consistent with a small portion of yearly budget allocated by the Malaysian government to the research and development activities. This problem might also arise as a result of weakness in the local technological systems due to lack of technological expertise and skills; therefore these domestic firms do not have a strong capacity to imitate, assimilate or develop the technology. As such, no spillover effect has occurred although foreign technology has existed in the manufacturing sector for more than three decades. The domestic industries will continuously depend for their technological development mainly on the large foreign capital inflows into the industries. Most of the positive effect brought about by FDI into Malaysian industries is associated with new job creations but not the transfer of technology and knowledge.

Comparatively government consumption and quality of macroeconomic policies are statistically significant in the dynamic model and less significant in the static model. Our findings suggest that an increase in the government consumption may reduce the productivity growth rate by causing a reduction in the business profits and thus leads to a reduction in private investment in the business that further reduces the growth rate from the supply-side. This finding is similar to Rodrik (1996) who shows a negative association of government consumption with economic growth. The author found that an increase in government spending will create an increase in the expenditure for incentives which can distort the allocation of resources in the country. It is believed that in Malaysia, the effect of government consumption on economic growth depends mainly on the types of decision made by the government at each development phases. The findings might also indicate that increased in the government spending have transferred the additional resources available from a productive sector of the economy to the government which uses them less efficiently.

Although, the government has recognized that manufactured export had played a significant role in determining economic growth, contributing almost 79 percent per annum to the GDP growth during the period analyzed, our findings suggest that the nature of the relationship between manufactured exports and economic growth is an inverse one. We conclude that our result is as described because the growth in the manufactured export was actually driven by the growth in the economy. This is not the first time such result has been revealed for the Malaysian case. A previous result found by Dodaro (1993), using a sample of 87 multi-countries sample (including Malaysia), indicates evidence that for Malaysia, it was the gross domestic product's growth that promoted export growth for a period from 1980 to 1990. Similarly, another study by Khalafalla and Webb (2000) also tests for the presence of export-led growth in Malaysia from 1965 to 1996. The data are disaggregated into exports of primary and manufactures goods. Granger causality tests are estimated firstly on the entire period from 1965 to 1996 and secondly on two sub-periods; the 1965 to 1980 period (when government embarked on import substitution strategies) and the 1981 to 1996 period (when government policies strongly emphases export-led growth). The findings show that there exists export-led growth causality relationship for the full period and for the first sub-period from 1965 to 1980. However, for the second sub-period analyzed from 1981 to 1996, there was a reverse causal relationship which indicates that economic growth caused export growth.

Regarding this, the Malaysian government argued that there was a weakening support for the export-led growth linkage in the sector as Malaysia broadened its export base to include a growing proportion of manufactures. It is an apparent paradox that support for the export led-growth hypothesis is weakest in the period when export expansion and export orientation of Malaysian policy is the greatest. Malaysian manufactures exports had relied heavily on imported raw materials and equipment which is consistent with the fact that from the 1980s until the present imports rather than exports have become a source of Malaysian growth. Most of the Malaysian economists and analysts agreed that the export of manufactures had been a significant determinant of the economic growth until the late 1980s and had changed when the structure of the trade changed after the 1985 commodities crisis experience. Malaysia had shifted away from dependency on primary commodity export and has been increasing its dependency on foreign imports.

In conjunction with the above discussion, our finding strongly support the arguments that there are changes in the support for the export-led growth hypothesis after Malaysia shifted from import-substitution strategies to export-oriented development strategies and this lies with the structural changes associated with the industrialization process. Sources of growth are perceived to change as structural changes evolve overtime and this has affected the export-growth relationship. As such, we believe our finding pertaining to the negative relationship between export and economic growth has added another empirical finding to the literature, covering the period from 1999 to 2006. Furthermore, the findings also indicate that the inverse relationship also exist in the main export-oriented industries that we have chosen to analyze. Although both import-substitution strategies and export-oriented development strategies are implemented hand-in-hand and overlapped each other during this period, we believe that the import-substitution strategies are more dominant. Unlike primary commodity exports, for which value-added is derived primarily from domestic sources, Malaysian manufactures exports rely heavily on imported raw materials and equipments. Therefore, as the proportion of manufactures export to the total Malaysia's export has increased, the export-led causality relationship has weakened and the interaction among trade and growth variables has become more complex.

Looking at the growth channels analysis for individual industry in the export-oriented industries, our results suggest that the role of the growth channels varies between the industries selected for the analysis. However, all the growth channels chosen have an association effect at least once in every industry. Resources-based industries such as wood products industry was driven mainly by a majority of the channels except for foreign direct investment and quality of macroeconomic policies channels. On the other hand, the rubber products industry was supported by government consumption channel followed by manufactured exports and foreign direct investment inflow channels. Petroleum and fuel products industry was generated by government consumption, manufactured exports and human capital channels. Meanwhile, for non-resources based industries such as the electrical and electronic products, the growth of this industry was mainly driven by manufactured exports followed by foreign direct investment channel. On the contrary, the scientific and measuring instruments industry was mainly supported by the manufactured export and human capital channels.

The next stage of analysis is related to the causality association between trade liberalization and the export-oriented industries growth through the channels. Our findings suggest that, trade liberalization variables namely tariff and nontariff variables has a positive short run causal relationship with the growth of the export-oriented industries, through a majority of the growth channels that have been chosen for analysis. The largest causality effect exists through foreign direct investment on the rubber industry, quality of macroeconomic policies on the electrical and electronic industry, and the fixed capital formation, government consumption and quality of macroeconomic policies channels on the machinery and equipment industry. We conclude that trade liberalization through these channels has brought a significant causality effect on the growth of these industries and the trade liberalization decision taken by the government has proven to be successful in prospering the growth of the Malaysian manufacturing sector.

Next, our study analyzed the relationship between imported inputs usage and industries growth. At industry level, the findings show mixed results. The OLS and GMM models suggest that imported inputs content does not play a significant role in determining the growth of the industries owned by Malaysians since no association effect was produced by the estimations. However, in both fixed and random effect models, the results are significant yet the relationship is the inverse which is against the hypothesis proposed. This finding might indicate the nature of current industries owned by Malaysia where a majority of the industries were strongly encouraged by the government to use domestic inputs through various incentives. The implementation of the first round of the Import Substitution phase particularly had created industrialization era which relied heavily on imported inputs and machineries which have resulted in distortions in domestic product prices, low value added, poor domestic economy linkages and inequalities in income and employment. Therefore, to overcome these problems, the government has implemented various plans to encourage the growth of domestic economy including promoting incentives for domestic inputs use. The findings might support the argument proposed by Zeile (1998) that manufacturers who relied on foreign sources for their intermediate inputs had impeded the development of indigenous suppliers through backward linkages. Besides, the industries owned by Malaysian might also face problems due to penetration of the domestic market with products from China, Thailand and Indonesia which participate in the ASEAN Free Trade Area (AFTA) agreement. On the contrary, our findings suggest that imported inputs content played a significant role in the growth of the industries owned by non-Malaysian. The results for all static and dynamic models support the hypothesis. As such, we can assume that industries owned by non-Malaysian which import their intermediate inputs have increased their growth performance which is according to the empirical finding by Lopez (2006) and Kasahara and Rodrigue (2008).

An analysis at the firms' level suggests that imported inputs content has played a significant role in determining the growth of the firms' whether for Malaysian or non-Malaysian owned firms. All results whether in static or dynamic models supported the hypotheses described earlier. As such, we conclude that at firms' level both Malaysian and non-Malaysian firms which imported their intermediate inputs have increased their growth performance. Firms participating in the international networks are more productive than the other non-participating firms and import penetration of inputs positively matters for productivity growth. Furthermore, one of the advantages of becoming an importer of foreign intermediates is improve in productivity through greater resource reallocation. The importing firms would accumulate more capital and are less likely to exit the industry than non-importers. Again, this findings support the empirical findings by Lopez (2006), Kasahara and Rodrigue (2006), Altomonte et al. (2008) and Kasahara and Rodrigue (2008).

Since, our panel of firms consists of one's which had survived through the whole period and it was randomly selected regardless of the industries in the manufacturing sector, we assume that it has influenced the results related to the impact of trade liberalization on firms' imported inputs than on the industries. Our results suggest that both tariff and non-tariff barrier had a significant relationship with the imported inputs content in industries owned by Malaysians, meanwhile in industries owned by non-Malaysian only non-tariff barrier show the association. Accordingly, at firms' level, the results suggest that only non-tariff barrier have positively influence the imported inputs, and only in related to firms owned by Malaysians. As for comparison, we have also estimated the freedom to trade internationally as a component of the Economic Freedom Index. The results suggest that the index has more significant influenced on the industries owned by non-Malaysians than by Malaysians.

Lastly, our study examined the relationship between country-characteristic determinants with the share of intra-industry trade. Our findings suggest that each of the gross domestic products variables has a statistically significant relationship with the share of the trade for the manufactured goods at least once according to the static model estimations. Our findings indicate that the gross domestic products variables which proxies for the potential market size of a country, the similarity in income and the relative size effects between Malaysia and its trading partners has had influence the share of intra industry trade of the manufactured goods. As such, these findings are similar to empirical findings by Ekanayake (2001), Umemoto (2005) Leitao and Faustino (2009) and and Shahbaz and Leitao (2010).

In conjunction with the above findings, the other country-characteristics variables indicate relationship as hypothesized except for trade orientation. Our findings suggest a positive relationship between foreign direct investment and the share of intra-industry trade which is consistent to empirical findings by Martin and Blanes (1999), Leitao and Faustino (2009) and Shahbaz and Leitao (2010). Furthermore, according to Grubel and Lloyd (1975) and Greenaway and Milner (1986) in the presence of demand for different varieties of the same products with production subject to economies of scale, there may be a tendency for foreign direct investment and intra-industry trade to go hand in hand.

In like manner, our findings also show a statistically significant relationship between distance and trade imbalance with the share of intra-industry trade. A negative association suggests that increasing information costs and distance would reduce the share of intra-industry trade. This is consistent with the theoretical view pointed by Grubel and Lloyd (1975) that the measurement of intra-industry trade share for a particular product or industry will be affected by the total trade imbalance of a country. This finding is also similar to those by Ekanayake (2001), Sunde et al. (2009) and Shahbaz and Leitao (2010). In spite of these findings, the estimated results for the two-step difference GMM suggest that only trade imbalance that is statistically significant while two-step system GMM estimation indicate that none of the variable is statistically significant.

Our final analysis section focused on the individual industry analysis. Five export-oriented industries such as rubber products, wood products, textiles products, electrical and the electronics products and petroleum and fuel products have been chosen for analysis. Our findings suggest that a majority of the gross domestic product variables indicate a statistically significant relationship with the share of intra-industry trade in the dynamic estimation techniques for wood, textiles and electrical and electronic industries except for the maximum value of gross domestic products which has a statistically significant relationship in the rubber, textiles and electrical and electronic industries, respectively according to the static estimation techniques, but not in the dynamic estimations.

Meanwhile, the other country-characteristic determinants such as foreign direct investment, trade imbalance and trade orientation are statistically significant in both estimations model for wood, rubber, textiles, electrical and electronic and petroleum and fuel products industries, respectively. Nevertheless, distance, border and asean are statistically significant only in the static estimation model for rubber, wood, textiles, electrical and electronic and petroleum and fuel products industries, respectively. The previous value of intra-industry trade share show a negative sign in the rubber products industries during the period studied which indicate an inverse relationship between this variable with the share of the trade. This is maybe due to fluctuated demand for Malaysian rubber products which was due to the unstable world price. According to a report by the Malaysian Rubber Authority in May 2014, from January 1999 to the end of 2010, the trade of Malaysian rubber product experienced massive fluctuation due to the world price instability.

8.4 Policy Implication and Recommendations

Based on the empirical findings, all of the growth channels selected is statistically significant in explaining the growth of the industry output except for foreign direct investment. The empirical results show that there is no relationship between foreign investment and growth of the manufacturing sector over the sample period of 1999 to 2006, implying they are independent of each other. This finding is interesting because it contradicts with most theoretical expectations of foreign direct investment driven growth. However this is not the first empirical findings pertaining to Malaysia which does not support the FDI-led-growth hypothesis. Individual industry analysis also shows that foreign direct investment have an impact only on the paper and fabricated metal industry growth which failed to support the economists who claimed that the export based industries such as electrical and electronic industry and petroleum and fuels industry are FDI-growth led.

Studies have shown that there are challenges to enhance the impact of foreign investment on the Malaysia manufacturing sector such as the levels of rent seeking, bureaucracy and corruption within the related government agencies. Other challenges include the ethnicity-based ownership restrictions, regulatory barriers to business operations and restrictions on capital flows. High quality skilled human capital with creativity and which has been ICT-enabled; who are physically, mentally and spiritually strong; are the other necessary pre-conditions for such a motivated labor force to be absorptive of foreign investment inherent benefits. One of the solutions in order to be able to absorb the full foreign investment advantages is that the Malaysian manufacturing sector needs to further improve the productivity and competitiveness, further stimulate investment in human capital, and upgrade the technological capabilities, expertise and workplace philosophies and values. At the same time the government needs to find ways to reduce the high labor cost in order to compete with China and India. As such there is urgency for the government to formulate or re-formulate the policies pertaining to the manufacturing sector and make sure that it is well implemented and not become one nice written document only.

Lower trade barriers, organisational innovations, decrease in coordination costs, progress in information and communication technologies and different stages of production usually located in different countries have made the production process cheaper and easier. Furthermore heavy regulations and high labor costs in rich countries have accelerated the shift through a wave of outsourcing and offshoring to the developing countries. As a result, intermediate inputs have become a salient part of world trade, particularly as imports of these goods have increased sharply relative to their total use. To date, intermediate inputs are claimed to represent more than half of the goods imported by the OECD economies and accumulate almost three-quarters of the imports of large developing economies, such as China and Brazil. They also account for a significant portion of the exports with large differences across countries. Even the European Central Bank had estimated that import content accounted for about 44 percent of the European Union exports in 2000, ranging from about 35 percent in Italy to about 59 percent in the Netherlands.

However, the growing role of imported intermediate inputs has several implications for economic study and policy recommendations. Firstly with the rising role of trade in intermediates the importance of bilateral trade balances will be exaggerated and are less meaningful as they do not reflect the value added. As highlighted by the World Trade Organisation, many countries' exports are economically less significant than they look because these exports consist of re-exports and the modest reprocessing of intermediate goods. Secondly, the importance of exports as a driver of demand is overestimated, while the importance of trade as a source of efficiency is underestimated. Over the last several decades, world exports have grown on average at almost twice the rate of world gross domestic product. The increased trade in intermediate goods, commonly involved several times in export activities before becoming embodied in a final product, helps account for this. Sectors which have registered large export growth, such as machinery, are also the sectors where the fastest growth of vertical specialisation has occurred. Besides that the growth of trade in intermediate goods also explains why exports account for an enormous share of gross domestic product in mega-traders or the entrepôt (or re-export) economies, such as Singapore and Hong Kong.

Thirdly, trade has become more volatile and a larger source of shocks. Generally, intermediate imports appear to be more important for exports of manufactures than those of services, particularly in industries such as electronic and communications equipment, and electrical machinery and instruments. For example in the United State and Japan, the import content of manufactures exports, is four times that of the services exports. Meanwhile in the Republic of China, the import content of manufactures exports is claimed to be twice that of the services exports. At the same time, around the world manufactures, durable goods play a larger role in trade than in gross domestic products. For example durables goods manufactures in the United States accounted for more than 60 percent of trade in goods compared to 24 percent of the gross domestic product. However, the demand for durable goods tends to fluctuate more than demand for services. As a result, trade is more volatile than gross domestic product and the effect is compounded by the fact that durable goods account for a high share of trade in components.

According to a study by the International Monetary Fund the trade in capital and durable goods fell about 10 times faster than trade in consumer non-durables, as amid a global credit crunch and loss of confidence consumers postponed any purchases that could be delayed during the Global Crisis in 2008. In addition, due to countries' specialisation in different stages of production, shocks in one country could forcefully translate to shocks to stages undertaken in another, magnifying the disruption. Though such trade volatility does not necessarily translate into equivalent changes in domestic value-added, it is nonetheless highly disruptive. With the growing trade in intermediates, economies are becoming more intertwined, implying greater vulnerability to shocks emanating from abroad. At the same time, increased reliance on foreign demand and supply make the economies less vulnerable to domestic shocks.

Fourthly, higher cost of protection. Trade in intermediates means that the cost of protection is higher because the effective rate of protection (the tariff as a share of domestic value-added) is higher than the nominal tariff. Because imports increasingly feed into exports, an import tariff on parts and raw materials has a big impact on exports. Tariffs on intermediates may also discourage inward bound foreign direct investment and encourage outward bound instead. In addition to the direct impact of higher costs on intermediate imports, which are needed for domestic firms to compete internationally, import barriers on such imports have an indirect effect on real wages of workers induced by the increase in the cost of capital. The danger of higher protection is particularly pronounced for smaller economies where the share of intermediate imports in a country's overall exports is large. In addition, higher trade barriers may be particularly disruptive to intra-regional trade, as countries tend to import intermediate inputs from other countries in their region, partly reflecting production networks' high sensitivity to time constraints, trade, and transportation costs.

Large trade in intermediates can lead countries to overestimate exports as a source of demand growth, but also to overlook the crucial role that imports play in enhancing efficiency and exports. Generally, the existence of large and growing trade in intermediates, which is associated with foreign direct investment and the globalisation of production, greatly raises the stakes on countries having an open and predictable trade regime. Although large trade in intermediates has its dangers, as evidenced by the huge global trade shock imparted during the financial crisis the answer, however, is not less trade, but building better safeguards against financial instability.

Malaysia's constant and rapid economic development and its participation in increasing global and regional trade agreements for the past 20 years have raised the importance of intra-industry trade in Malaysia. Coupled with increasing international fragmentation of productions and inflows of foreign direct investment to the country, Malaysia's trade in manufacturing sector has moved from traditional inter-industry trade to intra-industry trade. Beginning from the 1960s but gathering pace in the 1970s, the Malaysian government has sought to shift the economy from dependence on agriculture to manufactured goods. This shift has been facilitated by several broad policies including the government commitment to the provision of adequate infrastructure to meet the needs of industries and the implementation of a variety of industry incentives such as the provision of business and sales tax exemptions.

The country has also been a member of regional integration associations such as ASEAN and APEC and has been active on tariff reform with reductions in import duties and tariffs. Malaysia's trade and investment barriers have been low compared to other Southeast Asian countries such as Indonesia, Vietnam, Thailand and Philippines. The above initiatives are linked not only to the growth in manufactured exports from the mid 1980s but to a change in their composition starting from the late 1980s. The trend is clearly a move away from resource-based and labor-intensive products in favor of differentiated and science-based products. One attribute of these manufactured exports is their close connection to intra-industry trade via their potential to be differentiated or subject to economies of scale. Of course, developments on the world scene and domestic macroeconomic issues have overlaid these developments sometimes dampening and sometimes enhancing outcomes. The empirical analyses in this study have identified a number of variables that influence intra-industry trade in Malaysia.

Another policy implication deriving from the impact of the trade orientation variable on intra-industry trade is commitments under ASEAN Free Trade Area (AFTA) to liberalize the tariff regime which will pose challenges to the Malaysian producers serving the domestic market. Tariff reform to lower the duties on imports and simplification of the regime are now a priority. Under the APEC agenda, a key benefit of non-discriminatory trade liberalization will be the opportunity to make use of the cheapest imports from the best sources and this will allow some existing resources in import-competing industries to be reallocated to better uses domestically. Policies also need to be designed or redesigned in tandem with the firms' needs to specialize, operating in efficient manner with high value-added products incorporated with hi-tech capabilities. This could also be one of the challenges that need to be addressed in order to achieve the country's aspiration of becoming a high income nation by the year 2020.

Economic size was claimed to be one aspect that can increase intra-industry trade. Therefore policies must be aimed at encouraging economic growth, through stabilization policies and an attractive and supportive business environment which will attract more foreign investment. This is crucial as Malaysia was perceived to have lost it competitiveness to the other ASEAN countries after the Global Crisis in 2008. This critic was made by the government opposition parties and also by the press in other neighboring countries such as Singapore and Indonesia.

Malaysia should maintain good relations with its neighbors as well as countries with which it has historical ties. This would open potential benefits in terms of reducing transaction cost because of closeness. Besides that, following the implementation of ASEAN Free Trade Agreement (AFTA), Malaysia should enter into more trade agreements with her neighbors as this would result in the elimination of trade barriers. Distance is also an important determinant of intra-industry trade between Malaysian and her ASEAN trading partners such as Thailand, Cambodia, Vietnam, Brunei and Singapore. One of the related characteristics is the use of road transport. Therefore, improvement in the road infrastructure as well as reduction in the delay at border posts and elimination of other administrative constraints would be necessary steps to the expansion of the trade within the region. Improvement of the road network is beneficial to the country in terms of increasing export earnings to countries such as Thailand, Cambodia and Vietnam which have in recent years experienced growing demand for consumer goods. The government should increase their efforts to solve constraints to trade by offering more incentives to traders in aspects related to communication networks. With good communication networks system, distance may be less of an obstacle to trade.

The government should reposition the economy to take advantage of the rebound in global economic activity and trade. Malaysia has continues to maintain a liberal trade policy regime aimed at enhancing productivity and the competitiveness of its products in domestic and international markets. Furthermore, our results suggest that participation by Malaysia and its trading partners in the Association of South-East Asian Nations (ASEAN) would increase the intra-industry trade in this industry by 73.3 percent which supports the theories that countries belonging to the sub-region do engage in intra-industry trade especially with their immediate neighbors, and those that are relatively more advanced in terms of their manufacturing sectors.

8.5 Future Research

Malaysia is a country on the move. Malaysia had progressed from an economy dependent on agriculture and primary commodities to a manufacturing-based, export-driven economy spurred on by high technology, knowledge-based and capital-intensive industries. Over the past 54 years through the implementation of massive industrialization programs starting with import-substitution in the 1960s, export-orientation in the early 1970s and second round of import-substitutions in the 1980s Malaysia has undergone a significance structural transformation. These structural transformations of Malaysian economy have been spectacular. Malaysia also offers the world its Multimedia Super Corridor (MSC) projects which brings together a legislative framework and a next-generation telecommunications infrastructure in eco-friendly surroundings to create the best environment for the development of multimedia industries.

Based on the empirical findings and discussion pertaining to the growth channels, we believe that in any attempt to capture the channels of growth, the analysis should be specifically focused on decomposition of industries into firms. This is important to assure an in-depth examination and a meaningful insight for the policy formulation process given that specific growth channels have significant and positive effects on specific industries. For example the growth of output for paper and fabricated metal industry are statistically positively influenced by most of the channels namely the foreign direct investment channel, the capital formation channel and government consumption channel. Meanwhile the growth of leather industry output is statistically positively influence by the manufactures export channel and the human capital channel. Meanwhile, the quality of macroeconomic policy channel is statistically positively significant in determining the output of chemical products, machinery products, and electrical and electronic products. As such, we suggest that more emphasis should be accorded on the selected channels when drafting economic policies related to each of the specific industries.

Economic growth is influenced by a variety of factors many of which are not included in this study hence further investigation into this aspect is necessary. Perhaps instead of measuring the impact of total fixed capital formation, further study needs to investigate from the growth accounting perspective where the per capita growth is normally explain by two source namely the physical capital accumulation channel and the total factor productivity channel. Regarding the export-growth relationship our empirical results might provide insight into how the Malaysian trade-growth relationship has evolved according to the strategies adopted at different stage of development. The empirical studies for export-led growth may be effective in capturing the trade–growth interaction at early and intermediate stages of development, but as a nation's economic structure becomes more complex, normal regression and causality tests on aggregate trade and growth variables will likely fail to capture these complicated interrelationships. Future empirical studies of the export-led growth hypothesis need to consider how to incorporate a broadening of the export base and a diversification of the economic structure into the measurement of trade-growth relationships.

Generally with this technique, it becomes clear that technological catch-up not factor accumulation, accounts for the widely documented phenomenon of conditional convergence. The technique can also shows that both rich and poor countries converge mainly through technological catch-up, and normally richer countries converge much faster on one another than the poor. As such, we believe that the same technique will be able to measure the convergence of specific individual industry if applied. One of the limitations of this paper is the classification of industries using three digits Standard Industrial Trade Classification (SITC) aggregated data level especially pertaining to the growth channels analysis. This has reduced the number of observations and characteristics of the sub-industries and is the major drawback of the analysis. As such we would like to suggest further research that may utilize data at five digits level to have a bigger number of observations, which may improve the result of estimation. The use of a more detailed SITC level will enable the researcher to have a detailed investigation on a particular industry.

Our study also analyzed the impact of trade liberalization through the implementation of tariff and non-tariff barriers in the selected manufacturing sector. The main focus is to investigate the impact of trade liberalization on industries growth through the channels and the impact of trade liberalisation on the importation of intermediate inputs. The analysis pertaining to the trade liberalization effect on industry growth shows that channels such as government consumption, quality of macroeconomic policies and manufactured export are statistically significant in facilitating the effect of trade liberalization on industries growth. Based on the empirical findings, we suggest that further study to capture the effect of trade liberalization on industries growth should be made on detailed decomposed of SITC level data instead of using aggregate SITC level data. The analysis also should be specifically focused at firms' level data to assure an in-depth analysis and insight for policy recommendation.

The findings pertaining to the effect of trade liberalization on the imported input content show mixed results between tariff, non-tariff variables and the components of index of economic freedom. We have analyzed the impact of trade liberalization on Malaysian owned and non-Malaysian owned industry. The analysis has been extended to also include firms' level analysis. Interestingly at industry level the result shows that for Malaysian owned industry both tariff and non-tariff variables are statistically significant. Meanwhile for non-Malaysian owned industry both non-tariff and freedom to trade internationally variables are statistically significant. At the firms' level, firms owned by Malaysians are not influenced by either tariff or non-tariff variables while non-Malaysian owned firms are influenced by tariff variable.

Based on the empirical findings, we suggests that further study to capture the effect of trade liberalization on imported inputs should be made structural according to the phases of the implementation of import substitution policy which was dated since the 1980s to assure an in-depth analysis insight for policy recommendation. However, the utilization of data may be impractical due to the unavailability of imported input data recorded by the Malaysian authority. As such, other sources of data such as the Input-Output Table may become handy.

Many empirical analyses have used total intra-industry trade as the dependent variable and as a consequence different econometric analyses have resulted in different conclusions. As such, the findings of this thesis might be improved if the econometric analysis or the measurement aspect is differentiated between vertical and horizontal intra-industry trade types. This distinction is important as pointed out by Kinnerup (2005); 'It is important to disentangle between vertical and horizontal intra-industry trade because the theories of both types lead to contradictory hypotheses regarding the determinants even though it was theoretically known that the determinants of VIIT and HIIT differed, this was empirically under-researched for a long time due to lack of methods to delimit VIIT and HIIT from each other'. This is more important when referring to the negative impact of the ASEAN variable on Malaysian intra-industry trade index; where the association is supposed to be positive, but not necessarily where vertical trade dominates. As argued by Martin and Blanes (1999) from the context of welfare analysis of economic integration, vertically differentiated products may result in significant adjustment costs in response to the regional integration process, such as closure of firms in the relatively labor abundant countries, resulting in unemployment. If these negative effects are not compensated by improvement in the consumers' welfare emanating from lower prices and access to higher quality varieties, an impoverishment of the poorest countries will take place. Therefore one possible solution could point to the need for policies such as the promotion of the R&D and human capital in the poorest countries or direct transfer policies between the members of the integrating area.

Another aspect of research area is to include industry-specific determinants into the model specification or the estimation analysis. Industry-specific determinants such as number of establishments in an industry, sectoral dispersion index, advertising-to-sales ratio, and capital-to-labour ratio will surely provide an interesting finding whether on their own or analyzed together with country-specific determinants.

Our study is an attempt to examine three important issues related to growth of the manufacturing sector in Malaysia. These issues are firstly the determinants (channels) of industries growth; secondly, the use of imported inputs and lastly the determinants of intra industry trade. Generally, there are massive literature discussions on growth determinants, imported inputs use and intra-industry trade share which covered either developing or developed countries. A survey of the empirical literature shows that the empirical studies for growth determinants are massive. These studies include researches by Gan and Soon (1996), Lim (1997), Ibrahim (2000), Kogid et al. (2010) and Hassan et al. (2010) among others. Various exogenous and endogenous determinants have been selected in these studies to identify which variable would significantly effects the economic growth.

Similarly, empirical studies on Malaysia's trade liberalization impact are also very rich. The studies on trade liberalization include researches by Zakariah and Ahmad (1999), Rajah and Ishak (2001), Mahadevan (2002b) and Said et al. (2004), among others. Although empirical studies for both growth determinants and trade liberalization effect are massive, studies at specific sub-industry level are limited. Most of the above studies did not investigate the effect of trade liberalization on individual sub-industries directly. On the other hand, a survey on the literature for imported inputs shows that empirical studies for Malaysia manufacturing sector are almost non-existent. As regards to intra industry trade, there are studies which have included Malaysia as a group of countries in the trade structure and pattern analysis. These include studies by Min (1992), Thorpe (1993), and Duc (1994) and Chemsripong et al. (2005). However, there is no study that analyzed the determinants for Malaysia intra industry trade determinants specifically.

To date, many approaches have been applied to study growth of an economy either for time-series or cross-section dataset and the methodologies are massive. General approaches that have been used to examine cause and effects and other relationships include regression, co-integration and Granger causality analysis. However, as methodologies evolve and dataset characteristics become more complex, the approaches evolve to include advance estimation techniques. Since our data depicts a micro-panel characteristics we have employed the static (Ordinary Least Square, Fixed and Random effect, and Generalized Least Square) and dynamic (Generalized Method of Moments) techniques. Our analysis has produced consistent results and conclusive evidence on the issues as highlighted above.

We perceived that our study has contributes towards enriching the literature by presenting the specific case of Malaysian export-oriented sub-industries besides the general case of aggregate industry. This study has shown that among six channels selected for analysis, fixed capital formation and human capital channels are the main determinants that driven the growth of Malaysian export-oriented sub-industries for period from 1999 to 2006. Although the export of manufactured goods share shows an increasing trend during the period analyzed, however it has consistently indicates a negative relationship regardless of the industry level analyzed. This association has suggests that the growth for export of manufactured goods was actually driven by the economy growth. Meanwhile, we have also found that the role of foreign direct investment is less significant in a majority of the export-oriented industries. This is against the huge emphasis given by the government to attract inflows of foreign capital into these industries. This finding is contradicts with most theoretical expectations of foreign direct investment driven growth and failed to support the Malaysian researchers who claimed that the export based industries such as electrical and electronic industry and petroleum and fuels industry are FDI-growth led. Previous studies have shown that there are challenges to enhance the impact of foreign investment on the Malaysia manufacturing sector. These challenges include among others the levels of rent seeking, bureaucracy and corruption within the government agencies.

Another important finding is related to the role played by trade liberalization in generating the growth of the export-oriented industries. Among the export-oriented industries selected the results suggest that trade liberalization cause growth in the output of a majority of the export-oriented industries except for growth of electrical and electronic industry output through foreign direct investment and growth of the scientific and measuring instruments industry through fixed capital formation.

The next contribution of our study to the mainstream literature is pertaining to the role of imported inputs in accelerating industrial growth in the Malaysian manufacturing sector. We have selected 53 industries owned by both Malaysia and non-Malaysia, 300 firm owned by Malaysia and 227 firm owned by non-Malaysia to capture the role played by imported inputs in accelerating the output growth for period from 2000 to 2006. Our findings have shown that imported inputs played a significant role in the growth of the industries owned by non-Malaysian, but not in industries owned by the Malaysians. We perceive that the result was due to government strategies to encourage domestic inputs use among the Malaysians industries. This is consistent with the government efforts to overcome heavy reliance on imported inputs and machineries that have affected the growth of the economy as a whole. On the other hand, we have found that imported inputs played an important and significant role in driven the growth output for firm either owned by the Malaysia or non-Malaysia. As regards to the analysis of trade liberalization relationship with the usage of imported inputs, we have found that the results are mixed either in industries or firms owned by both the Malaysian and non-Malaysian.

Last but not least is our contribution with respect to examining the determinants of intra industry trade share for the manufactured goods and also the export-oriented sub-industries. Perhaps the most striking finding pertaining to intra industry trade determinants is the role played by trade imbalance and distance in determining the share of intra industry trade for both manufactured goods and export-oriented sub-industries. The results for both variables are consistent throughout the industries regardless of the estimation techniques adopted. This finding might suggest that Malaysia should maintain good relations with its neighbors as well as countries with which it has historical ties since this would open potential benefits in terms of reducing transaction cost. The gross domestic products variables for example economic size show a significant positive relationship with the share of intra-industry trade in a majority of the export-oriented sub-industries. Therefore this finding might suggest that the government should focus on formulating policies to encourage economic growth and to support the business environment.

ENDNOTE

[1] Refers to study by Kasahara and Rodriguez (2005), Johannes van Biesebroeck (2004), Mahadevan (2002), Chad and Sen (2002), Wacziarg (2001), Jonsson and Subramanian (2001), Harris and Kherfi (2001), Dutta and Ahmed (2001), and Hallaward-Driemiere et al (2001) among others.

[2] See Kasahara and Lapham's (2007) study for Chile, Bernard, Jensen, and Schott (2009) for the US, Amiti and Konings (2007) for Indonesia and Halpern, Koren and Szeidl (2009) for Hungary.

[3] See Amiti and Konings (2005) Biscourp and Kramarz (2006) and Halpern, Koren and Szeidl (2005) for similar findings.

4 Including studies by Kogid M et al (2010), Hassan, Baharom and Abd Aziz (2010), V.G.R. Chandran and Munusamy (2009), N. Mahendhiran et al (2006), Yusoff A.A (2005), Zakariah and Ahmad (1999), Tham S.Y. (1997), Lee Lim Kean (1997), Lin See Yan (1996) among others.

[5] Menon and Dixon (1996) have argued that for the meaningful analysis of intra-industry trade, the 'industry' categories must be neither too fine nor too broad. Hence, using the Standard International Trade Classification, sectors can be distinguished into ten different broad sectors (the so-called 1-digit level). Each of these 1-digit sectors can, in principle, be subdivided into ten more detailed 2-digit sectors. Each of the 2-digit sectors can in turn, in principle, be subdivided into ten even more detailed 3-digit sectors, and so forth. For example sector 6 at the 1-digit level consists of 'manufactured goods'. One of the sub-sectors at the 2-digit level is sector 61 which consists of 'leather manufactures' while another is sector 63 which consists of 'cork/wood manufactures'. A further reduction occurs if we look at even more detailed levels of aggregation. The 3-digit level for example distinguishes between cork manufacturers (sector 633) and different types of wood manufacturers (sector 634 and 635 separately. Therefore, analyzing intra-industry trade at the very broad 1-digit level classifies trade of leather manufacturers in exchange for cork/wood manufactures as intra-industry trade seems unwarranted. Hence, looking at the more detailed level such as 3-digit level eliminate partially this problem and a smaller extent of trade is therefore classified as intra-industry trade.

[6] Marginal intra-industry trade refers to the degree of change in a country's exports and imports of the same products over a certain period of time. The concept is concerned with changes between two points in time as opposed to their values at a given point in time. It is thought to be useful for ascertaining the amount of adjustment costs associated with changing trade flows or the degree to which changes in trade might be responsible for changes in the distribution of income. There are many proposed formulas and the most widely used is that of Shelburne (1993), $MIIT=1-(|\Delta X-\Delta M|/ (|\Delta X|+ |\Delta M|))$, where ΔX represents the change in exports between two points in time and ΔM represents the change in imports over the same period of time. Generally adjustment costs or distribution effects are thought to be small if the MIIT index is high. The index is usually calculated as a sum of the different changes in imports and exports in the different sub-sectors (i) i.e. $MIIT=1-\sum_i(|\Delta X_i-\Delta M_i|)/(|\Delta X_i|+ |\Delta M|_i)$

[7] Komo et al (1987), World Bank (1989), Mahani and Lim (1989), and Mahani (1998) pointed out two reasons for the recession, namely trade deficits due to falling export prices and secondly fiscal deficits caused by large public sector spending. The drastic fall in export of primary commodities has resulted in a serious shortfall of trade balance.

[8] The initial goals of NEP was to eradicate poverty and restructure the economy to eliminate the identification of ethnicity with economic function. This was to be done by redistribution of wealth to increase the ownership of enterprise by Bumiputra (son of soil) from 2.4% to 30% of the share of national wealth. The target was to move the ratio of economic ownership in Malaysia from a 2.4:33:63 ratios of Bumiputra (son of soil), other Malaysia, and foreign ownership to a 30:40:30 ratio. After 20 years of

implementation, the statistics recorded by the government show that the target has been achieved; as there was reduction in the incidence of poverty from 49.3 per cent in 1970 to 10.5 per cent in 1993.

[9] The National Development Policy (NDP) replaced the NEP in 1990 but continued to pursue most of NEP policies. In a review of the NEP at the end of the 1980s, the government concluded that although income inequality had been reduced; the Bumiputra (son of soil) share of the economy was not near the initial 30% target; and the target for overall Malaysia corporate ownership had not been met.

[10] The New Economic Policy was a development plan justified by the need for national unity and nation building. Its basic philosophy was growth with equity and national unity as the overriding objectives. It was planned to strive for greater economic well-being for the 'son of the soil' (Bumiputera). Generally, there were two main objectives of the NEP firstly to eradicate poverty as to raise the income level of the low-income group; and secondly to restructure society; the restructuring of society entailed the correction of the economic imbalance to eventually eliminate the identification of race based on economic function.

[11] The NDP contained several new dimensions that entailed shifting the focus of the anti-poverty strategy towards eradication of hardcore poverty while reducing relative poverty, emphasizing employment creation, greater reliance on the private sector in the restructuring objective and refining human resource development to upgrade the development of the productive labor force. In addition, it aimed to promote a more equitable economic growth for all Malaysians, ensure greater welfare to citizens, promote positive spiritual and social values and patronize science and technology-based development that entailed building of knowledge-based technologies that pursued economic development. The Government shifted from input driven growth, to the strategy generating high total factor productivity (TFP). As productivity increased the standard of living also rose. Since technological change is the fruit of research and development (R&D), investment in R&D was given much priority and less dependence was placed on traditional factors of production to improve productivity.

[12] The objectives of the NVP include establishing a progressive and prosperous 'Bangsa Malaysia' (United Malaysia), improving total factor productivity (TFP) to reduce the cost of production, achieving domestic demand driven growth, reducing import intensity and increasing service receipts to maintain the balance of payments, emphasizing the manufacturing and servicing sectors, maintaining low inflation and price stability and achieving the surplus in the public sector account.

[13] *'Bumiputra'* is a term to describe the Malay race and other indigenous peoples such as *Iban*, *Kadazan* and *Bidayuh* tribes in Malaysia, the term also carries the meaning "son of the land" or "son of the soil"

[14] The agriculture sector performance declined following the accelerated industrialization. However, initial action under the National Agriculture Policy (NAP) was to combine small size farms into mini estates to redistribute rural land to attain economies of scale by increasing production.

[15] The First Industrial Master Plan (IMP1) recommended export-targeting linked to incentives, as many industries needed domestic market protection to facilitate export sales at much lower prices.

[16] The Look East Policy was introduced to develop heavy industries to boost productivity through hard work and management, with special preference to car project known as "Proton".

[17] The 70 Million Population Policy is to be achieved at the end of the 21st century. It is useful to expand the size of the domestic market in order to develop a self-reliant economy since heavy industry needed large domestic market.

[18] The Malaysia Incorporated is a policy perceiving the nation as a corporate entity that is jointly owned by both the public and private sectors. Government bureaucracy was reoriented to support business and accelerate privatization programs.

[19] The Privatization Policy was announced in 1983 to increase the role played by the private sector. The arguments for privatization were firstly, that privatization relieves the financial and administration burden of the public sector and only profitable enterprises are attractive to the private sector. Secondly there are externalities of privatization; since the objectives of private entities are to maximize profit, privatization may increase government revenue via taxes. Lastly government assets that are privatized have been discounted and the assets of public enterprises are often purchased at subsidized prices. Therefore, it is argued that the gains made in the floatation and underwriting process, where shares of public enterprise are sold as a means to promote crony capitalism.

[20] The New Economic Model (NEM) is a model that targeted to transform the ethnic-based economic system of Malaysia and turned it into a need-based nation or one-nation. The main goals are twofold; firstly to transform the economy into high income economy by 2020 through improvement of worker productivity across all sectors of the society and secondly to shift affirmative action by the government so as to become more competitive, marketable and investor friendly.

[21] In general foreign investors in Malaysia's manufacturing sector can hold 100 per cent equity in projects which export at least 80 per cent of their production. However, effective from 17 June 2003, 100 per cent foreign equity holding is allowed for all investments in new projects, as well as investment in expansion/diversification projects by existing companies irrespective of their level of exports.

[22] Heavy industrialization was made possible by high protection and direct government equity participation. Companies were created to operate in the steel, cement, automotive, petrochemical and paper industries.

[23] These instruments influence directly the operations of the manufacturing sector through the price system or by altering the conditions of competition under which firms operate in Malaysia.

[24] Column (5) of the first schedule to the Customs Duties Order 1996 indicates the rate of export duty applicable on a particular type of goods.

[25] Column (4) of the first schedule to The Customs Duties Order 1996 indicates the rate of import duty applicable to each category of goods imported.

[26] The rate of sales taxes leviable is as stated in the Sales Tax (Rate of Tax) Order 1977. Sales tax is generally at 10 percent. However, certain non-essential foodstuffs and building materials are taxed at 5 percent, general goods at 10 percent, liquor at 20 percent and cigarettes at 25 percent. Goods such as raw materials and machinery for use in the manufacture of taxable goods are eligible for exemption from the tax, while inputs for selected non-taxable products are also exempted. Goods exempted from sales tax are listed in the Sales Tax (Exemption) order 1980. Certain primary commodities, basic foodstuffs, basic building materials, certain agricultural implements, heavy machinery for use in the construction industry, certain tourism and sports goods, books, newspapers and reading materials are also exempted.

[27] Licensed manufacturers are taxed on their output while manufacturers that are not licensed or exempted from licensing need to pay tax on their inputs. To relieve small-scale manufacturers from paying sales tax upfront on their inputs, they can opt to be licensed under the Sales Tax Act 1972 in order to purchase tax-free inputs. Hence, small-scale manufacturers can opt to pay sales tax only on their finished products.

[28] Note that imported goods are not subject to excise tax.

[29] The objective of this act is to ensure an adequate supply of controlled goods to meet the nation's needs.

[30] According to World Economic Forum (WEF) competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity of a country. The level of productivity, in turn sets the

sustainable level of prosperity that can be earned by an economy. Thus more competitive economies tend to be able to produce higher level of income for their citizens.

[31] Mansfield et al (1981) finds that on average it cost imitating firms 65% of the cost of innovation to imitate new products.

[32] World Bank's 2005 World Development Report states that competition strengthens firm's incentives to innovate and estimates that competitive pressure could increase the probability that firms in developing countries innovate.

[33] Industrial cluster represent the entire value chain of an industry ; which include group of interconnected firms from suppliers, supporting services, other related industries and specialized institutions and infrastructure to the end products; which have being geographically group in a particular locations.

[34] RosettaNet is a consortium of major Computer and Consumer Electronics companies besides the Semiconductors Manufacturing, Telecommunication and also Logistics companies.

[35] A study by the International Labor Organization (ILO) has revealed that a typical electronics assembly plant located in one of the Export Processing Zones (EPZs) sources as much as 60 per cent of its material inputs requirements from overseas.

[36] In any car case, heavy industrialisation did mean some diversion of resources from other competing uses and increased importation of machinery and intermediate goods.

[37] Ariff (1994), Athukorala and Menon (1996) and Baharumshah and Rashid (1999) empirically prove that exports have led Malaysian economic growth. Warr (1987) concluded that contribution of manufacturing exports is very important to income and employment growth, where high volume of manufacturing output has produced large revenue and has created employment opportunities which absorbed unskilled labor and provided a solution to problem of rural employment. Ariff and Hill (1985) showed that the success of export-led growth was very much dependent on government policies that were designed to promote manufacturing exports.

[38] Deichmann, Karidis and Sayek (2003) empirically prove that higher financial development is associated with increase in foreign direct investment (FDI). Financial development was portrayed as a mechanism in facilitating the adoption of new technologies in the domestic economy. James B. Ang (2007) showed that foreign direct investment was a key driver underlying the strong growth performance experienced by the Malaysian economy. Factors such as policy reforms, sound macroeconomic management, sustained economic growth and the presence of a well functioning system have made Malaysia an attractive prospect for FDI.

[39] The United States, Hong Kong, Singapore, Switzerland and Denmark were in the top five among the 57 economies surveyed. The improved rating placed Malaysia ahead of China (ranked 20 dropping from 17 in 2008) the United Kingdom (ranked 21), Belgium (ranked 22), Taiwan (ranked 23 dropping from 13 in 2008), Thailand (ranked 26 up one position from 27 in 2008) and South Korea (ranked 27).

[40] Index of Economic Freedom Report 2008.

[41] Among these are institutions of higher learning set up by large corporations such as Telekom Malaysia Berhad, Tenaga Nasional Berhad and Petronas which provide degree-level courses. Various private colleges in Malaysia offer degree programmes on a twinning basis with overseas institutions of higher learning, while foreign universities have set up branch campuses in the country. Educational institutions in Malaysia generate a large pool of professionals with degree and post-graduate qualifications.

[42] The guideline on the employment of expatriate personnel are as follows:

a) Manufacturing companies with foreign paid-up capital of USD2 million and above: automatic approval is given for up to 10 expatriate posts, including five key posts; expatriates can be employed for up to a maximum of 10 years for executive posts, and five years for non executive.

b) Manufacturing companies with foreign paid-up capital of more than USD200,000 but less than USD2 million: automatic approval is given for up to five expatriate posts, including at least one key pos; expatriates can be employed for up to a maximum 10 years for executive posts, and five years for non-executive posts.

c) Manufacturing companies with foreign paid-up capital of less than USD200,000 will be considered for both key posts and time posts based on current guidelines: key posts can be considered where the foreign paid-up capital is at least RM500,000 (the key post allowed however depends on the merits of each case); posts can be considered for up to 10 years for executive posts that require professional qualifications and practical experience, and five years for non-executive posts that require technical skill and experience in both case depends on the merits of the case.

d) For Malaysian owned manufacturing companies, approval for the employment of expatriates for technical posts, including R&D posts, will be given as requested.

[43] Foreign companies in the manufacturing sector are allowed to employ expatriates where certain skills are not available in Malaysia. A company with foreign paid-up capital of USD2 million and above will be allowed up to 10 expatriate posts, including five key posts, that is, posts that are permanently filled by foreigners.

[44] Malaysia has a young, educated and productive workforce. Literacy levels are high and school leavers entering the job market have at least 11 years of basic education. To meet the manufacturing sector's expanding demand for technically trained workers, the government has taken measures to increase the number of engineer, technician and other skilled personnel graduating each year from local and foreign universities, colleges and technical and industrial training institutions. Many of Malaysia's university graduates are trained overseas in fields such as engineering or accountancy, allowing them to adapt easily to an international corporate environment. English is widely used, especially in business thus facilitating the investor's communication with local personnel and suppliers.

[45] A current account is defined as the sum of the balance of trade (goods and services exports less imports), net income from abroad and net current transfers. A current account deficit decreases a nation's net foreign assets by the amount of the deficit. A negative current account balance indicates that the nation is a net borrower from the rest of the world.

[46] Malaysia, currently a middle-income country, would be a high income nation by 2020, for which the Malaysian Government had laid out a comprehensive plan and was working out accordingly, to achieve the set goal. High income nation is characterized by knowledge and innovation-intensive economic activities, competition-driven private sector-led economy, greater balance between domestic and external demand, deeper global and regional integration and quality workforce with an instilled culture of innovation among others.

[47] This is particularly noticeable in the cases of the EEC and North American automobile pact.

[48] All estimations were performed using the xtabond2 routine designed by Roodman (2009).

[49] The miscellaneous products cover a wide range of products that cannot readily be classified into other specific sectors of manufacturing and the processes used by the establishments vary significantly, both among and within industries. Examples include products such as tennis racquets and golf balls (sports and athletic products), jewelry (precious metals), fabrication (toys), office supplies and bending and forming products (medical equipment).

[50] Jones (1995) finds that a permanent change in policy variable proxies by an increase in investment rate or level of resource devoted to research and development; will results in a permanent effect on the growth rate which supports the endogenous growth specification.

[51] The adjustment factor for *Xì* and *Mì* are α and β respectively, where

$\alpha = \{ \Sigma^{n}_{i} (X\grave{\imath} + M\grave{\imath}) / [2 \Sigma^{n}_{i} X\grave{\imath}] \}$ and

$\beta = \{ \Sigma^{n}_{i} (X\grave{\imath} + M\grave{\imath}) / [2 \Sigma^{n}_{i} M\grave{\imath}] \}$

[52] Null hypothesis under White's test indicates constant variance (homoskedasticity) and the null hypothesis under Wooldridge's test indicates no first-order autocorrelation.

[53] According to the Definition of Product Grouping SITC Revision 3 Harmonized System, SITC 68 and SITC 667 are grouped under the primary products category.

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Appendix A

Appendix 3.1: Incentives for the Manufacturing Sector

Tax Incentives	Tax Concessions
Reinvestment Allowance (RA)	An allowance of 60 percent of capital expenditure incurred by the companies. The allowance can be utilized to offset against the 70 percent (100 percent for Sabah, Sarawak, Labuan and designated Eastern Corridor of Peninsula Malaysia and companies which can improve significantly in productivity) for of the statutory income in the year of assessment. RA is given for a period of 5 years beginning from the year of first reinvestment is made. Upon expiry of RA, companies producing promoted products/engaging in promoted activities are eligible for Accelerated Capital Allowance on capital expenditure where 40 percent of initial rate and 20 percent of annual rate will enable capital write off within 3 years.
Incentives for Industrial Adjustment	Incentive given to manufacturing sector for recognition, reconstruction or amalgamation within the same sector, enhancing industrial self sufficiency, improving industrial technology, increasing productivity and enhancing efficient use of manpower and resources.
Incentives to strengthen the Industrial Linkages Scheme • Incentives for Large Companies • Incentives for Vendor	Tax deductions for expenditure incurred for training of employees and products development. Pioneer status or an ITA status for five years with 100 percent exemption on the statutory income.
Incentives for Export	Double deduction for promotion of export, double deduction on freight charges, double deduction of export credit insurance premiums. Tax exemption on the value of increased exports, industrial building allowance and export credit refinancing scheme.
Incentives for Promoting Malaysian Brand Names	Double deduction for expenditure local advertisement. Professional fees paid to companies promoting Malaysian Brand Names.
Training Incentive • Pre-Employment Training • Double Deductions for Expenses Incurred for Approval Training • Human Resources Development Fund	Single deduction on training expenses incurred prior to the commencement of business. Double deductions on expenses incurred of employees trained at approved training institutions.

Infrastructure Allowance	Companies which are engaged in the manufacturing or commercial sector in East Malaysia and the Eastern Corridor whereby expenses incur on qualifying capital infrastructure are given an infrastructure allowance of 100 percent. The allowance can be utilized to offset against the 85 percent of the statutory income in the year of assessment. Any unutilized allowance can be carried forward to the following year until the amount has been used up.
Incentives for Research & Development Contract	Eligible for Pioneer Status with full income tax exemption at statutory level for five years, or an Investment Tax Allowance (ITA) for 100 percent on qualifying capital expenditure within 10 years. The ITA can be used to offset against the 70 percent of the statutory income in the year of assessment. Eligible to apply for ITA 100 percent on qualifying capital expenditure incurred within 10 years. The ITA can be utilized to offset the 70 percent of the statutory income in the year of assessment. Eligible to apply for ITA of 50 percent on qualifying capital expenditure within 10 years.
Accelerated Capital Allowance	After the 15-year period of eligibility for RA, companies that reinvest in the manufacture of promoted products are eligible to apply for Accelerated Capital Allowance (ACA). The ACA provides a special allowance, where the capital expenditure is written off within three years, i.e. an initial allowance of 40 percent and an annual allowance of 20 percent. Applications should be submitted to the IRB accompanied by a letter from MIDA certifying that the companies are manufacturing promoted products. SMEs are eligible for the following incentives: • ACA on expenses incurred on plant and machinery acquired in the Year of Assessment 2009 and 2010. This allowance is to be claimed within one year that is in the year of assessment the asset is fully acquired. This incentive is effective for the Year of Assessment 2009 and 2010; and • SMEs are not subject to the maximum limit of RM10,000 for capital allowance on small value assets effective from the Year of Assessment 2009.

Accelerated Capital Allowance on Equipment to Maintain Quality of Power Supply	In order to reduce the costs of doing business companies which incur capital expenditure on equipment to ensure the quality of power supply, are eligible for Accelerated Capital Allowance (ACA) for a period of two years which allows the companies to write off the capital expenditure within two years, i.e. an initial allowance of 20 percent and an annual allowance of 40 percent. Only equipment determined by the Ministry of Finance is eligible for the ACA.
Accelerated Capital Allowance on Security Control Equipment	Accelerated Capital Allowance (ACA) is given on security control equipment installed in the factory premises of companies licensed under the Industrial Coordination Act 1975. This allowance is eligible to be claimed within one year. Effective from the Year of Assessment 2009, this allowance is extended to all business premises. Security control equipment which are eligible for the allowance are: • anti-theft alarm system; • infra-red motion detection system; • siren; • access control system; • closed circuit television; • video surveillance system; • security camera; • wireless camera transmitter; and • time lapse recording and video motion detection equipment. Applications submitted to the IRB from the Year of Assessment 2009 to 2012 are eligible for this allowance.
Incentive for Industrial Building System	Industrial Building System (IBS) will enhance the quality of construction, create a safer and cleaner working environment as well as reduce the dependence on foreign workers. Companies which incur expenses on the purchase of moulds used in the production of IBS components are eligible for Accelerated Capital Allowances (ACA) for a period of three years.

Group Relief	Group relief is provided under the Income Tax Act 1967 to all locally incorporated resident companies. Effective from the Year of Assessment 2009, group relief is increased from 50% to 70% of the current year's unabsorbed losses to be offset against the income of another company within the same group (including new companies undertaking activities in approved food production, forest plantation, biotechnology, nanotechnology, optics and photonics) subject to the following conditions: i. The claimant and the surrendering companies each has a paid-up capital of ordinary shares exceeding RM2.5 million; ii. Both the claimant and the surrendering companies must have the same accounting period; iii. The shareholding, whether direct or indirect, of the claimant and the surrendering companies in the group must not be less than 70%; iv. The 70% shareholding must be on a continuous basis during the preceding year and the relevant year; v. Losses resulting from the acquisition of proprietary rights or a foreign-owned company should be disregarded for the purpose of group relief; and vi. Companies currently enjoying the following incentives are not eligible for group relief: • Pioneer Status • Investment Tax Allowance/Investment Allowance • Reinvestment Allowance • Exemption of Shipping Profits • Exemption of Income Tax under section 127 of the Income Tax Act 1967; and • Incentive Investment Company • With the introduction of the above incentive, the existing group relief incentive for approved food production, forest plantation, biotechnology, nanotechnology, optics and photonics will be discontinued. However, companies granted group relief incentive for the above activities shall continue to offset their income against 100% of the losses incurred by their subsidiaries.

Source: Malaysian Investment Development Authority (2015)

Appendix B

Selected Output for Industries Growth Channels Analysis

```
. describe

Contains data
  obs:           152
 vars:            11
 size:         8,360 (99.9% of memory free)
-------------------------------------------------------------------------------
              storage  display     value
variable name   type   format      label      variable label
-------------------------------------------------------------------------------
industry        byte   %8.0g                  panel of 19 industries
year            int    %8.0g                  1999-2006
y               double %8.0g                  output of industry
fdi             double %8.0g                  foreign direct investment inflows
gfcf            double %8.0g                  gross fixed capital formation
gc              float  %8.0g                  government consumption
mq              float  %8.0g                  quality of macroeconomics policies
mx              float  %8.0g                  manufactured exports
hc              long   %8.0g                  human capital
tariff          float  %8.0g                  tariff barrier index
nontariff       float  %8.0g                  non-tariff barrier index
-------------------------------------------------------------------------------
Sorted by:
     Note:  dataset has changed since last saved
```

```
. xtsum y fdi gfcf gc mq mx hc

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
y        overall |  2.63e+07   4.05e+07     125017   2.23e+08 |     N =     152
         between |             4.02e+07   187737.8   1.78e+08 |     n =      19
         within  |             1.01e+07  -1.17e+07   7.08e+07 |     T =       8
                 |                                            |
fdi      overall |  8.38e+08   1.86e+09       3189   1.13e+10 |     N =     152
         between |             1.66e+09    4315543   7.49e+09 |     n =      19
         within  |             9.06e+08  -3.03e+09   4.66e+09 |     T =       8
                 |                                            |
gfcf     overall |   1051927    1830428      -7116   1.14e+07 |     N =     152
         between |              1755567       4498    7798125 |     n =      19
         within  |               641347  -935281.7    4623830 |     T =       8
                 |                                            |
gc       overall |  11.99871    .918883   10.16524   12.96801 |     N =     152
         between |                    0   11.99871   11.99871 |     n =      19
         within  |              .918883   10.16524   12.96801 |     T =       8
                 |                                            |
mq       overall |    3.1225   .2329177       2.66       3.33 |     N =     152
         between |                    0     3.1225     3.1225 |     n =      19
         within  |             .2329177       2.66       3.33 |     T =       8
                 |                                            |
mx       overall |  77.55163   2.668974   73.38886   80.35532 |     N =     152
         between |                    0   77.55163   77.55163 |     n =      19
         within  |             2.668974   73.38886   80.35532 |     T =       8
                 |                                            |
hc       overall |  75449.64   87931.27        203     480577 |     N =     152
         between |             86182.66   5048.375   405397.4 |     n =      19
         within  |              25471.1  -87927.73     240439 |     T =       8
```

```
. corr y fdi gfcf gc mq mx hc
(obs=152)

             |        y      fdi     gfcf       gc       mq       mx       hc
-------------+---------------------------------------------------------------
           y |   1.0000
         fdi |   0.8147   1.0000
        gfcf |   0.8688   0.8367   1.0000
          gc |   0.0571  -0.0263  -0.0575   1.0000
          mq |  -0.0612   0.0081  -0.0324  -0.1292   1.0000
          mx |  -0.1334  -0.0314  -0.0196  -0.4444   0.3435   1.0000
          hc |   0.8224   0.7392   0.8269   0.0075  -0.0097  -0.0564   1.0000
```

```
. vce, corr

Correlation matrix of coefficients of regress model

        e(V) |      fdi       gfcf         gc         mq         mx         hc 
-------------+------------------------------------------------------------------
         fdi |   1.0000 
        gfcf |  -0.5970     1.0000 
          gc |  -0.0184     0.0921     1.0000 
          mq |  -0.0702     0.0910    -0.0203     1.0000 
          mx |   0.0286    -0.0311     0.4251    -0.3236     1.0000 
          hc |  -0.1464    -0.5703    -0.0692    -0.0459     0.0432     1.0000 
       _cons |   0.0110    -0.0360    -0.7013    -0.0707    -0.8713    -0.0123 

        e(V) |    _cons 
-------------+----------
       _cons |   1.0000 


. estat vce

Covariance matrix of coefficients of regress model

        e(V) |        fdi         gfcf           gc           mq           mx 
-------------+-----------------------------------------------------------------
         fdi |  2.043e-06 
        gfcf | -.00149089    3.0523775 
          gc | -46.044696    281311.57    3.057e+12 
          mq | -659.64529    1045388.6   -2.330e+11    4.319e+13 
          mx |  25.854451    -34408.39    4.708e+11   -1.347e+12    4.013e+11 
          hc | -.00616135   -29.346952   -3563107.4   -8890889.1    805102.32 
       _cons |   927.6765   -3717909.8   -7.244e+13   -2.747e+13   -3.261e+13 

        e(V) |         hc        _cons 
-------------+--------------------------
          hc |  867.38528 
       _cons |  -21330036    3.491e+15 


. estat vif

    Variable |       VIF       1/VIF  
-------------+----------------------
        gfcf |      5.00    0.200140
         fdi |      3.43    0.291159
          hc |      3.28    0.305195
          mx |      1.40    0.715939
          gc |      1.26    0.793103
          mq |      1.14    0.873592
-------------+----------------------
    Mean VIF |      2.58
```

Regression - Static Model

```
. reg ly lfdi lgfcf lgc lmq lmx lhc

      Source |       SS       df       MS              Number of obs =     152
-------------+------------------------------           F(  6,   145) =  112.74
       Model |  243.318479     6  40.5530798           Prob > F      =  0.0000
    Residual |  52.1552903   145  .359691657           R-squared     =  0.8235
-------------+------------------------------           Adj R-squared =  0.8162
       Total |  295.473769   151  1.95677993           Root MSE      =  .59974

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lfdi |   .1665055   .0322922     5.16   0.000     .1026813    .2303297
       lgfcf |   .6344593   .0496453    12.78   0.000     .5363373    .7325813
         lgc |   1.252642   .6903117     1.81   0.072     -.111731    2.617015
         lmq |   .5651568   .6776663     0.83   0.406    -.7742232    1.904537
         lmx |  -2.948382   1.672247    -1.76   0.080    -6.253511    .3567458
         lhc |    -.04354   .0537617    -0.81   0.419    -.1497978    .0627178
       _cons |   14.46438   8.044997     1.80   0.074    -1.436234    30.36499
------------------------------------------------------------------------------
```

```
. xtserial ly lfdi lgfcf lgc lmq lmx lhc

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      18) =    137.427
           Prob > F =      0.0000


. xtreg ly lfdi lgfcf lgc lmq lmx lhc, fe

Fixed-effects (within) regression               Number of obs      =       152
Group variable: panel                           Number of groups   =        19

R-sq:  within  = 0.5581                         Obs per group: min =         8
       between = 0.6803                                        avg =       8.0
       overall = 0.3108                                        max =         8

                                                F(6,127)           =     26.73
corr(u_i, Xb)  = 0.4171                         Prob > F           =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lfdi |   .0174258   .0139197     1.25   0.213    -.0101187    .0449703
       lgfcf |   .0232013   .0298204     0.78   0.438    -.0358079    .0822105
         lgc |   .1444687   .2447927     0.59   0.556    -.3399319    .6288693
         lmq |  -.1543396   .2387883    -0.65   0.519    -.6268586    .3181794
         lmx |   -5.49207   .6004151    -9.15   0.000    -6.680183   -4.303957
         lhc |   .0746299   .0368626     2.02   0.045     .0016855    .1475744
       _cons |   38.58051    3.06199    12.60   0.000     32.52139    44.63964
-------------+----------------------------------------------------------------
     sigma_u |  1.2903642
     sigma_e |   .2094902
         rho |  .97431946   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(18, 127) =    58.97             Prob > F = 0.0000


. xtreg ly lfdi lgfcf lgc lmq lmx lhc, re

Random-effects GLS regression                   Number of obs      =       152
Group variable: panel                           Number of groups   =        19

R-sq:  within  = 0.4658                         Obs per group: min =         8
       between = 0.8297                                        avg =       8.0
       overall = 0.7148                                        max =         8

Random effects u_i ~ Gaussian                   Wald chi2(6)       =    122.54
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lfdi |    .050007   .0196074     2.55   0.011     .0115772    .0884369
       lgfcf |   .1717663   .0393437     4.37   0.000     .0946541    .2488785
         lgc |   .4061335   .3514375     1.16   0.248    -.2826713    1.094938
         lmq |  -.0315176   .3436526    -0.09   0.927    -.7050643    .6420291
         lmx |  -4.646518   .8576414    -5.42   0.000    -6.327464   -2.965571
         lhc |   .1321584   .0492349     2.68   0.007     .0356599     .228657
       _cons |   30.95517   4.300135     7.20   0.000     22.52706    39.38328
-------------+----------------------------------------------------------------
     sigma_u |  .35554683
     sigma_e |   .2094902
         rho |  .74230051   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
        lfdi |    .0174258      .050007       -.0325813               .
       lgfcf |    .0232013     .1717663        -.148565               .
         lgc |    .1444687     .4061335       -.2616648               .
         lmq |   -.1543396    -.0315176        -.122822               .
         lmx |    -5.49207    -4.646518        -.845552               .
         lhc |    .0746299     .1321584       -.0575285               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =   -78.97    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test

. xtgls ly lfdi lgfcf lgc lmq lmx lhc, panel(hetero) corr(1)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   common AR(1) coefficient for all panels  (0.2418)

Estimated covariances      =        19          Number of obs      =       152
Estimated autocorrelations =         1          Number of groups   =        19
Estimated coefficients     =         7          Time periods       =         8
                                                Wald chi2(6)       =    665.23
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lfdi |   .0788162   .0197927     3.98   0.000     .0400233    .1176091
       lgfcf |   .5724569   .0415998    13.76   0.000     .4909229     .653991
         lgc |   .6044975   .3772424     1.60   0.109    -.1348839    1.343879
         lmq |    .112029   .3395726     0.33   0.741     -.553521     .777579
         lmx |  -3.286343   .9623405    -3.41   0.001    -5.172496    -1.40019
         lhc |    .147921   .0506271     2.92   0.003     .0486938    .2471482
       _cons |   18.38802   4.649297     3.96   0.000     9.275567    27.50047
------------------------------------------------------------------------------
```

Regression - Dynamic Model

```
. xtabond ly lfdi lgfcf lgc lmq lmx lhc

Arellano-Bond dynamic panel-data estimation  Number of obs         =       114
Group variable: panel                        Number of groups      =        19
Time variable: year
                                             Obs per group:    min =         6
                                                               avg =         6
                                                               max =         6

Number of instruments =     28               Wald chi2(7)          =    335.95
                                             Prob > chi2           =    0.0000
One-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .0332339   .1297571     0.26   0.798    -.2210853    .2875531
             |
        lfdi |  -.0037319   .0108505    -0.34   0.731    -.0249986    .0175348
       lgfcf |   .0266272   .0206208     1.29   0.197    -.0137888    .0670433
         lgc |  -.2097882   .1497809    -1.40   0.161    -.5033533     .083777
         lmq |    .066557    .168613     0.39   0.693    -.2639184    .3970324
         lmx |  -5.177562   .8188962    -6.32   0.000    -6.782569   -3.572555
         lhc |   .0364263   .0218754     1.67   0.096    -.0064487    .0793013
       _cons |   38.10018   5.454522     6.99   0.000     27.40951    48.79085
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.lfdi D.lgfcf D.lgc D.lmq D.lmx D.lhc
Instruments for level equation
        Standard: _cons

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(20)     =  36.31732
        Prob > chi2  =    0.0141


. xtabond ly lfdi lgfcf lgc lmq lmx lhc,twostep

Arellano-Bond dynamic panel-data estimation  Number of obs         =       114
Group variable: panel                        Number of groups      =        19
Time variable: year
                                             Obs per group:    min =         6
                                                               avg =         6
                                                               max =         6

Number of instruments =     28               Wald chi2(7)          =   1706.00
                                             Prob > chi2           =    0.0000
Two-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |    .023759   .0956837     0.25   0.804    -.1637776    .2112956
             |
        lfdi |  -.0022044   .0077558    -0.28   0.776    -.0174056    .0129968
       lgfcf |   .0267987   .0101055     2.65   0.008     .0069924    .0466051
         lgc |   -.202914   .1023848    -1.98   0.047    -.4035846   -.0022434
         lmq |   .0815348   .0943224     0.86   0.387    -.1033336    .2664032
         lmx |  -5.187803   .5837492    -8.89   0.000    -6.331931   -4.043676
         lhc |   .0378506   .0099917     3.79   0.000     .0182674    .0574339
       _cons |   38.19141   3.636261    10.50   0.000     31.06447    45.31836
------------------------------------------------------------------------------


Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.lfdi D.lgfcf D.lgc D.lmq D.lmx D.lhc
Instruments for level equation
        Standard: _cons
```

```
. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors

  +-----------------------+
  |Order |  z     Prob > z|
  |------+----------------|
  |   1  |-3.058  0.0022  |
  |   2  |1.0007  0.3170  |
  +-----------------------+
   H0: no autocorrelation

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(20)     =  18.21763
        Prob > chi2  =    0.5731


. xtdpdsys ly lfdi lgfcf lgc lmq lmx lhc

System dynamic panel-data estimation         Number of obs         =       133
Group variable: panel                        Number of groups      =        19
Time variable: year
                                             Obs per group:    min =         7
                                                               avg =         7
                                                               max =         7

Number of instruments =     34               Wald chi2(7)          =   1118.61
                                             Prob > chi2           =    0.0000
One-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .9066576   .0486453    18.64   0.000     .8113146    1.002001
             |
        lfdi |   .0012328   .0162055     0.08   0.939    -.0305295    .0329951
       lgfcf |    .067191   .0287454     2.34   0.019     .0108509     .123531
         lgc |   -.377654   .2123019    -1.78   0.075     -.793758      .03845
         lmq |  -.5670738   .1816368    -3.12   0.002    -.9230755   -.2110721
         lmx |  -.0789777   .4318566    -0.18   0.855     -.925401    .7674456
         lhc |   .0521876   .0307689     1.70   0.090    -.0081183    .1124935
       _cons |   2.089218   2.224635     0.94   0.348    -2.270986    6.449422
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.lfdi D.lgfcf D.lgc D.lmq D.lmx D.lhc
Instruments for level equation
        GMM-type: LD.ly
        Standard: _cons


. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(26)     =  40.48869
        Prob > chi2  =    0.0349


. xtdpdsys ly lfdi lgfcf lgc lmq lmx lhc,twostep

System dynamic panel-data estimation         Number of obs         =       133
Group variable: panel                        Number of groups      =        19
Time variable: year
                                             Obs per group:    min =         7
                                                               avg =         7
                                                               max =         7

Number of instruments =     34               Wald chi2(7)          =  25003.53
                                             Prob > chi2           =    0.0000
Two-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .9539341   .0470449    20.28   0.000     .8617278     1.04614
             |
        lfdi |  -.0013257   .0077242    -0.17   0.864    -.0164649    .0138136
       lgfcf |   .0593192   .0097507     6.08   0.000     .0402083    .0784302
         lgc |  -.5856617   .1295363    -4.52   0.000    -.8395483   -.3317752
         lmq |  -.6346251   .0830558    -7.64   0.000    -.7974114   -.4718388
         lmx |   .0095264   .2400176     0.04   0.968    -.4608996    .4799523
         lhc |   .0561086    .029542     1.90   0.058    -.0017926    .1140098
       _cons |   1.637775   1.502038     1.09   0.276    -1.306165    4.581716
------------------------------------------------------------------------------
```

```
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.lfdi D.lgfcf D.lgc D.lmq D.lmx D.lhc
Instruments for level equation
        GMM-type: LD.ly
        Standard: _cons


. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
```

Order	z	Prob > z
1	-2.9273	0.0034
2	.19689	0.8439

```
   H0: no autocorrelation

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(26)     =  15.97567
        Prob > chi2  =    0.9368
```

Appendix C

Selected Output for Imported Inputs Analysis

```
. describe

Contains data
  obs:           364
 vars:            14
 size:        23,296 (99.9% of memory free)
-------------------------------------------------------------------------------
              storage  display     value
variable name   type   format      label      variable label
-------------------------------------------------------------------------------
panel           byte   %8.0g                  industries
year            int    %8.0g                  2000-2006
y               long   %8.0g                  industries revenue
rnd             long   %8.0g                  research and development
                                                expenditure
ce              long   %8.0g                  capital expenditure
imp             long   %8.0g                  imported intermediate inputs
hc              int    %8.0g                  human capital
sizeofgovernm~t float  %8.0g                  size of government
legalstructur~e float  %8.0g                  legal structure and security of
                                                property
accesstosound~y float  %8.0g                  access to sound money
freedomtotrad~y float  %8.0g                  freedom to trade internationally
regulationofc~n float  %8.0g                  regulation of capital, labor and
                                                business
tariff          str15  %15s                   tariff barrier index
nontariff       float  %8.0g                  non-tariff barrier index
-------------------------------------------------------------------------------
Sorted by:
     Note:  dataset has changed since last saved
```

```
. xtsum y rnd ce imp hc

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
y        overall |   5172821    8585870        190   6.90e+07 |     N =     364
         between |              7962909   47730.86   4.11e+07 |     n =      52
         within  |              3370060  -1.40e+07   3.30e+07 |     T =       7
                 |                                            |
rnd      overall |  13213.63   58956.84          4     702025 |     N =     364
         between |             50095.39   37.28571   354895.4 |     n =      52
         within  |              31746.5  -253244.8   360343.2 |     T =       7
                 |                                            |
ce       overall |   3524876    6450130       6430   5.00e+07 |     N =     364
         between |              5933299   23808.29   3.10e+07 |     n =      52
         within  |              2642352  -1.12e+07   2.58e+07 |     T =       7
                 |                                            |
imp      overall |    936476    1657928        793   1.60e+07 |     N =     364
         between |              1459414   3113.857    9257143 |     n =      52
         within  |             808727.4   -2220667    7679333 |     T =       7
                 |                                            |
hc       overall |  392.2967   663.1188          2       6558 |     N =     364
         between |             615.8515          3   3491.286 |     n =      52
         within  |             258.3067   -829.989   3459.011 |     T =       7
```

```
. corr y rnd ce imp hc
(obs=364)

             |        y      rnd       ce      imp       hc
-------------+---------------------------------------------
           y |   1.0000
         rnd |   0.2173   1.0000
          ce |   0.9767   0.2289   1.0000
         imp |   0.4894   0.4203   0.4730   1.0000
          hc |   0.0797  -0.0791   0.0588  -0.0066   1.0000
```

```
. vce, corr

Correlation matrix of coefficients of regress model

        e(V) |      rnd         ce        imp         hc      _cons
-------------+-------------------------------------------------------
         rnd |   1.0000
          ce |  -0.0439     1.0000
         imp |  -0.3620    -0.4258     1.0000
          hc |   0.0870    -0.0738     0.0049     1.0000
       _cons |  -0.0178    -0.2077    -0.2545    -0.4345     1.0000

. estat vce

Covariance matrix of coefficients of regress model

        e(V) |        rnd          ce          imp           hc        _cons
-------------+-----------------------------------------------------------------
         rnd |  3.2010497
          ce | -.00132063   .00028307
         imp | -.04535026  -.00050166   .00490409
          hc |  22.510804  -.17955237   .04934601    20908.736
       _cons | -4003.9132   -440.0932   -2244.375   -7913189.2   1.586e+10

. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
         imp |      1.48    0.673517
          ce |      1.30    0.770923
         rnd |      1.23    0.815975
          hc |      1.01    0.987478
-------------+----------------------
    Mean VIF |      1.26
```

Malaysian Industries
Regression - Static Model

```
. reg ly limp lce lrd lhc

      Source |       SS       df       MS              Number of obs =     364
-------------+------------------------------           F(  4,   359) =  493.08
       Model |  896.180397     4  224.045099           Prob > F      =  0.0000
    Residual |  163.121206   359  .454376618           R-squared     =  0.8460
-------------+------------------------------           Adj R-squared =  0.8443
       Total |   1059.3016   363  2.91818623           Root MSE      =  .67407

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |  -.0184984   .0384114    -0.48   0.630    -.0940381    .0570412
         lce |    .906453   .0455247    19.91   0.000     .8169243    .9959817
         lrd |   .0258099   .0226164     1.14   0.255    -.0186673    .0702871
         lhc |   .1355861   .0254053     5.34   0.000     .0856242    .1855479
       _cons |   1.099317   .3429131     3.21   0.001     .4249467    1.773688
------------------------------------------------------------------------------

. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(14)     =     27.60
         Prob > chi2  =    0.0161

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df      p
---------------------+-----------------------------
  Heteroskedasticity |      27.60     14    0.0161
            Skewness |       7.38      4    0.1171
            Kurtosis |       2.57      1    0.1092
---------------------+-----------------------------
               Total |      37.54     19    0.0068
---------------------------------------------------
```

```
. xtserial ly limp lce lrd lhc

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      51) =      6.440
           Prob > F =      0.0143

. xtreg ly limp lce lrd lhc, fe

Fixed-effects (within) regression               Number of obs      =       364
Group variable: panel                           Number of groups   =        52

R-sq:  within  = 0.3002                         Obs per group: min =         7
       between = 0.9259                                        avg =       7.0
       overall = 0.8290                                        max =         7

                                                F(4,308)           =     33.03
corr(u_i, Xb)  = 0.5136                         Prob > F           =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |  -.2093029   .0592315    -3.53   0.000    -.3258525   -.0927533
         lce |   .8633629   .1003218     8.61   0.000     .6659601    1.060766
         lrd |   .0629336   .0308009     2.04   0.042     .0023269    .1235404
         lhc |   .1325838   .1335771     0.99   0.322    -.1302554    .3954229
       _cons |   3.867193   1.076638     3.59   0.000     1.748698    5.985689
-------------+----------------------------------------------------------------
     sigma_u |   .5111184
     sigma_e |  .60429728
         rho |  .41704156   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(51, 308) =     2.72             Prob > F = 0.0000
. xtreg ly limp lce lrd lhc,re

Random-effects GLS regression                   Number of obs      =       364
Group variable: panel                           Number of groups   =        52

R-sq:  within  = 0.2857                         Obs per group: min =         7
       between = 0.9464                                        avg =       7.0
       overall = 0.8447                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(4)       =   1041.67
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |  -.0811295   .0447207    -1.81   0.070    -.1687805    .0065215
         lce |   .9285316   .0564005    16.46   0.000     .8179887    1.039075
         lrd |   .0414986   .0250323     1.66   0.097    -.0075639    .0905611
         lhc |   .1437967   .0350488     4.10   0.000     .0751024    .2124911
       _cons |   1.428382    .455453     3.14   0.002     .5357109    2.321054
-------------+----------------------------------------------------------------
     sigma_u |  .27298341
     sigma_e |  .60429728
         rho |  .16948093   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. hausman fixed

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
        limp |   -.2093029    -.0811295       -.1281734        .0388385
         lce |    .8633629     .9285316       -.0651687        .0829665
         lrd |    .0629336     .0414986         .021435        .0179465
         lhc |    .1325838     .1437967        -.011213         .128897
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       18.31
                Prob>chi2 =      0.0011
```

```
. xtgls ly limp lce lrd lhc, panel(hetero) corr(ar1)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   common AR(1) coefficient for all panels  (1.5976)

Estimated covariances      =        52          Number of obs      =       364
Estimated autocorrelations =         1          Number of groups   =        52
Estimated coefficients     =         5          Time periods       =         7
                                                Wald chi2(4)       =  16882.80
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |  -.0130103   .0099682    -1.31   0.192    -.0325477    .0065271
         lce |   .9170073   .0138515    66.20   0.000      .889859    .9441557
         lrd |   .0191777   .0041046     4.67   0.000     .0111329    .0272225
         lhc |    .075997   .0070452    10.79   0.000     .0621887    .0898053
       _cons |   1.300516   .1137138    11.44   0.000     1.077641    1.523391
------------------------------------------------------------------------------
```

Regression - Dynamic Model

```
. xtabond ly limp lce lrd lhc

Arellano-Bond dynamic panel-data estimation  Number of obs         =       260
Group variable: panel                        Number of groups      =        52
Time variable: year
                                             Obs per group:    min =         5
                                                               avg =         5
                                                               max =         5

Number of instruments =     20               Wald chi2(5)          =    117.75
                                             Prob > chi2           =    0.0000
One-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |  -.0312074   .1007687    -0.31   0.757    -.2287103    .1662955
             |
        limp |  -.0992835    .062046    -1.60   0.110    -.2208913    .0223244
         lce |   .8030897   .0992929     8.09   0.000     .6084793    .9977002
         lrd |    .053325   .0347683     1.53   0.125    -.0148197    .1214697
         lhc |  -.0493107   .1457104    -0.34   0.735    -.3348978    .2362765
       _cons |   4.716513   1.571942     3.00   0.003     1.635564    7.797462
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        Standard: _cons

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(14)     =  20.23464
        Prob > chi2  =    0.1229
```

```
. xtabond ly limp lce lrd lhc,twostep

Arellano-Bond dynamic panel-data estimation  Number of obs         =       260
Group variable: panel                        Number of groups      =        52
Time variable: year
                                             Obs per group:    min =         5
                                                               avg =         5
                                                               max =         5

Number of instruments =     20               Wald chi2(5)          =   3075.57
                                             Prob > chi2           =    0.0000
Two-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .0104361   .0194151     0.54   0.591    -.0276169    .0484891
             |
        limp |    .019946   .0438181     0.46   0.649    -.0659358    .1058278
         lce |   .7204124   .0582157    12.37   0.000     .6063117    .8345131
         lrd |     .04332   .0063845     6.79   0.000     .0308066    .0558335
         lhc |   .0722738   .0544875     1.33   0.185    -.0345197    .1790673
       _cons |   3.326815   .5532004     6.01   0.000     2.242562    4.411068
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        Standard: _cons


. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
  +-----------------------+
  |Order |  z     Prob > z|
  |------+----------------|
  |   1  |.34136  0.7328  |
  |   2  |-.7563  0.4495  |
  +-----------------------+
   H0: no autocorrelation

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(14)     =  14.43458
        Prob > chi2  =    0.4179


. xtdpdsys ly limp lce lrd lhc

System dynamic panel-data estimation         Number of obs         =       312
Group variable: panel                        Number of groups      =        52
Time variable: year
                                             Obs per group:    min =         6
                                                               avg =         6
                                                               max =         6

Number of instruments =     25               Wald chi2(5)          =    218.37
                                             Prob > chi2           =    0.0000
One-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .4333351   .0627413     6.91   0.000     .3103645    .5563057
             |
        limp |  -.0977992   .0679118    -1.44   0.150    -.2309039    .0353054
         lce |   .6309146   .0981889     6.43   0.000     .4384679    .8233613
         lrd |   .0012775   .0344454     0.04   0.970    -.0662342    .0687892
         lhc |   .1668916   .0993164     1.68   0.093    -.0277649    .3615481
       _cons |  -.2528032   1.118116    -0.23   0.821     -2.44427    1.938663
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        GMM-type: LD.ly
        Standard: _cons
```

```
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(19)     =  100.7216
        Prob > chi2  =    0.0000

. xtdpdsys ly limp lce lrd lhc,twostep

System dynamic panel-data estimation         Number of obs        =       312
Group variable: panel                        Number of groups     =        52
Time variable: year
                                             Obs per group:    min =         6
                                                               avg =         6
                                                               max =         6

Number of instruments =     25               Wald chi2(5)         =   2704.01
                                             Prob > chi2          =    0.0000
Two-step results
```

ly	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ly						
L1.	.3702803	.0338825	10.93	0.000	.3038718	.4366888
limp	-.0339305	.0350463	-0.97	0.333	-.10262	.0347589
lce	.6401782	.0383815	16.68	0.000	.5649518	.7154046
lrd	-.0090523	.0115413	-0.78	0.433	-.0316727	.0135682
lhc	.1563415	.0165732	9.43	0.000	.1238586	.1888243
_cons	-.1529837	.310513	-0.49	0.622	-.7615779	.4556106

```
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        GMM-type: LD.ly
        Standard: _cons

. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
```

Order	z	Prob > z
1	-1.676	0.0937
2	1.4054	0.1599

```
   H0: no autocorrelation

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(19)     =  34.74404
        Prob > chi2  =    0.0150
```

Non-Malaysian Industries
Regression - Static Model

```
. reg ly limp lce lrd lhc
```

Source	SS	df	MS
Model	853.682596	4	213.420649
Residual	44.467977	359	.123866231
Total	898.150573	363	2.474244

```
Number of obs =     364
F(  4,   359) = 1722.99
Prob > F      =  0.0000
R-squared     =  0.9505
Adj R-squared =  0.9499
Root MSE      =  .35195
```

ly	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
limp	.0999664	.0323655	3.09	0.002	.0363166	.1636163
lce	.7536873	.0354961	21.23	0.000	.6838808	.8234938
lrd	.0321277	.0116236	2.76	0.006	.0092687	.0549866
lhc	.0994151	.0219051	4.54	0.000	.0563366	.1424935
_cons	2.040013	.1860337	10.97	0.000	1.67416	2.405866

```
. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(14)     =     52.71
         Prob > chi2  =    0.0000

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df      p
---------------------+-----------------------------
  Heteroskedasticity |      52.71     14    0.0000
            Skewness |       9.83      4    0.0434
            Kurtosis |      10.07      1    0.0015
---------------------+-----------------------------
               Total |      72.62     19    0.0000
---------------------------------------------------
. xtserial ly limp lrd lce lhc

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      51) =     37.611
           Prob > F =      0.0000
. xtreg ly limp lce lrd lhc, fe

Fixed-effects (within) regression               Number of obs      =       364
Group variable: panel                           Number of groups   =        52

R-sq:  within  = 0.7427                         Obs per group: min =         7
       between = 0.9611                                        avg =       7.0
       overall = 0.9487                                        max =         7

                                                F(4,308)           =    222.23
corr(u_i, Xb)  = 0.6407                         Prob > F           =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |   .0528193   .0327764     1.61   0.108    -.0116747    .1173132
         lce |   .6904383   .0354138    19.50   0.000     .6207547    .7601218
         lrd |  -.0041947   .0110406    -0.38   0.704    -.0259192    .0175298
         lhc |   .0889435   .0403227     2.21   0.028     .0096006    .1682864
       _cons |   3.780686   .3595841    10.51   0.000     3.073134    4.488238
-------------+----------------------------------------------------------------
     sigma_u |  .40588252
     sigma_e |   .1922528
         rho |  .81675352   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(51, 308) =    17.55             Prob > F = 0.0000
. xtreg ly limp lce lrd lhc, re

Random-effects GLS regression                   Number of obs      =       364
Group variable: panel                           Number of groups   =        52

R-sq:  within  = 0.7409                         Obs per group: min =         7
       between = 0.9619                                        avg =       7.0
       overall = 0.9498                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(4)       =   2008.67
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |   .0904438   .0304843     2.97   0.003     .0306956     .150192
         lce |   .7177392   .0335668    21.38   0.000     .6519495     .783529
         lrd |   .0083742   .0104911     0.80   0.425     -.012188    .0289364
         lhc |    .116426   .0321229     3.62   0.000     .0534663    .1793856
       _cons |   2.759002   .2681113    10.29   0.000     2.233514    3.284491
-------------+----------------------------------------------------------------
     sigma_u |  .30152453
     sigma_e |   .1922528
         rho |  .71096604   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. hausman fixed

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
        limp |    .0528193     .0904438       -.0376245        .0120414
         lce |    .6904383     .7177392        -.027301        .0112874
         lrd |   -.0041947     .0083742       -.0125689        .0034396
         lhc |    .0889435      .116426       -.0274825        .0243731
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       20.14
                Prob>chi2 =      0.0005

. xtgls ly limp lce lrd lhc, panels(hetero) corr(ar1)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   common AR(1) coefficient for all panels  (0.7719)

Estimated covariances      =        52          Number of obs      =       364
Estimated autocorrelations =         1          Number of groups   =        52
Estimated coefficients     =         5          Time periods       =         7
                                                Wald chi2(4)       =  18979.46
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        limp |   .0597176   .0148585     4.02   0.000     .0305955    .0888397
         lce |   .7988329   .0161745    49.39   0.000     .7671315    .8305342
         lrd |   .0257781   .0032255     7.99   0.000     .0194562    .0321001
         lhc |   .0583591   .0100993     5.78   0.000     .0385649    .0781533
       _cons |    2.10066   .0946091    22.20   0.000     1.915229     2.28609
------------------------------------------------------------------------------
```

REGRESSION – DYNAMIC MODEL

```
. xtabond ly limp lce lrd lhc

Arellano-Bond dynamic panel-data estimation  Number of obs         =       260
Group variable: panel                        Number of groups      =        52
Time variable: year
                                             Obs per group:    min =         5
                                                               avg =         5
                                                               max =         5

Number of instruments =     20               Wald chi2(5)          =    825.45
                                             Prob > chi2           =    0.0000
One-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .1182342   .0464634     2.54   0.011     .0271677    .2093007
             |
        limp |   .1473447   .0371191     3.97   0.000     .0745926    .2200968
         lce |   .5756542   .0369477    15.58   0.000      .503238    .6480705
         lrd |   .0198787   .0131349     1.51   0.130    -.0058652    .0456226
         lhc |   .0501504   .0429289     1.17   0.243    -.0339887    .1342894
       _cons |   2.423131   .6379668     3.80   0.000     1.172739    3.673523
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        Standard: _cons
```

```
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(14)     =  36.48109
        Prob > chi2  =    0.0009


. xtabond ly limp lce lrd lhc,twostep

Arellano-Bond dynamic panel-data estimation  Number of obs         =       260
Group variable: panel                        Number of groups      =        52
Time variable: year
                                             Obs per group:    min =         5
                                                               avg =         5
                                                               max =         5

Number of instruments =     20               Wald chi2(5)          =   8569.68
                                             Prob > chi2           =    0.0000
Two-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .0668691   .0176677     3.78   0.000     .0322411     .101497
             |
        limp |   .1269435   .0154216     8.23   0.000     .0967178    .1571693
         lce |   .6376437   .0165587    38.51   0.000     .6051893    .6700981
         lrd |   .0134356   .0052227     2.57   0.010     .0031992     .023672
         lhc |   .0457157   .0251793     1.82   0.069    -.0036348    .0950662
       _cons |   2.648053   .2099335    12.61   0.000     2.236591    3.059515
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        Standard: _cons
```

```
. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors

  +-----------------------+
  |Order |   z     Prob > z|
  |------+----------------|
  |   1  |-1.7199  0.0854 |
  |   2  | .20318  0.8390 |
  +-----------------------+
   H0: no autocorrelation
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(14)     =  11.29376
        Prob > chi2  =    0.6628

. xtdpdsys ly limp lce lrd lhc

System dynamic panel-data estimation         Number of obs        =       312
Group variable: panel                        Number of groups     =        52
Time variable: year
                                             Obs per group:    min =         6
                                                               avg =         6
                                                               max =         6

Number of instruments =     25               Wald chi2(5)         =   1739.46
                                             Prob > chi2          =    0.0000
One-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .2354096   .0352225     6.68   0.000     .1663748    .3044443
             |
        limp |   .2257028   .0368187     6.13   0.000     .1535394    .2978663
         lce |   .4990918   .0383896    13.00   0.000     .4238496     .574334
         lrd |   .0315609   .0139762     2.26   0.024     .0041682    .0589537
         lhc |   -.002171   .0422197    -0.05   0.959    -.0849201    .0805782
       _cons |   .8869725   .3832923     2.31   0.021     .1357334    1.638212
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        GMM-type: LD.ly
        Standard: _cons

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(19)     =  78.44098
        Prob > chi2  =    0.0000
```

```
. xtdpdsys ly limp lce lrd lhc,twostep

System dynamic panel-data estimation          Number of obs        =       312
Group variable: panel                         Number of groups     =        52
Time variable: year
                                              Obs per group:    min =         6
                                                                avg =         6
                                                                max =         6

Number of instruments =     25                Wald chi2(5)         =  12855.91
                                              Prob > chi2          =    0.0000
Two-step results
------------------------------------------------------------------------------
          ly |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ly |
         L1. |   .2075614   .0170972    12.14   0.000     .1740515    .2410713
             |
        limp |   .2017312   .0200898    10.04   0.000     .1623559    .2411065
         lce |     .53867   .0162612    33.13   0.000     .5067985    .5705414
         lrd |   .0296451   .0053152     5.58   0.000     .0192275    .0400627
         lhc |   .0667895   .0287621     2.32   0.020     .0104168    .1231623
       _cons |    .832767   .1474918     5.65   0.000     .5436884    1.121846
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).ly
        Standard: D.limp D.lce D.lrd D.lhc
Instruments for level equation
        GMM-type: LD.ly
        Standard: _cons

. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
  +-----------------------+
  |Order |  z     Prob > z|
  |------+----------------|
  |   1  |-1.9294  0.0537 |
  |   2  | 1.0233  0.3062 |
  +-----------------------+
   H0: no autocorrelation
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(19)     =  19.72932
        Prob > chi2  =    0.4110
```

Appendix D

Selected Output for Intra Industry Trade Analysis

```
. describe

Contains data
  obs:            75
 vars:            13
 size:         4,350 (99.9% of memory free)
-------------------------------------------------------------------------------
              storage  display     value
variable name   type   format      label      variable label
-------------------------------------------------------------------------------
country         str14  %14s                   Malaysia's Trading Partners
year            int    %8.0g                  2005-2009
iit             float  %8.0g                  intra-industry trade G-L unadjusted
                                                index
dgdpc           float  %8.0g                  difference in percapita income
mingdpc         float  %8.0g                  minimum value of gross domestic
                                                products
maxgdpc         float  %8.0g                  maximum value of gross domestic
                                                products
agdpc           float  %8.0g                  average per capita income
timb            float  %8.0g                  trade imbalance
fdi             float  %8.0g                  foreign direct investment inflows
w_dist          float  %8.0g                  distance between trading countries
                                                capital
to              float  %8.0g                  trade orientation
border          byte   %8.0g                  sharing of a common border
asean           byte   %8.0g                  ASEAN cointegration members
-------------------------------------------------------------------------------
Sorted by:
     Note:  dataset has changed since last saved

. xtsum iit dgdpc agdpc mingdpc maxgdpc timb fdi w_dist to border asean

Variable         |      Mean   Std. Dev.       Min        Max |    Observations
-----------------+--------------------------------------------+----------------
iit      overall |  .6451003   .2635749    .179891    .995894 |     N =      75
         between |             .2617356   .1958558   .9581492 |     n =      15
         within  |             .0683317   .4895875   .9917945 |     T =       5
                 |                                            |
dgdpc    overall |  3.273541   2.496189     1.0066    9.90507 |     N =      75
         between |             1.616884    1.28422   7.623056 |     n =      15
         within  |             1.938546  -.1588992   9.985277 |     T =       5
                 |                                            |
agdpc    overall |  4.304267   2.816097    1.01684    9.94101 |     N =      75
         between |             2.452175    1.95182   8.196374 |     n =      15
         within  |             1.497424  -.2821872   9.755939 |     T =       5
                 |                                            |
mingdpc  overall |   1.30971   .0935487    1.16105    1.41491 |     N =      75
         between |             5.17e-07    1.30971   1.309712 |     n =      15
         within  |             .0935487   1.161048    1.41491 |     T =       5
                 |                                            |
maxgdpc  overall |  3.862429   1.379826    2.14274     8.2428 |     N =      75
         between |             1.371527   2.438606    7.69552 |     n =      15
         within  |             .3528652   2.490859   5.166449 |     T =       5
                 |                                            |
timb     overall |  .2126993   .3021105    -.26231    .875771 |     N =      75
         between |             .3017344   -.205314   .8593178 |     n =      15
         within  |             .0717521  -.0255503   .4826907 |     T =       5
                 |                                            |
fdi      overall |  4.893793   5.590825    1.04809    47.4389 |     N =      75
         between |             2.927261    2.12469   13.33199 |     n =      15
         within  |             4.811617  -5.994733   39.00071 |     T =       5
                 |                                            |
w_dist   overall |  5.04e-09   4.37e-09   4.10e-10   1.80e-08 |     N =      75
         between |             4.46e-09   5.34e-10   1.58e-08 |     n =      15
         within  |             5.75e-10   3.64e-09   7.24e-09 |     T =       5
                 |                                            |
to       overall |  4.994108   1.627152    1.76122    7.79469 |     N =      75
         between |             1.668165    2.04973   7.686144 |     n =      15
         within  |             .1235589   4.705598   5.277652 |     T =       5
                 |                                            |
border   overall |        .2   .4026936          0          1 |     N =      75
         between |             .4140393          0          1 |     n =      15
         within  |                    0         .2         .2 |     T =       5
                 |                                            |
asean    overall |  .2666667   .4451946          0          1 |     N =      75
         between |             .4577377          0          1 |     n =      15
         within  |                    0   .2666667   .2666667 |     T =       5
```

```
. corr iit dgdpc mingdpc maxgdpc agdpc timb fdi w_dist to border asean
(obs=75)
```

	iit	dgdpc	mingdpc	maxgdpc	agdpc	timb	fdi
iit	1.0000						
dgdpc	0.1021	1.0000					
mingdpc	0.0896	-0.3040	1.0000				
maxgdpc	0.3543	0.3260	0.2005	1.0000			
agdpc	-0.0994	0.1687	-0.0644	-0.2203	1.0000		
timb	-0.7425	-0.1053	0.0324	-0.1746	0.1559	1.0000	
fdi	0.1837	0.0184	-0.1155	0.0641	-0.0550	-0.2313	1.0000
w_dist	-0.7219	-0.1692	-0.0964	-0.3144	0.0381	0.6318	-0.0497
to	0.0142	-0.3238	0.0481	0.1687	-0.6252	0.0157	-0.0633
border	0.4850	0.2254	-0.0000	0.5181	0.1702	-0.1850	-0.1093
asean	0.3360	0.1724	-0.0000	0.3275	0.3444	-0.2369	-0.1030

	w_dist	to	border	asean
w_dist	1.0000			
to	0.2562	1.0000		
border	-0.1821	0.2312	1.0000	
asean	-0.1444	0.0691	0.8292	1.0000

```
. vce, corr
```

Correlation matrix of coefficients of regress model

e(V)	dgdpc	mingdpc	maxgdpc	agdpc	timb	fdi
dgdpc	1.0000					
mingdpc	0.4107	1.0000				
maxgdpc	-0.3635	-0.3452	1.0000			
agdpc	0.0652	-0.0288	0.3206	1.0000		
timb	0.0778	-0.0383	-0.1837	-0.2101	1.0000	
fdi	0.1043	0.1548	-0.2135	-0.0491	0.3058	1.0000
w_dist	-0.1201	0.0537	0.2160	-0.1354	-0.6224	-0.1779
to	0.3702	0.0660	0.0339	0.6954	0.0537	0.0685
border	-0.1250	0.0958	-0.3709	-0.2177	-0.0989	0.0573
asean	0.0541	-0.0366	0.0164	-0.2848	0.3069	0.0869
_cons	-0.4926	-0.8770	0.0732	-0.3579	0.0566	-0.1734

e(V)	w_dist	to	border	asean	_cons
w_dist	1.0000				
to	-0.3985	1.0000			
border	0.1907	-0.3789	1.0000		
asean	-0.1549	-0.0069	-0.7078	1.0000	
_cons	0.0032	-0.4571	0.1324	0.0372	1.0000

```
. estat vce
```

Covariance matrix of coefficients of regress model

e(V)	dgdpc	mingdpc	maxgdpc	agdpc	timb
dgdpc	.00005201				
mingdpc	.00050279	.02881512			
maxgdpc	-.00003931	-.00087883	.00022493		
agdpc	4.092e-06	-.00004248	.00004182	.00007564	
timb	.00003788	-.00043872	-.00018607	-.00012339	.00455954
fdi	2.010e-06	.00007023	-8.557e-06	-1.141e-06	.00005519
w_dist	-4181.4217	43991.301	15636.167	-5685.5636	-202874.29
to	.00004116	.00017263	7.834e-06	.00009324	.00005592
border	-.00006867	.0012381	-.00042363	-.00014423	-.00050845
asean	.00002458	-.00039085	.00001552	-.00015596	.00130483
_cons	-.00088976	-.0372856	.00027509	-.00077967	.00095673

e(V)	fdi	w_dist	to	border	asean
fdi	7.145e-06				
w_dist	-2295.218	2.330e+13			
to	2.821e-06	-29659.346	.0002377		
border	.00001167	70117.543	-.00044484	.00579957	
asean	.00001462	-47067.165	-6.729e-06	-.00339389	.00396453
_cons	-.00011606	3837.5376	-.00176511	.00252487	.00058591

e(V)	_cons
_cons	.06272529

```
. estat vif
```

Variable	VIF	1/VIF
border	4.97	0.201318
asean	4.15	0.240955
to	3.32	0.300846
agdpc	3.17	0.315611
w_dist	2.35	0.424957
maxgdpc	2.26	0.442118
timb	2.20	0.454961
dgdpc	1.71	0.584231
mingdpc	1.33	0.750813
fdi	1.18	0.847818
Mean VIF	2.66	

Regression - Static Model

```
. reg iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean
```

Source	SS	df	MS
Model	4.3113002	10	.43113002
Residual	.829608434	64	.012962632
Total	5.14090863	74	.069471738

Number of obs =	75
F(10, 64) =	33.26
Prob > F =	0.0000
R-squared =	0.8386
Adj R-squared =	0.8134
Root MSE =	.11385

iit	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ldgdp	-.0452794	.0261275	-1.73	0.088	-.0974751	.0069164
lagdp	-.0507814	.0311689	-1.63	0.108	-.1130484	.0114857
lmingdp	.2856159	.2145601	1.33	0.188	-.1430171	.7142488
lmaxgdp	-.1817194	.0732908	-2.48	0.016	-.3281346	-.0353042
ldsit	-.0956874	.0184863	-5.18	0.000	-.132618	-.0587568
lfdi	.0575148	.0211549	2.72	0.008	.0152529	.0997766
timb	-.4423447	.0572268	-7.73	0.000	-.5566683	-.3280211
to	-.005506	.0121493	-0.45	0.652	-.0297769	.018765
border	.517694	.0722768	7.16	0.000	.3733044	.6620836
asean	-.1930539	.0611224	-3.16	0.002	-.31516	-.0709479
_cons	-.9660214	.38504	-2.51	0.015	-1.735227	-.1968155

```
. xtreg iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean,fe
note: border omitted because of collinearity
note: asean omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =        75
Group variable: country1                        Number of groups   =        15

R-sq:  within  = 0.3176                         Obs per group: min =         5
       between = 0.3136                                        avg =       5.0
       overall = 0.3021                                        max =         5

                                                F(8,52)            =      3.02
corr(u_i, Xb)  = -0.8895                        Prob > F           =    0.0072

------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ldgdp |  -.0189996   .0187199    -1.01   0.315    -.0565639    .0185646
       lagdp |   .0041071   .0234256     0.18   0.862    -.0428998     .051114
     lmingdp |  -.2139758    .275153    -0.78   0.440    -.7661107    .3381592
     lmaxgdp |   .1143729   .4804387     0.24   0.813     -.849698    1.078444
       ldsit |  -.4252982   .4198392    -1.01   0.316    -1.267767    .4171708
        lfdi |   .0159665   .0149219     1.07   0.290    -.0139764    .0459094
        timb |  -.1559963   .1219468    -1.28   0.206    -.4007005    .0887079
          to |  -.1231374   .1017767    -1.21   0.232    -.3273673    .0810925
      border |  (omitted)
       asean |  (omitted)
       _cons |  -7.123836   7.876824    -0.90   0.370    -22.92984    8.682168
-------------+----------------------------------------------------------------
     sigma_u |  .47891185
     sigma_e |  .06733841
         rho |  .98061293   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(14, 52) =     9.35              Prob > F = 0.0000
. xtreg iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean,re

Random-effects GLS regression                   Number of obs      =        75
Group variable: country1                        Number of groups   =        15

R-sq:  within  = 0.1940                         Obs per group: min =         5
       between = 0.8387                                        avg =       5.0
       overall = 0.7934                                        max =         5

Random effects u_i ~ Gaussian                   Wald chi2(10)      =     70.36
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ldgdp |  -.0383426   .0182709    -2.10   0.036    -.0741529   -.0025323
       lagdp |  -.0307751   .0229441    -1.34   0.180    -.0757447    .0141945
     lmingdp |   .1603988   .1664217     0.96   0.335    -.1657816    .4865792
     lmaxgdp |  -.0474088   .1244441    -0.38   0.703    -.2913148    .1964971
       ldsit |  -.1068794    .038983    -2.74   0.006    -.1832846   -.0304742
        lfdi |   .0168083   .0159157     1.06   0.291     -.014386    .0480026
        timb |  -.3077314   .0889009    -3.46   0.001     -.481974   -.1334888
          to |  -.0091426   .0225234    -0.41   0.685    -.0532876    .0350025
      border |   .4164066   .1590418     2.62   0.009     .1046904    .7281228
       asean |  -.1407476   .1319286    -1.07   0.286    -.3993228    .1178276
       _cons |  -1.308277   .7722543    -1.69   0.090    -2.821867    .2053138
-------------+----------------------------------------------------------------
     sigma_u |  .10191864
     sigma_e |  .06733841
         rho |  .69611977   (fraction of variance due to u_i)
```

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
       ldgdp |   -.0189996    -.0383426         .019343        .0040754
        lagdp |    .0041071    -.0307751        .0348822        .0047252
     lmingdp |   -.2139758     .1603988       -.3743746        .2191187
     lmaxgdp |    .1143729    -.0474088        .1617817        .4640421
       ldsit |   -.4252982    -.1068794       -.3184188        .4180254
        lfdi |    .0159665     .0168083       -.0008418               .
        timb |   -.1559963    -.3077314        .1517351        .0834725
          to |   -.1231374    -.0091426       -.1139948        .0992532
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       16.06
                Prob>chi2 =      0.0415
                (V_b-V_B is not positive definite)
. xtgls iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean, panels(
> hetero) corr(1)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   common AR(1) coefficient for all panels  (0.2423)

Estimated covariances      =        15          Number of obs      =        75
Estimated autocorrelations =         1          Number of groups   =        15
Estimated coefficients     =        11          Time periods       =         5
                                                Wald chi2(10)      =    810.44
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ldgdp |  -.0279222   .0185404    -1.51   0.132    -.0642606    .0084163
       lagdp |  -.0454267   .0176061    -2.58   0.010     -.079934   -.0109194
     lmingdp |   .3066587   .1255205     2.44   0.015      .060643    .5526744
     lmaxgdp |  -.1740758   .0514961    -3.38   0.001    -.2750063   -.0731454
       ldsit |  -.0674861   .0137208    -4.92   0.000    -.0943784   -.0405938
        lfdi |   .0216581   .0113489     1.91   0.056    -.0005854    .0439015
        timb |  -.5053218   .0462852   -10.92   0.000    -.5960391   -.4146046
          to |  -.0112133   .0086288    -1.30   0.194    -.0281255     .005699
      border |   .5651907   .0601614     9.39   0.000     .4472766    .6831048
       asean |  -.2173166     .04115    -5.28   0.000    -.2979691    -.136664
       _cons |   -.358028   .2813277    -1.27   0.203    -.9094201    .1933641
------------------------------------------------------------------------------
```

Regression - Dynamic Model

```
. xtabond iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean
note: border dropped from div() because of collinearity
note: asean dropped from div() because of collinearity

Arellano-Bond dynamic panel-data estimation  Number of obs         =        45
Group variable: country1                     Number of groups      =        15
Time variable: year
                                             Obs per group:    min =         3
                                                               avg =         3
                                                               max =         3

Number of instruments =     15               Wald chi2(9)          =     23.74
                                             Prob > chi2           =    0.0047
One-step results
------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         iit |
         L1. |   .4857599   1.049329     0.46   0.643    -1.570887    2.542407
             |
       ldgdp |   .0121854   .0299338     0.41   0.684    -.0464838    .0708546
       lagdp |   .0138849   .0315434     0.44   0.660    -.0479391    .0757089
     lmingdp |  -.1676057   .3587486    -0.47   0.640    -.8707401    .5355286
     lmaxgdp |    .652163   .7001053     0.93   0.352    -.7200182    2.024344
       ldsit |  -.0660335   .6665352    -0.10   0.921    -1.372418    1.240351
        lfdi |   .0028736   .0208145     0.14   0.890    -.0379222    .0436693
        timb |  -.4509745   .1784958    -2.53   0.012    -.8008198   -.1011292
          to |  -.0610958   .1801651    -0.34   0.735    -.4142129    .2920212
      border |  (omitted)
       asean |  (omitted)
       _cons |  -1.392834   11.91755    -0.12   0.907     -24.7508    21.96513
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).iit
        Standard: D.ldgdp D.lagdp D.lmingdp D.lmaxgdp D.ldsit D.lfdi D.timb
                  D.to
Instruments for level equation
        Standard: _cons
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(5)      =  14.20448
        Prob > chi2  =    0.0144
. xtabond iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean,twoste
> p
note: border dropped from div() because of collinearity
note: asean dropped from div() because of collinearity

Arellano-Bond dynamic panel-data estimation  Number of obs         =        45
Group variable: country1                     Number of groups      =        15
Time variable: year
                                             Obs per group:    min =         3
                                                               avg =         3
                                                               max =         3

Number of instruments =     15               Wald chi2(9)          =   2233.45
                                             Prob > chi2           =    0.0000
Two-step results
------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         iit |
         L1. |   .5744453   .5240488     1.10   0.273    -.4526714    1.601562
             |
       ldgdp |  -.0001106   .0084289    -0.01   0.990     -.016631    .0164098
       lagdp |   .0018171   .0106307     0.17   0.864    -.0190187     .022653
     lmingdp |   .2120627   .3982322     0.53   0.594     -.568458    .9925835
     lmaxgdp |   .1901008    .401713     0.47   0.636    -.5972422    .9774437
       ldsit |  -.0260924   .3074376    -0.08   0.932     -.628659    .5764742
        lfdi |   .0052768   .0063155     0.84   0.403    -.0071014     .017655
        timb |  -.4143173   .1403623    -2.95   0.003    -.6894223   -.1392123
          to |   -.012913   .0964602    -0.13   0.894    -.2019714    .1761455
      border |  (omitted)
       asean |  (omitted)
       _cons |  -.4000364   5.503791    -0.07   0.942    -11.18727     10.3872
------------------------------------------------------------------------------
```

```
Instruments for differenced equation
        GMM-type: L(2/.).iit
        Standard: D.ldgdp D.lagdp D.lmingdp D.lmaxgdp D.ldsit D.lfdi D.timb
                  D.to
Instruments for level equation
        Standard: _cons
. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors

   +-----------------------+
   |Order |  z     Prob > z|
   |------+----------------|
   |   1  |  .1173  0.9066 |
   |   2  |-.56092  0.5749 |
   +-----------------------+
   H0: no autocorrelation
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(5)      =  5.872741
        Prob > chi2  =    0.3188

. xtdpdsys iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean
note: border dropped from div() because of collinearity
note: asean dropped from div() because of collinearity

System dynamic panel-data estimation         Number of obs        =        60
Group variable: country1                     Number of groups     =        15
Time variable: year
                                             Obs per group:    min =         4
                                                               avg =         4
                                                               max =         4

Number of instruments =     18               Wald chi2(11)        =     60.49
                                             Prob > chi2          =    0.0000
One-step results
------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         iit |
         L1. |   .3578003    .564866     0.63   0.526    -.7493167    1.464917
             |
       ldgdp |   .0126221   .0298416     0.42   0.672    -.0458663    .0711105
       lagdp |   .0131925    .031241     0.42   0.673    -.0480388    .0744238
     lmingdp |   -.178206   .3518898    -0.51   0.613    -.8678974    .5114853
     lmaxgdp |   .6111708   .6414248     0.95   0.341    -.6459988     1.86834
       ldsit |  -.1433024   .3991092    -0.36   0.720     -.925542    .6389372
        lfdi |   .0038837   .0196468     0.20   0.843    -.0346232    .0423907
        timb |  -.4388602   .1579274    -2.78   0.005    -.7483922   -.1293283
          to |  -.0788507   .1320961    -0.60   0.551    -.3377544     .180053
      border |  -.5790212   1.519444    -0.38   0.703    -3.557076    2.399034
       asean |  -.2561057   .3163969    -0.81   0.418    -.8762322    .3640208
       _cons |  -2.498342    8.14503    -0.31   0.759    -18.46231    13.46562
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).iit
        Standard: D.ldgdp D.lagdp D.lmingdp D.lmaxgdp D.ldsit D.lfdi D.timb
                  D.to
Instruments for level equation
        GMM-type: LD.iit
        Standard: _cons

. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(6)      =  13.35937
        Prob > chi2  =    0.0377
```

```
. xtdpdsys iit ldgdp lagdp lmingdp lmaxgdp  ldsit lfdi timb to border asean,twost
> ep
note: border dropped from div() because of collinearity
note: asean dropped from div() because of collinearity

System dynamic panel-data estimation        Number of obs        =        60
Group variable: country1                    Number of groups     =        15
Time variable: year
                                            Obs per group:    min =         4
                                                              avg =         4
                                                              max =         4

Number of instruments =     18              Wald chi2(11)        =    947.13
                                            Prob > chi2          =    0.0000
Two-step results
------------------------------------------------------------------------------
         iit |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         iit |
         L1. |  -.2712019   .6139839    -0.44   0.659    -1.474588    .9321845
             |
       ldgdp |  -.0389459   .0269988    -1.44   0.149    -.0918627    .0139708
       lagdp |  -.0378886   .0280459    -1.35   0.177    -.0928577    .0170804
     lmingdp |   1.955468   1.221154     1.60   0.109    -.4379499    4.348886
     lmaxgdp |  -.9374508   .8550722    -1.10   0.273    -2.613361    .7384599
       ldsit |   .4693726   .6091724     0.77   0.441    -.7245833    1.663329
        lfdi |   .0099867   .0072129     1.38   0.166    -.0041502    .0241237
        timb |  -.2214732   .1796498    -1.23   0.218    -.5735804     .130634
          to |   -.219061   .1439718    -1.52   0.128    -.5012405    .0631185
      border |   .8104402   1.173667     0.69   0.490    -1.489905    3.110785
       asean |   -.557885   .7181899    -0.78   0.437    -1.965511    .8497413
       _cons |   11.91574   12.84202     0.93   0.353    -13.25416    37.08564
------------------------------------------------------------------------------
Instruments for differenced equation
        GMM-type: L(2/.).iit
        Standard: D.ldgdp D.lagdp D.lmingdp D.lmaxgdp D.ldsit D.lfdi D.timb
                  D.to
Instruments for level equation
        GMM-type: LD.iit
        Standard: _cons
. estat abond

Arellano-Bond test for zero autocorrelation in first-differenced errors
  +-----------------------+
  |Order |  z     Prob > z|
  |------+----------------|
  |   1  | 1.5984  0.1099 |
  |   2  |-.62447  0.5323 |
  +-----------------------+
   H0: no autocorrelation
. estat sargan
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(6)      =  3.924174
        Prob > chi2  =    0.6869
```