Doctoral Dissertation

Exports – Economic Growth Causal Structure and the Determinants of Exports:
An Investigation on Exports Performance in Indonesia

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We hereby recommend that the dissertation by Mr. Rudy Rahmaddi entitled "Exports – Economic Growth Causal Structure and the Determinants of Exports: An Investigation on Exports Performance in Indonesia" be accepted in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY.

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When the ancient Greeks faced dilemma, they consulted the Oracle at Delphi. If we were to ask the Oracle the secret to wealth, what would she say? Work hard? Get an education? Probably not. Diligence and intelligence are strategies for improving one's a lot in life, but plenty of smart, hard-working people still remain poor.

No, the Oracle's advice would consist just a few words: ***Do what you do best. Trade for the rest****. In other words, specialize and then trade.**

*) "The Fruits of Free Trade", *2002 Annual Report*, reprint, Federal Reserve Bank of Dallas, p. 6.

EXECUTIVE SUMMARY

The theme of this dissertation is the exports policy issues in developing countries especially on maintaining rapid and sustained exports performance and the importance of exports on economic development. The study provides the perspective of developing countries using one country as a case study upon some established development economic concepts, especially with regard to export-led development and export determinants. The main concern in developing countries' development strategy is to achieve high and sustainable economic growth. One measure to achieve such an objective is through exports development.

For this purpose, this study focuses on two main issues with special attention of Indonesia case. First, considering the characteristics of Indonesia as a populous, vast domestic market, and previously oil-dependent economy, it is our attention to assess the interaction between exports and economic growth as to whether export promotion is an appropriate development strategy for economic development. In this regard, we test a validity of Export-led Growth (ELG) hypothesis in Indonesia. Second, what factors determining the performance of export performance and how should they be administered to promote sustained and rapid the economy. In this case, we consider some export determinants guided by related theoretical foundations: price and income factors; commodity composition, market distribution and competitiveness, all of which are as non-price factors; and FDI and exchange rate. These selected factors may affect economic

growth through exports performance.

The study aims to review issues concerning the importance of exports on economic growth and the determinants of exports performance within specific individual country study. The specific objectives are: to review the ELG hypothesis in Indonesia; to investigate price and income effect on exports performance; to scrutinize the influence of commodity structure, market distribution and competitiveness on exports performance, and the evolution of export competitiveness of manufacturing commodities; to analyze the impact of FDI, domestic investment and exchange rate on export performance; and to draw significant policy implications in the area of international trade policy in Indonesia

In scrutinizing the importance of exports on economic growth as well as the determinants of exports performance, this study deals with several established economic concepts, namely ELG hypothesis, price- and income effect of demand and -supply for exports frameworks, domestic demand-pressure hypothesis on exports performance, Constant Market Share (CMS) analysis of exports growth, Revealed Comparative Advantage (RCA) analysis of export competitiveness, and Kojima (1975) hypothesis of FDI complementary to trade.

The present study is divided into several chapters as follows: the first chapter is the **Introduction**, which explains the background, objectives, significance, scope and limitation, and the organization of the study including framework of dissertation. **Chapter 2** reinvestigates the ELG hypothesis by controlling variable of imports of capital and intermediate goods. **Chapter 3** examines the impacts of foreign- and domestic-demand, proxied by price and income factors, on exports performance. **Chapter 4** scrutinizes the

contribution of exports structure and competitiveness on the export performance of manufacturing commodities classified by factor intensity, followed by estimation of the impact of FDI and exchange rate on manufacturing exports performance in the penultimate **Chapter 5**. Finally, **Chapter 6** provides concluding remarks.

Chapter 1 provides the introduction including some backgrounds that propel the analyses in the present dissertation. Started by discussing some development phenomena and propositions in regard to exports and development strategy, the chapter continues by providing some comparative analyses between Indonesia and its comparators so that they may serve as preliminary indicators and best practices on the plausible linkage of export and economic growth, and the plausible determinants of export performance. It goes further by briefly discussing the theoretical foundations of trade that not only will provide guidance in selecting the appropriate variables used in, but also in coloring all result interpretations. Next, it explains the construction of problem statements, the definitions of research objectives, research significances, and the scope and limitation of the current dissertation. Finally, the organization of the current dissertation, which is summarized in dissertation framework, closes the introduction part.

Chapter 2 reinvestigates the validity of outward-oriented or ELG hypothesis, by controlling important variable of imports of capital and intermediate goods. The contribution of this chapter to existing literature is through the application of co-integration technique and Granger causality within vector error correction model, which enables one to dissect export-growth causal structure into long- and short-run perspective. The result indicates that exports and economic growth exhibit bi-directional causality, which is ELG

in long-run and GLE in short run. The evidence of GLE in short-run indicates the importance on productivity enhancing measures to promote export performance i.e. provision of excellent infrastructure, alleviate market distortion, prudent inflation management so forth. On the other hand, ELG result suggests the importance of astute export management so that any exporting activity can be managed in such a way to enhance continuous productivity and innovation (laddering up) through accumulative learning process in domestic economy to promote a sustained and rapid economic performance. In addition, imports of capital and intermediate goods are detrimental to economic growth both in long- and short-run. Even though it hampers economic growth, import of capital and intermediate goods is required for production of exportable.

Chapter 3 estimates the importance of foreign- and domestic demand on export performance by employing the 2SLS model that can handle the simultaneity problem of price and quantity of exports within supply and demand framework. Since previous ELG study exhibits a bi-directional causality between exports and economic growth, the inclusion of domestic-demand variable in export performance estimates becomes imperative. Both typical export variables of income and price factor are used as appropriate proxies for foreign- and domestic-demand variables. Income variable is dissected into its secular (trend) and cyclical (deviation) movement which also enable one to test domestic-demand pressure hypothesis on export performance in Indonesia, which is as one of this chapter's distinctions. The analysis also captures trade liberalization policy and some shocks suspected to influence export performance. The result indicates both price and income factors are significant in determining exports performance with highly elastic

magnitude implying the importance of manufacturing commodities in export structure. The finding also reveals a validity of domestic-demand pressure hypothesis on export performance implying an existence of resource competition between export-oriented and domestic sector. The result also indicates the importance of government trade liberalization policy in reducing exports price. This justifies government role in managing export competitiveness.

Chapter 4 analyzes non-price factors of export performance in terms of product composition, market distribution and competitiveness, and assesses the evolution pattern of exports structure in manufacturing industries using CMS analysis and RCA indicators. The previous evidence on the importance of manufacturing exports calls for further analysis on the structure and evolution of manufacturing exports performance, as to whether they are sustained and upgraded overtime. The contribution of this chapter to the literature is that it dissects manufacturing export commodities classified based on factor intensity up to 3-digit code of *Standard International Trade Classification*, SITC, (rev. 2), which enables one to analyze the evolution of export structure and competitiveness contribution on export performance in designated export-oriented sectors. The results suggest that while mostly enjoying benefits from world export growth, manufacturing exports performance is deteriorated by negative effects of commodity composition and market distribution. The finding also indicates that competitiveness in manufacturing export performance has continuously diminished until recent years and there is a mild improvement in export structure indicating that manufacturing exports are still concentrated in natural resource- and unskilled labor-intensive commodities.

Chapter 5 further scrutinizes the roles of FDI, domestic investment and exchange rate in determining the performance of sector-based manufacturing exports. Previous findings indicate a slow progress in upgrading exports structure and deteriorating contribution of competitiveness. These are as rationales for further analysis on the determinants of sector-based exports by controlling variable of FDI, domestic investment and exchange rate. This chapter contributes to the literature by investigating the sector-based impact of inward FDI on a host country's exports, using disaggregated data of manufacturing sectors categorized by factor intensity. Employing three different panel estimation models, this study finds that FDI crowds-in manufacturing exports and has a stronger effect in physical capital-, human capital-, and technology-intensive sector, without any evidence of a crowd-out effect in natural resource-intensive and unskilled labor-intensive industries—sector in which Indonesia has a comparative advantage. On the other hand, exports of natural resource-intensive and unskilled labor-intensive industries are responsive to any changes in domestic capital formation. Exchange-rate influences manufacturing exports performance in all sectors, yet with sector-based differences across the two sector groupings, which suggest that more highly technological products tend to be more susceptible to exchange-rate changes, *vice versa*.

Several implications and policy recommendations may be derived from the findings. A balance emphasis in maintaining the roles of exports and domestic-demand is required for successful and sustained economic development in Indonesia. Imports of capital and intermediate goods should be well managed because highly dependence on imported inputs could be detrimental to long-run economic growth. This also calls for concrete actions for

the development of viable export-supporting industries. Indonesia should continuously maintain its export competitiveness, and government may facilitate productivity & technology improvements in exports sector. In these regards, competitive exchange rate management, provision of excellent infrastructure and facilitation of more FDI toward export-oriented sectors to promote technology transfer and diffusion from multinational enterprises to indigenous firms' export can be conducted by government. Upgrading in industry's technological capabilities becomes imperative to rejuvenate against the depletion of comparative advantage in natural resource-intensive and unskilled labor intensive sectors. In addition, diversification of exports commodity structure and market destination are worth pursuing.

Finally, the study suggests that future research should be directed towards evaluation and estimation of the efficacy of export policy and the impact of export diversification on economic growth directly using timely data. To chase the extent to which export diversification and new product discovery play essential roles in determining export performance, export growth can be decomposed further based on intensive- and extensive margin of growth. Impact of exporting behaviour on productivity and innovation also needs to be explored further. With regard to FDI, further researches analyzing the effect of sector-based variation in FDI linkages on productivity and spillover, as well as whether FDI induces further export diversification and innovation are worth pursuing.

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IDEC, Hiroshima University, September 2012.

Rudy Rahmaddi

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CHAPTER 1

INTRODUCTION

1.1 Background

One of the most enduring questions in economics involves how a nation could accelerate the pace of its economic development, and one of the most lasting answers to this question is to promote country's exports, either because doing so directly influences economic development via encouraging production of tradable for exports, or because exports promotion permits accumulation of foreign exchange. While the former can cultivate the advancement in industrial capabilities through exposure to world market competition leading to higher productivity, the latter enables a country to import high-quality capital goods and service, which can in turn be utilized to expand the nation's production possibilities. In either case, economic growth is said to be *export-led*; the latter case is the so-called "two-gap" hypothesis (McKinnon, 1964; Findlay, 1973).

Indeed, exports play a vital role in a country's economic development. It is apparent that changes in exports level have wider and far reaching economic effects. It is thus very important to understand the linkage between exports and economic growth as well as underlying factors that determine and underpin the performance of exports. The primary objectives of any country are to maintain an adequate level of foreign reserves and

to create and maintain a sustained and rapid exports performance, as well as sustainable, internationally competitive exporting sectors that will contribute to job creation and high incomes. In addition, a country must also have the persistent capability to deliver competitive export commodities to the foreign market amid the persistent dynamic changes in world market. In short, a nation must be able to do business in a dynamic global environment successfully. The increase of exports performance will stimulate domestic production and employment thus, exports contributes to an improvement in a nation's welfare.

In macroeconomic perspective, the relationship between exports and economic growth is an established Keynesian macroeconomic identity as export is one integrated component of gross domestic product. Nevertheless, in development economics theory, such a linkage between those two is in fact an enduring debate that shapes development literature especially at empirical point of view (Aliman and Purnomo, 2001). From development economics perspective, the relationship of exports and economic growth is not a matter of gross domestic product (GDP) identity, but is more heavily concerned over matters whether exports can promote wealth or prosperity or, in contrast, whether it may in fact harm developing countries in their trade with the industrial world and with one another. In addition to this question especially the former one, Kravis (1970) casts some doubts whether exports are the handmaiden or the engine of growth. In all those views, export-oriented policy is more placed as to whether an appropriate development strategy for developing countries.

Such issues have propelled the continuing debate among scholars, between the so-

called “trade optimists” (free-traders) and “trade pessimist” (protectionist), both of whom propose outward- and inward-looking strategies of development, respectively, as a more appropriate development policy over the other. In their point of views, trade pessimists conclude that trade may hurt developing countries due to structural factors in trade structure between developed and developing countries. As a result, developing countries is at worse-off position compared to developed ones. As a prescription, developing countries should conduct inward-looking approach or so-called Import Substituting Industrialization (ISI) strategy. On the other hand, trade optimists believe that trade liberalization including export promotion, currency devaluation, removal of trade restriction, and generally “getting prices right” provide benefits such as increased efficiencies, product improvement and innovation due to competition in world market, attracted foreign investment and expertise, and so forth. [1] All of these advantages can generate rapid export and in turn lead to higher economic growth so that development strategy for developing countries should be outward-oriented or export promotion (EP) strategy. Such a conclusion is drawn through focusing on the relationship between developing countries’ trade policy, export performance, and economic growth.[2]

As the debates continue, another important strand of thought has emerged in recent years concerning the relationship between trade and development. The so-called industrialization strategy approach, or more narrowly as industrial policies, is outward-oriented and optimistic about export-led development, yet still envisions an active role for government in influencing the type and sequencing of exports as a country endeavor to

[1] For further details on enduring debates between trade and anti-trade proponents, see Todaro (2006).
[2] Lal and Rajapatirana (1987).

produce more advanced products, adding higher value.[3] This industrial policy proposes the active role of government interventions to encourage industrial exports and to attempt to move up the ladder of comparative advantage toward higher-skill and higher-technology content. In this point of view, the role a government intervention merely is to address market failures encountered in the process of industrialization following outward-oriented policy i.e. in research and development or technology transfer. In short, such a trade-based industrialization strategy attempts to seek appropriate policies to promote further industrialization process as appendage for export-led development or export-led growth strategy. This is sometimes as referred to ELG ver. 2.0.[4]

With regard to the importance of export on economic development, lessons from most successful exporting countries are perhaps interesting to be discussed. The capacity to sustain high export growth has been a hallmark of the path-breaking East Asian export-led development model. Changing in export structure is also notified from most successful exporting countries in East Asia such as South Korea, Singapore, Hong Kong, Taiwan, and China. As later our study will focus primarily on Indonesia, some selected countries, which share some similar attributes with Indonesia, will be briefly discussed here. A descriptive comparative analysis as presented in **Table 1.1** and some following figures depicts some selected figures of Indonesia and its seven comparators of developing countries, with regard to export performance and economic development.

[3] See Amsden (2001); Rodrik (1995); Lall (2003a, b), among others.
[4] Haddad and Shepherd (2011).

Table 1.1. Descriptive comparative analysis on export importance in selected countries

Country	Income per capita in US$ (2008)	Income per capita growth 1980-2008 (%)	Economic size 2008 (US$ billion)	Avg. share (%) exports to GDP (1980-2008)	Avg. exports growth (1980-2008)	Exports structure (% of total merchandise exports)							
						1980				2008			
						Oil and gas	Non-oil primary	Manufacturing	High-med tech manufacturing	Oil and gas	Non-oil primary	Manufacturing	High-med tech manufacturing
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Indonesia	3,867.85	3.36	247.23	29.47	8.51	71.86	23.91	4.23	0.53	29.10	28.57	42.33	11.72
Populous, geographically large, developing, and heavy oil exports-dependent in 1970-2000 period													
Mexico	12,750.42	1.37	701.01	22.40	14.20	66.82	17.93	15.25	18.98[a]	17.39	7.60	75.01	48.82
Nigeria	1962,36	1.21	74.18	41.02	13.14[e]	96.63[b]	2.66[b]	0.71[b]	0.02[b]	91.74	36.24	2.28	0.18
High population, geographically very large													
China	6,414.66	8.58	2,602.57	21.82	18.84[f]	23.02[c]	28.71[c]	48.27[c]	4.00[c]	2.21	3.68	94.46	43.53
Brazil	9,316.14	0.78	853.81	10.74	9.95	1.78	60.52	37.70	9.26[d]	9.46	43.57	46.97	15.12
ASEAN countries: similar contexts of ecological, climate zones and economic system													
Malaysia	11,902.94	3.89	139.16	85.36	11.02	24.72	47.51	27.77	11.17	18.40	25.75	55.85	32.77
Thailand	7,854.51	4.31	177.92	45.46	12.74	0.63	64.10	35.27	3.36	6.41	18.88	74.71	24.13
Philippines	2,960.96	1.31	110.71	36.45	9.29	0.86	75.56	23.58	1.94	3.31	9.98	86.71	67.25

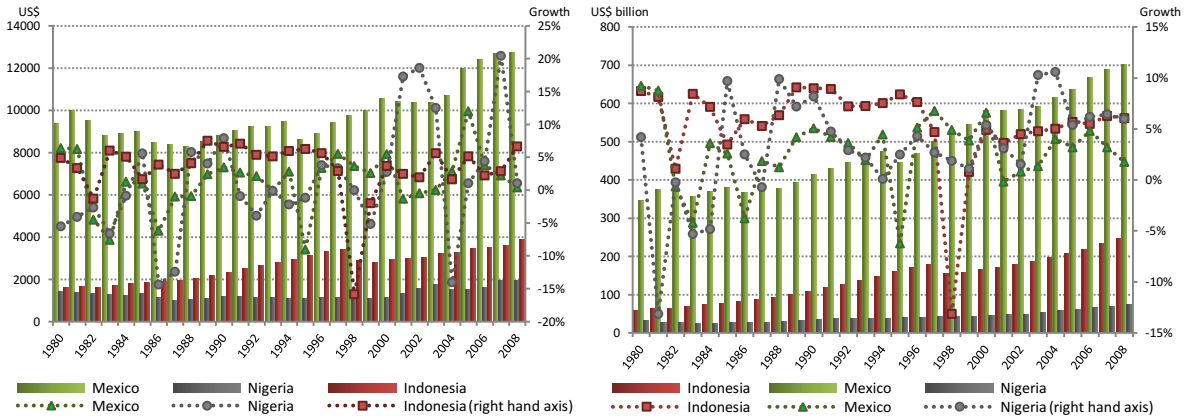
[a] 1986 [b] 1991 [c] 1984 [d] 1983 [e] growth of total exports of goods and service [f] avg. growth 1984-2008

Income per capita is in US$–2005 international price; Economic size is measured as real GDP (2000=100)

High-med tech exports comprise of commodity under SITC rev.2 code of 54, 75, 76, 92 (classification based on Hatzichronoglou (1997)

Source: *Penn World Table 7.0; World Development Indicators* 2010; *UN-COMTRADE*, calculated.

Mexico and Nigeria are two countries, which may serve as comparators to Indonesia with regard to number of population, land mass, and dependency on oil exports. With US$ 3,867.85 of real GDP per capita in 2008 –below US$ 12,750.42 of Mexico, Indonesia has the second highest income per capita and also second highest economic size (GDP) in this country group. Nevertheless, compared to other two comparators, it achieved the highest income per capita growth of 3.36% per annum (p.a.) during 1980-2008, while Mexico and Nigeria recorded 1.37% and 1.21%, respectively (**Table 1** third column and **Figure 1.1** panel a). In addition, Indonesia recorded the highest economic growth of 5.47% p.a. on average compared to 3.28% and 2.84% of Nigeria and Mexico, respectively (**Figure 1.1** panel b).



(a) Real GDP per capita and its growth

(b) Real GDP (2000=100) and its growth

Figure 1.1. Economic performance of Indonesia, Mexico and Nigeria 1980-2008
Source: *World Development Indicators 2010*, calculated

Export has become an important engine of growth for these countries as indicated in the contribution of exports to their overall economic performance. Nigeria has the highest export to GDP ratio in 2008, mainly contributed by oil exports, compared to other two countries. Indonesia's export to GDP ratio of 29.76% is in between levels of 41.56%

and 28.27% of Nigeria and Mexico, respectively. Interestingly, such the contribution of export on GDP may behave quite differently among countries. The level of export to GDP ratio was even higher for Indonesia during 1981 oil price shock and Asian 1998 economic crisis compared to that of Mexico during so-called 'Tequila economic crisis' in 1994[5] (**Figure 1.2**). This indicates the more relative importance of exports to bolster economic growth in Indonesia compared to Mexico during particular economic crisis.

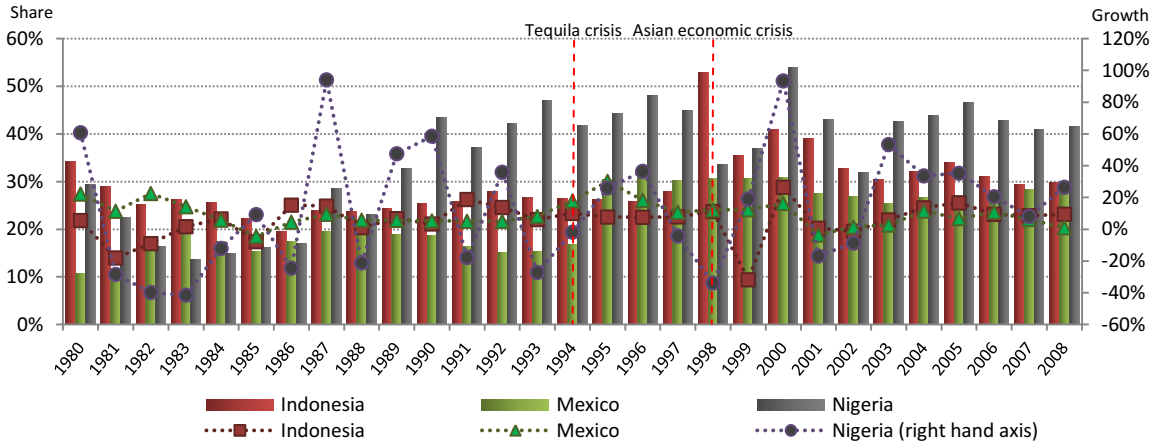


Figure 1.2. Export shares to GDP and export growths of Indonesia, Mexico and Nigeria (1980-2008)
Source: *World Development Indicators 2010*, calculated

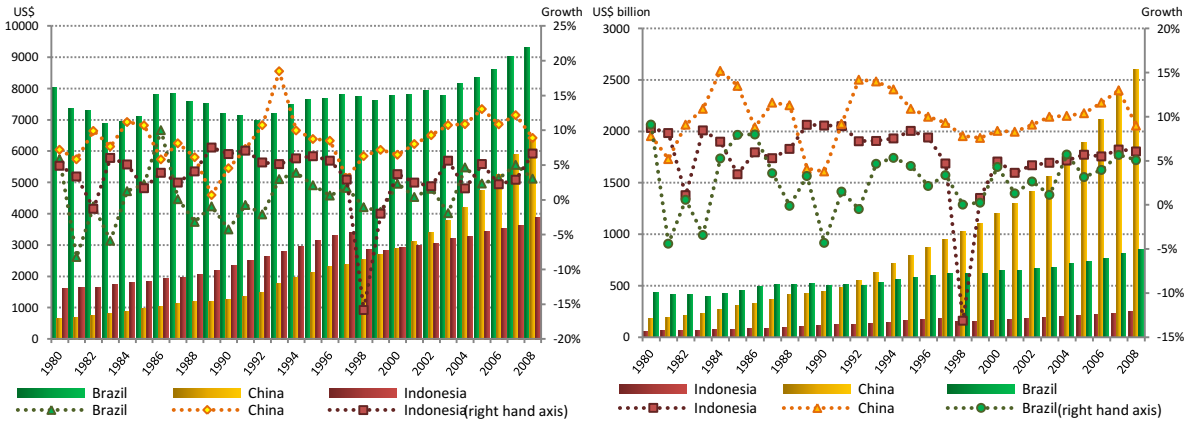
Similar to Indonesia in 1980, Mexico and Nigeria were relying heavily on oil exports and less dependent on manufacturing exports. Nigeria was being the most oil-dependent country than the other two, with ratio of oil export to total exports accounted for 96.63% as against Indonesia and Mexico of 71.86% and 66.83%, respectively. All three countries were less reliance on manufacturing exports in 1980. As ratio of oil export to its total exports declines over time, Mexico managed to shift its exports structure toward more manufacturing commodities. Ratio of its manufacturing exports rose significantly from

[5] Mexico 'Tequila' economic crisis was triggered by foreign exchange (Mexico Peso) crisis due to mismatch debt management and some institutional shortcomings. For further details of such a crisis, see Mishkin (1999). Both Mexican 1994 crisis and Asian 1998 economic crisis were attributed to huge foreign exchange crisis.

over 15.25% in 1980 to 75.01% in 2008, with 48.82% was exports of high tech manufacturing commodities. As a result, Mexico recorded high average growth of exports of 14.20% p.a. during 1980-2008. Indonesia has also managed to shift its exports structure toward more manufacturing-based exports as it has faced a continuous decline in oil production since mid-80s. The share of manufacturing export to Indonesia's total merchandise exports has increased rapidly from minuscule level of 4.23% in 1980 to 42.33% in 2008, which contributed to average total export growth of 8.51% during 1980-2008. In contrast, even though its exports grew quite rapidly at average 13.14% p.a., Nigeria still relies primarily on oil exports with minuscule portion of manufacturing exports.

In second group of comparative analysis, Indonesia can be classified as one of high populous and geographically very large countries with China and Brazil. In this country group, Brazil is the wealthiest developing country in this group with income of US$ 9,316.14 per capita, followed by China and Indonesia with US$ 6,414.66 and US$ 3,867.85, respectively. Interestingly, the GDP per capita of China and Indonesia (in US$ 2005 international price) was US$ 640.29 and US$ 1,599.14, respectively, in 1980; US$ 1,262.75 and US$ 2,349.41 in 1990; US$ 2,888.32 and US$ 2,920.63 in 2000; and US$ 6,414.66 and US$ 3,867.85 in 2008 (**Figure 1.3** panel a). Given this impressive 'catch-up' by China, we will later pay particular attention to its economic fundamentals focusing on the contribution of exports to economic performance, to draw out lessons for export development in Indonesia. In terms of economic size, China, with its total GDP more than US$ 2,602 billion in 2008, owns its position as a country with the biggest GDP

in this group, followed by Brazil and Indonesia with US$ 853.81 billion and US$ 247.23 billion, respectively. China has been the most star performer in growth terms for the last three decades with its impressive economic growth slightly below 10% p.a.; Indonesia is at second position with 5.47% p.a. and, lastly, Brazil, with 2.75% p.a. on average (**Figure 1.3** panel b**)**.



(a) Real GDP per capita and its growth

(b) Real GDP (2000=100) and its growth

Figure 1.3. Economic performance of Indonesia, Brazil and China 1980-2008
Source: *World Development Indicators 2010*, calculated

In 1984, oil exports accounted for significant share of export earnings of 23% for China. With its highest population in the world providing it with vast amount of manufacturing labor, China in particular, however, has maintained significant portion of manufacturing exports of 48% to total exports since 1984. This figure was even higher than the other comparator, Brazil, which relied primarily on non-oil primary exports, mainly from agriculture. The domination of manufacturing exports on China export commodities grows over time. In 2008, they have accounted for 94.46% of total exports with 43.53% were attributed to high to medium technology manufacturing exports. During 1984-2008, China's exports grew at an impressive average of 18.84%, the highest among

the other comparators. For Indonesia in particular, even though its export to GDP ratio of 29.47% during 1980-2008 was the highest compared to that of China (21.82%) and Brazil (10.74%) (**Figure 1.4**), it recorded slowest export growth of 8.51% during the last three decades in this country group, below that of Brazil, which grew 9.95%. Looking further into the exports structure reveals that Indonesian manufacturing exports share to its total exports were still at the lowest compared to that of other competitors. This export structure is as preliminary, yet important indicator worth analyzing further to examine the contribution of different product commodity on overall export performance.

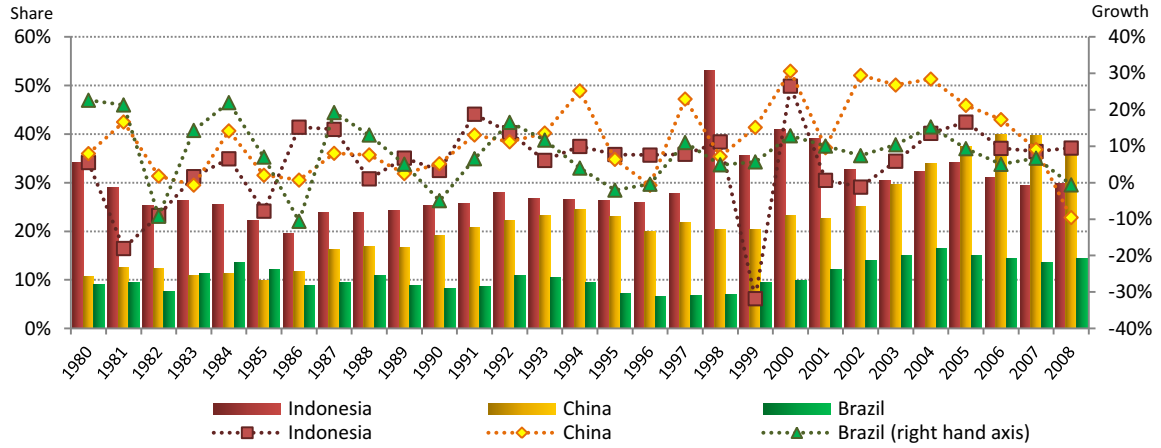
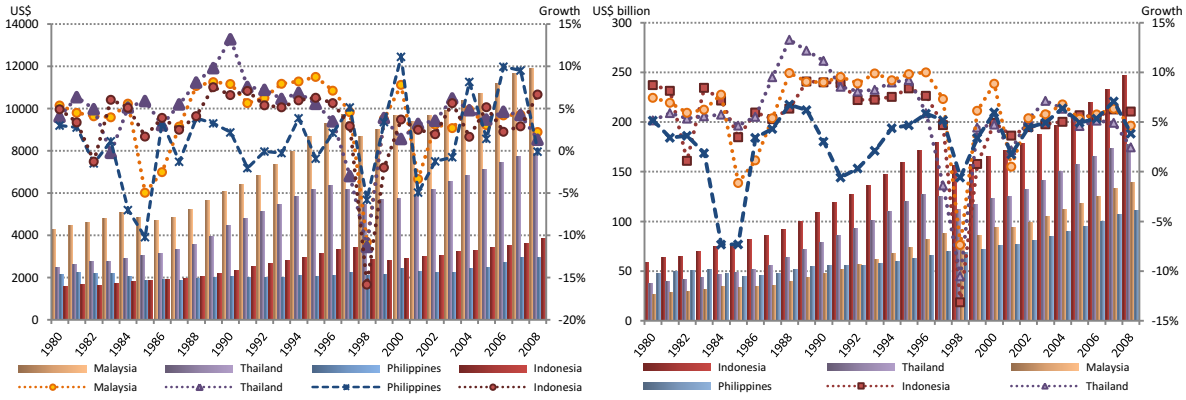


Figure 1.4. Exports share to GDP and exports growth of Indonesia, Brazil and China (1980-2008)
Source: *World Development Indicators 2010*, calculated

In ASEAN4 context, Indonesia can be classified with Malaysia, Thailand and Philippines since all countries share quite similar characteristics in terms of income level class, population, large geographical size (by Southeast Asian standards) and long term history of capitalist economic activity. Among those 4 countries, Malaysia earns its position as the wealthiest country in this group with real income per capita in 2008 of US$ 11,902.94, followed by Thailand, Indonesia, and lastly, Philippines with real income per capita of US$ 7,854.51, US$ 3,867.85, and US$ 2,960.96, respectively. In 1980, Indonesia was the poorest country within this country group with real income

per capita of US$ 1,599.14 below Philippines with US$ 2,161.82 real income per capita. It took merely less than a decade for Indonesia to 'catch-up' Philippines. In 1990, Indonesia's real income per capita was US$ 2,349.41, slightly higher than that of Philippines of US$ 2,065.38. During 1980-2008, Thailand recorded the highest real income per capita growth of 4.31% p.a., while Indonesia's real income per capita grew 3.36%, slightly below than that of Malaysia of 3.89% (**Figure 1.5** panel a). Nevertheless, in terms of economic size, Indonesia, with total GDP accounted for more than US$ 247.23 billion in 2008, holds its position as a country with the biggest GDP in ASEAN region, followed by Thailand, Malaysia and Philippines with US$ 177.92 billion, US$ 139.16 billion, and US$ 110.71 billion, respectively. During 1980-2008, Malaysia recorded the highest real GDP growth of 6.23% p.a., whereas Thailand, Indonesia, and Philippines grew 5.81%, 5.47%, and 3.19%, respectively (**Figure 1.5** panel b).



(a) Real GDP per capita and its growth

(b) Real GDP (2000=100) and its growth

Figure 1.5. Economic performance of Indonesia and ASEAN3 1980-2008
Source: *World Development Indicators 2010*, calculated

In export performance context, it seems that Indonesia is still lagged behind compared to the other three comparators of Malaysia, Thailand and Philippines. Average exports ratio to GDP of Indonesia from 1980 to 2008 (29.47%) was the lowest among ASEAN4 countries. Exports have served as a backbone for economic growth during 1980-2008 in Malaysia and Thailand with average exports to GDP ratio amounted up to 85.36% and 45.46%, respectively (**Figure 1.6**).

Among ASEAN4 countries, Malaysia is a country, which also depends significantly on oil industry just like Indonesia. Its oil exports represented 24.72% share to total merchandise exports in 1980, and it slightly declined in 2008 with portion of 18.40%, below that of Indonesia of 29.10%. However, average share of Malaysian manufacturing exports to total merchandise exports has accounted for higher portion than that of Indonesia since 1980 (**Table 1.1**). This may result in highly export growth of 11.02% p.a. on average. Both Thailand and Philippines were less dependent on oil industry. Overtime, they manage to rely on exports of non-oil primary and manufacturing commodities to promote their economic performance. During 1980-2008, exports of Thailand and Philippines increased at rapid average growth of 12.91% and 9.29% per annum, respectively. The fact that exports, particularly exports of manufacturing commodities, have served as a significant impetus to sustain impressive economic growth in Malaysia and Thailand for over three decades, should ring a bell for Indonesia to persistently enhance the performance of exports as its new engines of growth to substitute oil export that could not be counted on over to promote sustained high growth from 1990 onward.

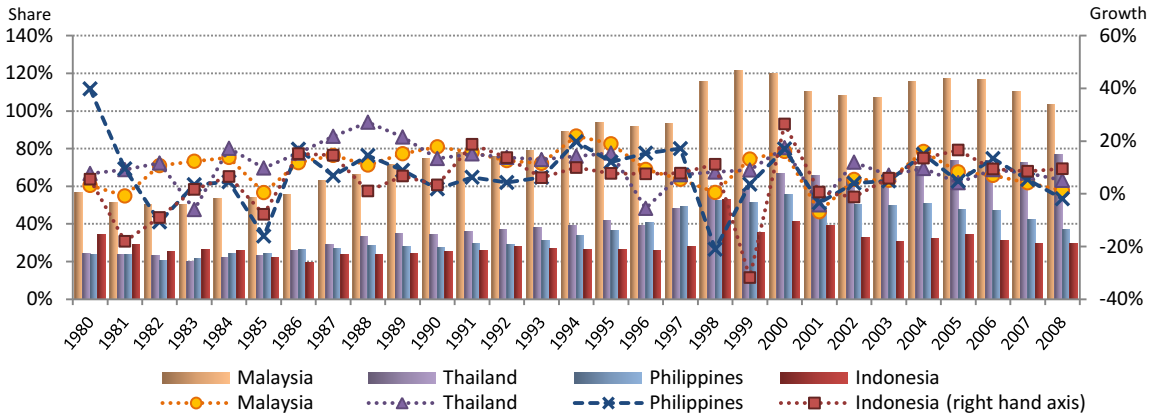


Figure 1.6. Export share to GDP and growth of exports of Indonesia and ASEAN3 1980-2008
Source: *World Development Indicators 2010*, calculated

After reviewing previous comparative analysis on main economic performance and export indicators of selected countries, we can summarize several following attributes that define Indonesia in particular, as follows:

First, Indonesia economic performance in the beginning of period 1980-2008 was relying heavily on energy sector especially petroleum and liquid natural gas (LNG). Oil exports accounted for over 70% in 1980 with minuscule share of manufactured exports (see **Table 1.1**). Oil exports, which reached its highest share in total exports value at 82.41%, started to decline continuously from 1983 and afterward. Petroleum production has been falling steadily from 1997, and as domestic petroleum consumption rose, Indonesia became a net petroleum importer since 2004 onward. Since oil export could not be relied upon to promote a rapid and sustained future growth, Indonesia needs to shrewdly manage and persistently enhance its non-oil exports particularly manufacturing exports as a new engine of growth.

Second, in terms of income per capita growth, it performs relatively impressive during 1980-2008 compared to its other comparators in each country group: it achieved the highest income growth among populous, heavy oil-export dependent developing countries; among high populous, geographically very large developing countries, it recorded second highest income per capita growth after the best performer, China; and within ASEAN developing countries, Indonesia is one of few countries, whose income grew relatively high, more than 3%, for more than three decades. Its income growth is only lower than those of Thailand and Malaysia. Indonesia', in short, exhibited relatively high income growth rate in international context.

Third, in terms of economic size, with total GDP of US$ 247.23 billion, Indonesia bears the fourth biggest GDP among all comparators, and the biggest one in ASEAN context. The World Bank suggests that by 2025 Indonesia will become one of the major

emerging economies in the world with its value of exports is likely to double between 2010 and 2025. Indonesia, along with five other major emerging economies: Brazil, China, India, Korea and Russia, will collectively account for more than half of the global growth rate.[6] These all signify the relative importance of Indonesia in international and regional trade context.

Fourth, Indonesia's manufacturing export to total exports ratio, nonetheless, is the lowest compared to other comparators, except for Nigeria which still relies upon oil-export. Indonesia's average 1980-2008 manufacturing exports to total merchandise exports ratio of 38.66% was the slowest compared to other comparators, not including Nigeria. Previous comparative analysis reveals one important fact. All the comparator countries exhibited higher average export growths than Indonesia, and all these high growths were mainly contributed by an increasing share of manufacturing exports to total exports (**Table 1.2**).

Table 1.2. Contribution of export commodity on exports growth 1980-2008

Exports structure	Indonesia	Previously oil-export dependent		Highly populous, vast territory		ASEAN3		
		Mexico	Nigeria	China	Brazil	Malaysia	Philippines	Thailand
Avg. growth of total merchandise exports (1980-2008, %)	8.51	14.20	23.05[a]	18.84	9.95	11.02	9.29	12.74
Contributors to export growth (%)								
Oil	19.93	24.86	100.74	0.05	7.26	14.53	2.95	3.59
Manufacturing	58.00	70.37	0.96	92.28	55.34	70.91	85.87	75.38
Non-oil primary	22.07	4.77	-1.70	7.67	37.40	14.56	11.18	20.99

Notes: [a]) average growth for 1997-2003

Source: *UN-COMTRADE*, author's calculation

Figures in such a table may provide as a preliminary indicator for the importance of export structure, especially of advanced technology, higher value-added manufacturing export commodities, in maintaining sustained and rapid export growth.

[6] World Bank (2011), *Global Development Horizons 2011*, pp. 2-3

Apart from the importance of manufacturing export commodities on total export performance, however, it is worth noting that the contribution of oil and gas- and non-oil primary exports still carries their significance on Indonesia's export structure. This is not surprising since Indonesia is as a natural-resource rich countries with most of its population are employed in primary (particularly agriculture) sector. **Table 1.3** exhibits that the portion natural resource and primary exports to total export structure were still being key commodities even though their trend has been declining over time.[7] In first decade of 1980s, oil and gas, and non-oil primary export commodities still accounted for 81.34% of Indonesia's total merchandise exports. Following oil price collapse in mid-1980s, nonetheless, Indonesia started to embark on trade liberalization era represented by an outward-oriented or export promotion (EP) strategy to replace import substitution industrialization (ISI) strategy that could not be counted on over to promote sustained high growth into the 1990s onward. As the consideration grew that a new growth engine was needed, the policy pendulum swung in favor of non natural resource-based, private-sector-led growth. Its economy later has been partly characterized by significant increases in and continuous growth of manufacturing exports (see third and fourth column of **Table 1.3**).

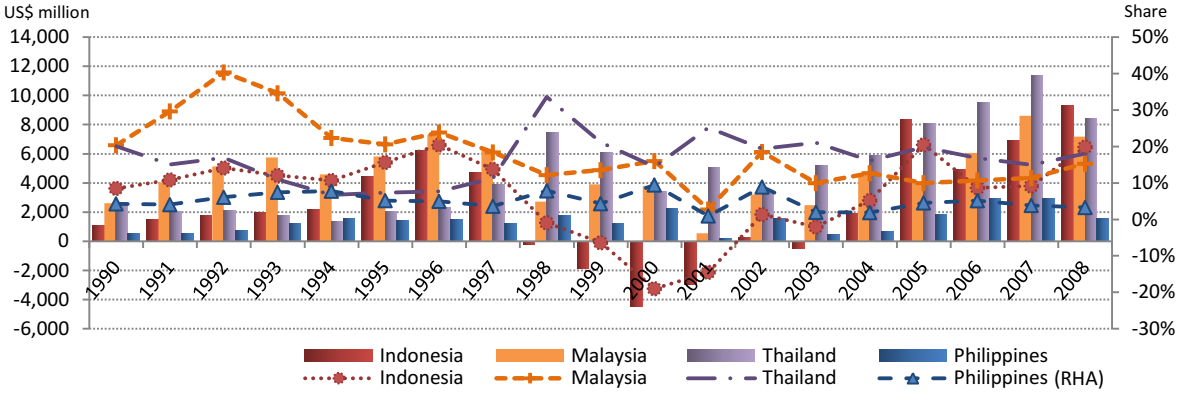
Table 1.3. Share of commodity to export structure of Indonesia

Commodity	**Share to merchandise exports (%)**		
	1980-1990	1990-2000	2000-2010
Oil and gas	61.47	28.53	26.76
Non-oil primary	19.87	21.99	23.02
Manufacturing	18.66	49.48	50.22

Source: *UN-COMTRADE*, author's calculation

[7] Despite of its still significant portion in total export structure, the analysis on the importance of natural-resource based exports is beyond the scope of our present dissertation. We avowedly indicate this key point as an important subject for further studies.

Beside international trade context, the importance of Indonesia over its other comparators especially those in ASEAN is also justified over foreign investors' perspectives, which put Indonesia as one important FDI destination in ASEAN region (see **Figure 1.7**).



Avg. share to ASEAN (1990-1997, %)	13.26	26.27	11.98	5.43
Avg. share to ASEAN (2000-2008, %)	3.24	11.91	18.40	4.45
Avg. share to ASEAN (1990-2008, %)	6.73	18.06	16.64	5.04

Figure 1.7. FDI inflows to ASEAN4 countries and share to total FDI ASEAN 1990-2008
Source: *UNCTAD-Statistics*, calculated

Figure 1.7 exhibits a fact that Indonesia during 1990-1997, the period of which before Asian 1997/1998 stroke, occupied the second highest of FDI inflows toward ASEAN region with average share of 13.26%, below Malaysia with 26.27% share and above Thailand's level of 11.98%. Nevertheless, the presence of Asian 1997/1998 crisis wrecked foreign investors' perception toward their future investment in Indonesia leading to negative net FDI inflows during 1998-2001. In overall, Indonesia occupied 6.73% share of total FDI towards ASEAN during 1990-2008, with growth of FDI inflows of 25.79% p.a. on average, the third highest FDI growth after those of Philippines and Malaysia with average growth of 52.73% and 34.20%, respectively. In regards to export performance, some economists (Kojima, 1975; Brezis et al., 1993; Petri and Plummer, 1998; among

others) argue that foreign direct investment (FDI) not only can utilize any host (FDI recipient) country as export-platform to home (investing) countries and/or third market, but it may also serve as a tutor to support export development and upgrading technological ladder toward more advanced manufacturing-based export commodities.

As all above mentioned aspects are apparent as justification for focusing on Indonesia in particular, the present dissertation may shed lights on how a large populous, previously oil-dependent country can manage its future economic development by switching to new engines of growth with regard to exports performance. Assessing the importance of exports on economic development in Indonesia as well as its determinants of exports performance may provide lessons to any export-oriented developing country, which shares similar characteristics with Indonesia. The preliminary effort will be devoted to provide answer as to whether export-oriented policy is an appropriate development strategy for Indonesia. It can be conducted by scrutinizing a causal structure between export and economic growth, or in other words, by testing the validity of an Export-led Growth (ELG) hypothesis in Indonesia.

Reassessing the ELG hypothesis for the case of Indonesia may provide some interesting evidences since any country with large domestic market like Indonesia may less rely on foreign market as Perkins and Syrquin (1989) argues. In addition, as later shown in **Table 2.6**, export development in Indonesia still requires high extent of imports of capital and intermediate goods. This may complicate the analysis on causal structure linkage between exports and economic growth the Indonesia, yet it is worth pursuing.

The importance of ELG hypothesis in Indonesia deserves attention since as a large

populous, previously oil-dependent country, Indonesia requires new engine for growth as petroleum cannot be counted on over to promote sustained high growth into the 1990s onward. As the consideration grew that a new growth engine was needed, the policy pendulum swung in favor of export expansion (outward-oriented policy) and non natural resource-based, private-sector-led growth. Nevertheless, the exports development toward highly technology, higher value-added commodities especially for those of manufacturing exports requires intensive importation of capital and intermediate goods since Indonesia is still lagged behind in industrial development and capabilities compared to its neighboring countries (Thee, 2005). These may amplify our interest to assess exports-growth causal structure as well as the determinants of exports in Indonesia.

It is worth noting that validity of ELG hypothesis is just preliminary evidence of the importance of exports in development, yet it is very important for further analyses. Any validity of ELG hypothesis for Indonesia will provide a justification for further assessing the determinants of export performance. A trade-based industrialization strategy requires appropriate trade policy in macro and micro level as appendages to export-led development. Since exports are an essential part of economic development in Indonesia and following exports promotion strategy which has been pursuing since trade liberalization unleashed in mid 1980s, it is thus imperative to assess exports performance and its determinants in Indonesia. These include rigorous analyses of the impact of foreign- and domestic demand on exports employing some typical exports variables (i.e. price and income factor), non-price factors including export structures and competitiveness, and the roles of foreign investment and exchange rate to promote upgrading export structure as previously

discussed. All those efforts will be based and guided by established theoretical contexts so that the plausible implications generated can be reliable based on strong theoretical justification.

1.2 Trade theory in brief

Prior to embark on detailed analysis in each chapter, it is worth discussing briefly here the theoretical mainstreams related to trade theory, which are used in the present dissertation not only to determine the set of variables that may potentially act as determinants of exports, but also indicates the scope and limitation of analyses in the present dissertation.

Trade theory advocates that international competitiveness is, among other things, determined by factor endowments, investment, innovation in products and production processes and intensity of entrepreneurial activity. In general, trade theory can be classified into two categories namely, traditional theory, which renders a classical/neoclassical foundation), and the new trade theories. Traditional trade theory explains trade as essentially a way for countries to benefit from their differences. It incorporates the principle of perfect competition, homogenous products and constant return to scale in production. This would include Ricardian static comparative advantage theory, Heckscher-Ohlin (H-O) neoclassical factor endowments theory, and some extensions of H-O theory. On the other hand, the new trade theory would render the characteristics of imperfect competition, product differentials, increasing return to scale, and technological lags, all of which imply dynamic comparative advantage in trade.

Built upon some strict assumptions, such as perfect competition, 2-2-1 model –two

countries, two commodities and one factor single factor of production of labor (or other factor is expressed in value of labor), identical consumers' preference, constant return to scale, labor immobility between countries, no transportation cost, and so forth, Ricardian static comparative advantage theory proposes the benefits of for two countries to trade when there exists a difference in relative cost of producing some goods. The comparative advantage theory goes further to assert that unrestricted exchange between countries will increase the total amount of world output if each country tends to specialize in those goods that it can produce at a relatively lower cost compared to its potential trading partners. Later, Dornbusch, Fischer and Samuelson (1977) extended the classical trade theory by constructing a multi commodity model between two countries that captures the relative supply and demand conditions. Using relative wage rates, prices, transportation cost, tariff and exchange rate, they explained how exogenous changes in productivity and relative demand can affect the structure of trade, wages, and price in trading partners.

Even though the previous Ricardian trade theory explained trade pattern among countries on the basis of comparative advantage as the consequence of different labor productivities (recall that the Ricardian theory is expressed in terms of labor theory of value), it did not explain the reasons of which the difference in labor productivity exists among countries. Employing factor endowments concept, the Heckscher-Ohlin (H-O) theory asserts that the relative abundance of resources is not the only factor, which determines the comparative advantage of a country. It argues that the intensity of resource utilization in producing the commodities across different countries also does matter in determining the pattern of trade. Characterized by some similar strict assumptions –perfect

competition, 2-2-2 model (two countries, two commodities, and two factors of labor and capital), constant return to scale, identical level of technology between countries, and no transportation cost, the H-O theory suggests that a country will export the commodity that intensively uses the relatively abundant factor of production, and import the commodity which intensively uses the relatively scarce resource.

Stopler and Samuelson (1941) developed a theorem as extension of the H-O theory, which proposes that with a full employment both before and after trade takes place, the increase in the price of abundant factor and the fall in the price of the scarce factor because of trade imply that the owners of the abundant factor will find their real incomes rising and the owners of the scarce factor will find their real incomes falling.

The complexities in international trade, i.e. the existence of multi commodities trade, trade between countries with similar factor endowment and productivity levels, trade of intermediate goods, the large amount of multinational production (i.e. foreign direct investment), difference in wage, transportation cost etc. has driven new school of thoughts to build a new trade theorem based on more realistic assumptions so that the model can be more applicable in explaining world trade patterns and dynamics. Krugman (1979, 1980), Helpman and Krugman (1985) proposed the new trade theory, which provide a more balanced perspective, focusing on both demand and supply sides. In contrast to the neoclassical trade theory, the new trade theory argues that the reasons why two countries trade do not necessarily depend on comparative advantage. It asserts that the determining factors, such as innovation, scale of economies at the firm level, and external economies i.e. concentrating production in one or few locations in order to reduce cost, play significant

roles in determining productivity gains from specialization. The spread of technology across national boundaries may drive changes in comparative advantage. This technology diffusion can also be stimulated by multinational enterprises' operations. Market structure in relation to imperfect competition, economies of scale (increasing return to scale), and transportation cost occupy the center of the argument and justify the applicability of the model to explain the dynamics of international trade. One result of these theories is the home-market effect, which asserts that, if an industry tends to cluster in one location because of returns to scale and if that industry faces high transportation costs, the industry will be located in the country with most of its demand, in order to minimize cost. Thus, where neoclassical one predicts inter-industry trade, the new classical theory predicts intra-industry trade in particular. We close this brief discussion on theoretical foundation of trade by summarizing some key attributes of each theory as presented in **Table 1.3**.

Table 1.4. The brief comparison of trade theories

No.	Ricardian static comparative advantage	H-O factor endowments theory	The new trade theory
1.	Relative cost/price is expressed in terms of labor theory of value.	Relative cost/price is expressed in terms of money/price theory.	Unit cost is expressed in terms of money/ price theory and it decreases when the output increases (scale of economies).
2.	2-2-1 model of two countries, two commodities, one input factor (labor).	2-2-2 model of two countries, two commodities with different factor intensities, two input factors (labor and capital).	Multi countries and –commodities, as well as including intermediate inputs and intra-industry trade.
3.	Homogenous products	Homogenous product	Differentiated products (variety of quality).
4.	Perfect competition.	Perfect competition.	Imperfect competition.
5.	Constant return to scale.	Constant return to scale.	Increasing return to scale.
6.	Factor (labor) is immobile between countries.	Factors (labor and capital) are immobile between countries.	Factors mobility.

7.	No transportation cost.	No transportation cost.	Transportation cost exists.
8.	The level of technology is fixed for both countries, yet the technology can differ between them	The level of technology is identical for both countries.	Technology is mobile across companies and countries; there is imperfect mobility of the ability to use technology based on localized investments in infrastructure, institutions, and labor.
9.	No government intervention.	No government intervention.	Government intervene market through strategic trade policy.
10.	It explains gain from trade (positive-sum game based on comparative- not absolute advantage).	It explains patterns of trade, which are determined by differences in factor endowments	Basis for trade is determined by increasing return to scale, imperfect competition, and love-of-variety effect.

Source: Summarized from Helpman and Krugman (1985), Appleyard et al. (2006) and Todaro (2006).

1.3 Problem statement

Exports play a vital role in Indonesia economic development as determined by its importance to GDP proportion. Since petroleum cannot be counted on over to promote sustained high growth into the 1990s onward, it requires new engine for sustained growth into the 1990s onward. As the consideration grew that a new growth engine was needed, the policy pendulum swung in favor of export expansion. Thus, it is very important that we confirm the validity of ELG hypothesis or outward-oriented policy as development strategy for Indonesia prior to conduct further analyses on the determinants of export performance. In addition, since the existence of Indonesia as being a populous country with vast domestic market, the causal structure between exports and economic growth may not be similar in short- or long-term.

In addition, two main objectives of any country are to manage foreign reserves at sound and adequate level and to create and maintain a sustainable, internationally competitive exporting sector that will contribute to job creation and high income. It is apparent that changes in export level have wider and far reaching economic effects. It is

truly essential for policy makers to comprehend underlying factors determining the volume of exports as well as those that underpin the export performance in Indonesia. Therefore, in addition to previous ELG analysis, the present study also seeks to scrutinize some following factors that may determine exports performance and how they can be administered to promote sustained and rapid export growth.

Firstly, as Indonesia's exports are growing overtime in line with improved economic performance in foreign and domestic market, our attention should be addressed on how and to what extent such foreign and domestic-demand, as any of which is proxied by price and income factor, may influence the growth of exports. In addition to domestic-demand influence, the validity of domestic-demand pressure hypothesis as to whether domestic demand chokes-off export condition is also worth examining. Secondly, the level export performance is not only influenced by price and income factor, but also by some non factors such as competitiveness, and the export structures namely product composition and market distribution. Thirdly, a trade-based industrialization strategy aiming to achieve a sustained and rapid export performance by encouraging the production of industrial exports especially toward higher-skill and higher-technology content requires continuous advancement of industrial capabilities. The use of manufacturing exports of growing technological content as a yardstick of performance automatically emphasizes targets with very strong development benefits (Todaro, 2006). Foreign investment (FDI) may play a role as tutor for advanced technology and expertise which are scarce in developing countries. Thus, examining quantitatively the roles of FDI in determining export performance of high technology exports may provide a significant implication on

industrialization policy. Finally, the last issue is whether and to what degree the influence of exchange rate permit export performance of manufacturing commodities. As commonly acknowledged, a competitive exchange rate level determines the level of export competitiveness. Assessing all these issues is expected to provide as rationales for astute trade-based industrialization strategy.

1.4 Objectives of the study

The aim of the study is to review the issues concerning exports performance and its impacts on economic growth in Indonesia. In general, the present study focuses to investigate the causal structure between exports and economic growth, and to identify some determinants of exports performance in Indonesia.

The specific objectives of the study are:

a. To review the ELG hypothesis in Indonesia;
b. To investigate the impact of price and income effect on export performance;
c. To scrutinize the contribution of commodity structure, market distribution, and competitiveness on manufacturing exports growth;
d. To analyze the influence of FDI and exchange rate on exports of manufacturing industry;
e. To draw significant policy implication in area of trade-based industrialization strategy.

1.4 Significance of the study

This study proposes distinction to existing trade literatures in several aspects as follows:

a. It reviews the ELG hypothesis in Indonesia by taking into account the inclusion of capital goods and intermediate imports variable. In addition, it dissects such exports–growth causal nexus into long- and short-run perspective.
b. It investigates the effects of price and income variables on exports performance by testing the domestic-demand pressure hypothesis in exports behavior that has sparsely been conducted for the case of Indonesia.
c. It scrutinizes the contribution of exports structure, namely product composition and market distribution, and competitiveness on exports performance of manufacturing commodities by factor intensity, including the evolution of export competitiveness, so that the implication could be utilized for designated export-oriented sector.
d. It analyzes the roles of FDI and exchange rate on the expansion of exports of manufacturing industries. In such a way, it may shed lights on the importance of FDI to promote of manufacturing commodities classified by content of technology and value-added.
e. Provide insightful information to assist policy makers in formulating trade-based industrialization policies to address the significances of growth and exports as well as exports determinants both price- and non price-factors, all of which are devoted to the development of Indonesia economy through sustained and rapid export performance.

1.5 Scope and limitation of the study

This study analyzes exports and economic growth causal structure as well as the determinants of export performance during development stage. In so doing, this study deals

with several established economic concepts as follows: ELG hypothesis; demand and supply for exports; Domestic demand-pressure hypothesis; Constant Market Share analysis of exports growth, export competitiveness and its evolution, and Kojima's (1975) FDI supplementary to trade hypothesis.

Due to data availability disparities, the depth of analysis differs among each of the concepts. In the case of export-growth causal structure, the analysis is built upon the foundation of the gains of trade proposed by Ricardian classical trade theory, and combined with the ELG hypothesis, all of which are devoted to seek a confirmation whether export promotion strategy is a viable development strategy in Indonesia. Next, the determinants of exports will be scrutinized based upon some theoretical foundation previously discussed. The impact of foreign- and domestic demand on exports will be analyzed using relative price and income variables within demand and supply framework as implied by neoclassical trade theory. Such analyses of ELG hypothesis and the impact of foreign- and domestic demand on exports are conducted for the aggregate data only due to data constraints of relative export price and income level by sector. Even though not perfect, the analyses are expected to provide some justification on the importance of exports as development strategy and may indicate some determinants of exports that will be scrutinized further using sector-based analyses in following chapters.

As the new trade theory indicates the importance of differentiated products (trade composition) and multinational operations (FDI) in determining comparative advantage dynamics, the analyses on the contribution of exports structure and competitiveness, as well as the impact of FDI and exchange rate on exports performance will be carried out

upon sector-based manufacturing exports classified by factor intensity. Many other trade aspects, however, are still beyond the scope of analyses in the present study. These include the transportation cost, labor cost, innovation, trade of intermediate goods (intra industry trade), and so forth. We indicate these as some limitations in the present study and subject to further studies.

1.6 Organization of the study

This study is organized as follows. Each chapter elaborates one theme with discussion including theoretical framework, literature review, case study, and analysis. We organize the construction of the present dissertation in such a way that it put review of ELG hypothesis as a preliminary analysis, yet its result serves as justification prior to move forward to further analyses on several exports determinants. They include foreign- and domestic-demand factor, non price factors comprising of competitiveness and export structure, namely product composition and market distribution factor, and finally, FDI and exchange rate. The first chapter is the Introduction. It specifies the background, objectives, significance, scope and organization of the study. It is difficult to completely separate the discussion on the export – growth causal structure and the determinants of exports in the framework. Therefore, the discussion will somewhat overlapping among some chapters of this study. **Chapter 2** reinvestigates the ELG hypothesis by controlling variable of imports of capital and intermediate goods. **Chapter 3** examines the impacts of foreign- and domestic-demand, proxied by price and income factors, on exports performance. **Chapter 4** scrutinizes the contribution of exports structure and competitiveness on the export performance of manufacturing commodities classified by factor intensity, followed by

estimation of the impact of FDI and exchange rate on manufacturing exports performance in **Chapter 5**. Finally, **Chapter 6** provides concluding remarks. The framework is shown in following **Figure 1.8**.

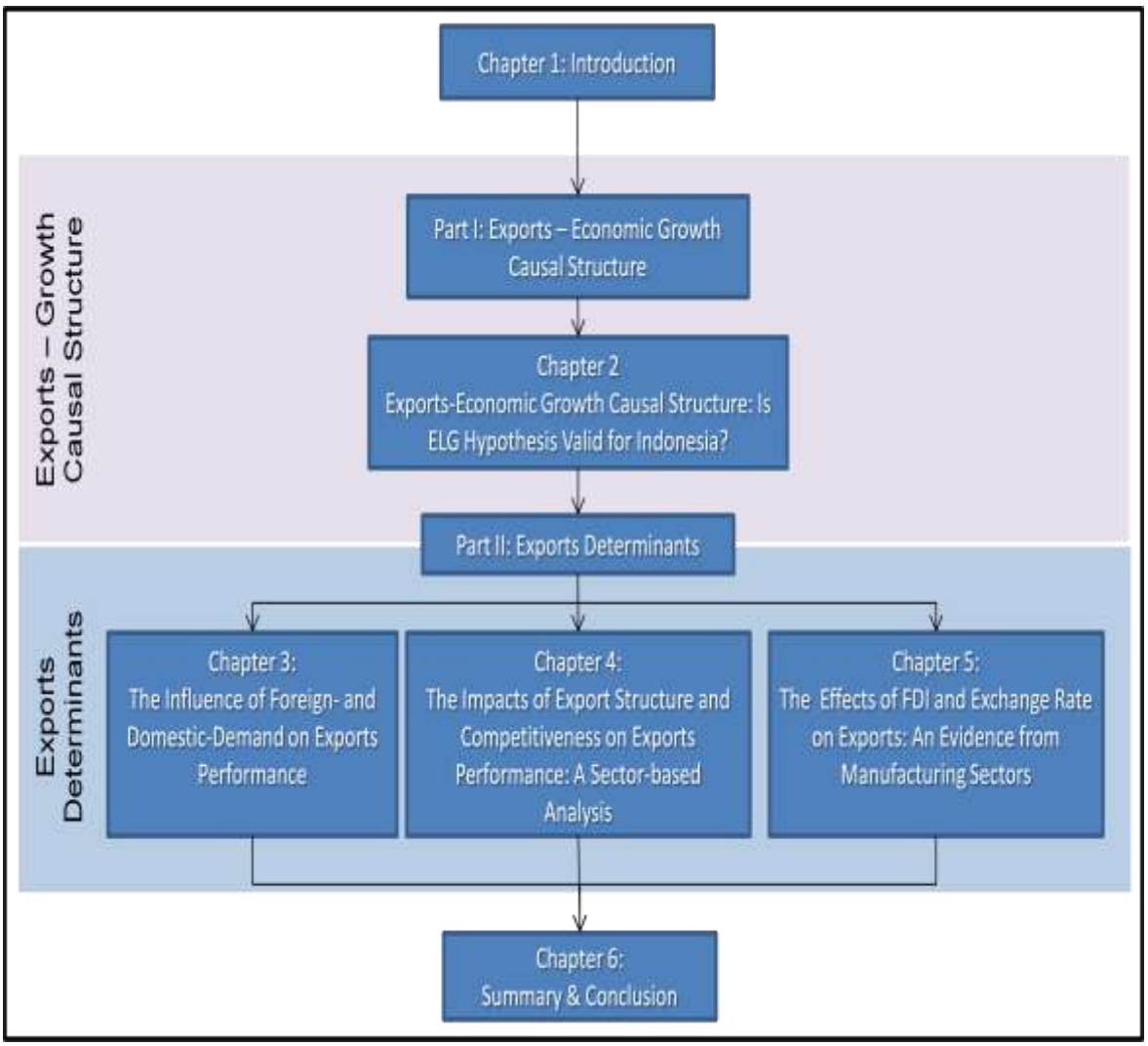


Figure 1.8. Analytical framework

CHAPTER 2

EXPORTS – ECONOMIC GROWTH CAUSAL STRUCTURE: IS EXPORT-LED GROWTH HYPOTHESIS VALID FOR INDONESIA?

This chapter reviews the ELG hypothesis during the period of 1971 to 2008 by controlling important variable of import of capital and intermediates goods, which has never been employed for the case of Indonesia. In contrast to cross-country study, the paper investigates such relationship in a time series framework using a Vector Autoregressive (VAR) model. In such a way, it dissects the causal structure in long- and short-run perspective so that it can reveal more rigorous findings and implications. This chapter is just a preliminary analysis, yet very important. Its finding, will not only reveal the validity of ELG hypothesis in Indonesia, but also may serve as justification for further analyses on the determinants of exports dissected in the following three chapters.

2.1 Background

A large number of empirical studies have been devoted during the last two decades to scrutinizing the role of exports in economic growth, using either cross-countries or time series data, on the grounds of enquiry whether an outward-oriented or EP policy is preferable to an inward-oriented (ISI) trade policy. These studies even have their

amplification, in particular, in the successful economic performance of the so-called "High Performing Asian Economies" (HPAEs) which lent support to the idea that export promotion could be an effective development strategy. Such a remarkable performance of the HPAEs has indeed renewed interest of studies in exports and economic growth[8] and often, exports by previous empirical studies is excessively claimed as the "engine of growth". [9] Although several studies have demonstrated the theoretical economic relationship between trade and economic growth, disagreement still persists regarding the causal direction and magnitude of the effects (Bhagwati, 1978; Edwards, 1998). The vast majority of this literature focuses on the causal effects of exports on economic growth. Some researchers argue that causality flows from exports to economic growth and denote this as the Export-led Growth or ELG hypothesis. Others find that reverse causal flow runs from economic growth to exports, which is termed the Growth-led Exports (GLE) hypothesis. The third alternative to such causal links derived from some other empirical studies is that, exports and economic growth reinforce each other or are bi-directional. This might be the case when such empirical studies embark on employing important relevant variables, such as imports.

Most studies on the effect of exports on economic growth have mostly employed bi-variate causal models and ignored the contribution of imports. However, some recent studies have shown that without controlling imports, any observed causal link between

[8] The World Bank (1993) and ADB (2005) supported the view that export growth and trade-oriented policy had been a significant source of rapid economic growth in the HPAEs through greater access to best practice technologies. HPAEs comprise of Hong Kong, Indonesia, Malaysia, South Korea, Singapore, Taiwan, and Thailand, all of which achieved such rapid and sustained growth during the 1980s.

[9] Rodrik (1999) raises some doubts on such proposition. He argues that exports are important only insofar as they represent "price" an economy pays for having access to imports, and should be treated as a means not an end. Furthermore, he adds that in fact it is imports of capital and raw material goods that are critical to long-run economic growth.

exports and economic growth might be spurious and thus, misleading (Esfahani, 1991; Riezman et al., 1996; Thangavelu and Rajaguru, 2004). As strongly argued by Rodrik (1999), imports may play a very significant role in long-run economic growth since significant export growth is usually associated with rapid import growth. Further, the export-growth analyses that exclude imports may be subject to the classic problem of omitted variables that may mask or overstate the impact of dynamics between exports and economic growth (Riezman et al., 1996).

In addition, earlier studies employing cross-country analysis were criticized for their simplified assumption of similar economic structures and levels of technology used throughout countries studied. As more data became available, more recent analyses focused on a single country using the time series study (Awokuse, 2005) and dug deeper on the country's specifics. With regard to Indonesia, the biggest country in ASEAN in terms of GDP, study in this area might be interesting since Perkins and Syrquin (1989) argue that a bigger country may rely less on foreign markets so the test for exports-led growth hypothesis in such a country may be worth examining.

This chapter aims to investigate the causal relationship between exports and economic growth in Indonesia within an integrated framework that explores the role of both exports and imports. In so doing, we construct our analysis based on two following hypotheses. First, considering Indonesia is as natural resource-rich and labor abundant country and an on-going effort to promote export-led development since 1986, we expect of long-run relationship between exports and economic growth in Indonesia. Second, based on preceding hypothesis and consideration of the existence of Indonesia as large domestic

economy, we thus expect that at least, one channel of causality of ELG or GLE exists either in short- or long-run.

This study proposes a contribution to the literature in several ways. First, in contrast to most previous cross-country studies on ELG, this study focuses on the study of the individual country such as Indonesia by employing the traditional neoclassical growth model and estimating an augmented production function that explicitly tests for the effect of both exports and imports of capital and intermediate goods on economic growth.[10] We include real exports and imports as two of endogenous variables in the co-integrated VAR model. Such modeling framework also makes it possible to test for both ELG and Import-led Growth (ILG) hypothesis in Indonesia. Second, the study also adopts a recent time series methodology by specifying causal model based on vector error correction models (Toda and Phillips, 1993). In addition to testing for Granger Causality between exports, imports, and economic growth, such behavior in the long run could also be investigated through co-integration and impulse response function analyses. Third, as a supplementary analysis to provide a clear explanation on changes in growth patterns related to export and economic growth between 1971 and 2008, a decomposition analysis of GDP growth will be conducted.

2.2 The economy of Indonesia from 1971 to 2008 at glance

Few countries have experienced reversals in economic fortune as dramatic as those of Indonesia. Started from 1970, after suffering from deep economic crisis triggered by heavy political turbulence over the 1960s, Indonesia embarked on new strategy of

[10] This is one of significant distinctions from most previous studies, in which total imports are used instead of imports of capital and intermediates goods due to data limitation. As pointed out by Islam (1998), only imports of capital and intermediate goods should ideally be included in the import figures.

development that prioritized economic development. In general, the economic structure was dominated by the primary sector (including agriculture) with a minuscule proportion of the industry sector. The economy was mostly fueled by exports of natural resource intensive (NRI) commodities particularly, petroleum exports (75% of merchandise exports and 66.67% of government revenue) reaping benefits from the quadrupled world oil prices. Indonesia recorded 6.9% of real GDP growth during 1971 – 1985, which reached its peaks of 11.3% in 1973.

Like in the first development phase of most developing countries, the industrialization strategy adopted during this period was Import Substitution Industrialization (ISI), a strategy of which marked by heavy protection focused on serving the domestic market. Tariffs were increased, but more importantly, the government embarked on heavy industrialization programs underpinned by increased resort to protection measures and petroleum exports. Generally speaking, the majority views of the researchers are that Indonesia's industrialization policy for import substitution was implemented simultaneously and in parallel with the oil boom that began in 1973.[11]

Certainly, there is no question that the oil boom had spurred the import substitution policy. Such a strategy persisted for about a decade. The fall in oil prices in the period between 1982 and 1986 wiped out Indonesia's gain from the oil boom of the mid 1970s. This weakened oil prices significantly reduced export earnings, budget revenues, as well as her balance of payments (BOP). During 1980–85, GDP grew by 4.76% per annum — slower than the 8.94% during period 1975–80. In response to this condition, the government undertook some required actions, one of which was to embark on a series of

[11] Ishida (2003).

major reforms including trade liberalization.[12] Until the end of the ISI era, the share of manufactured exports to total exports remained negligible at 11%.[13]

The decomposition analysis of GDP growth (2000=100) during 1971–1985 indicated that GDP grew at 6.9% p.a. on average, which was mainly contributed by growth in domestic demand or *seemingly* domestic demand-led growth (**Figure 2.1**). As can be seen previously in **Figure 2.2**, which depicts decomposition of GDP growth in more disaggregated analysis, such a domestic demand-led growth was essentially driven by growth of domestic consumption, especially until before Asian 1997/1998 economic crisis.

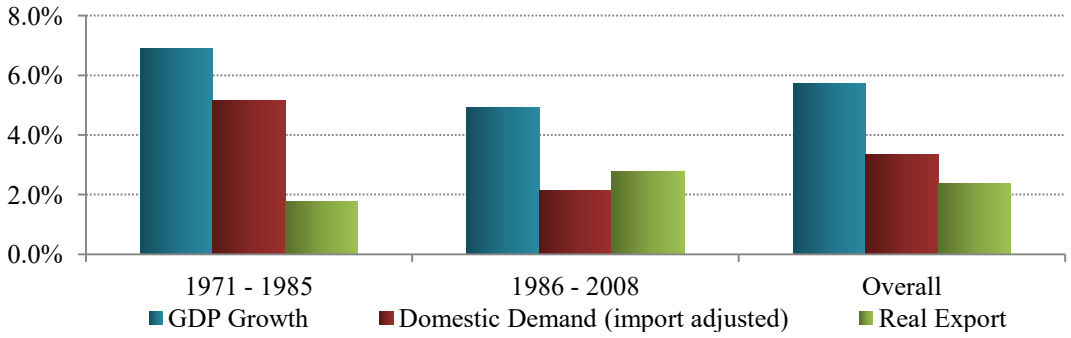


Figure 2.1. Contributions of expenditure components to GDP growth 1971 – 2008
Source: *World Development Indicators 2009*, calculated.

Some changes in contribution of national expenditure components are notified during two periods of economic shocks. First is during period of recession of 1981-1985 as part of global recession due to a significant oil price shock in 1981 and slump economic conditions in developed countries especially such as US and Japan, and second, the period of Asian 1997/1998 economic crisis. Both periods were marked by slump in contribution of domestic consumption to economic growth. At the same time, exports growth played a significant role as bolster to Indonesia economy. This is as preliminary evidence of the

[12] Basri and Hill (2007).
[13] Hill (1996)

importance of export promotion on economic development in Indonesia.

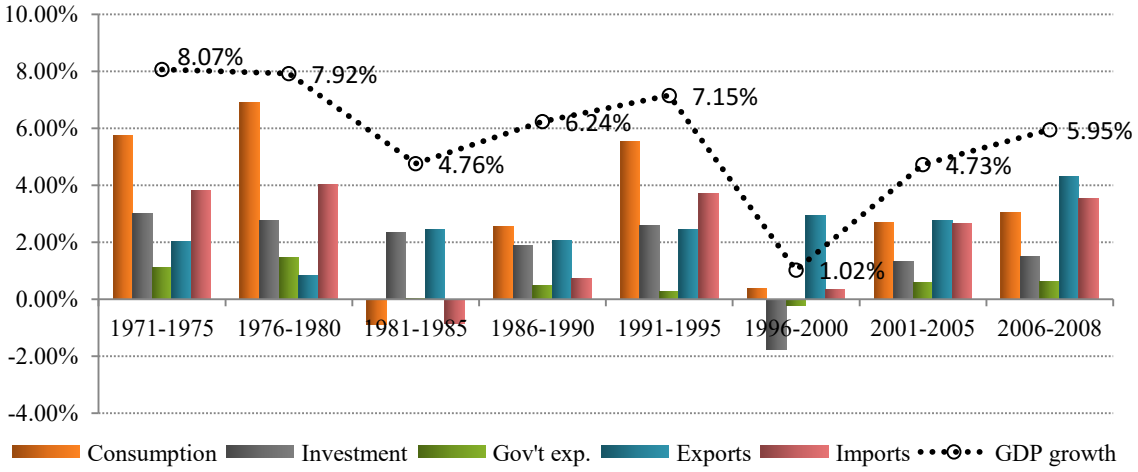


Figure 2.2. Contribution of expenditure component (disaggregated) to GDP growth 1971-2008
Source: *World Development Indicators 2009*, calculated.

The era of outward-oriented or EP strategy in Indonesia was embarked upon in 1985. During this period, the Indonesian economy began to feel the impact of the rapid increase in Foreign Direct Investment (FDI), owing to the bold and decisive series of liberal economic reforms introduced from the mid-1980s onward (including exchange rate management, which was including two large nominal depreciations, in 1983 and 1986; prudent fiscal policy; comprehensive tax reform; a more open posture towards foreign investment; and financial deregulation including in banking sector).[14] The private sector and exports became the main engine of development of the manufacturing sector for the first time ever. Exports of manufactured goods grew five-fold over nine years from 1985 owing to a string of liberalization packages on trade and investment, including the relaxation of restrictions on foreign investment, tariff cuts, and the abolition of non-tariff trade barriers such as import restrictions unleashed by the government. Companies

[14] Hill (1996) and Ishida (2003)

designated as export-oriented firms on the basis of the export ratios of products were accorded preferential treatment in the equity ratio of foreign capital, operations in bonded export processing zones, and procurement of raw materials. The government also restored the drawback system, under which import tariffs imposed on raw materials and parts were refunded when finished products were exported. During this EP era (1986-2008), in average, growth of GDP was dominated by real exports or *seemingly* export-led growth.[15] The combination of those macroeconomic policies and microeconomic measures contributed to 6.6% GDP growth on average during 1986–1997 with a more balanced proportion of shares of domestic demand (66.3%) and real exports (33.7%) than that of the ISI era. Yet, the existence of the Asian economic crisis in 1997/1998 and its long recovery process in Indonesia resulted in slowing GDP growth at 4.9% on average between 1986 and 2008.

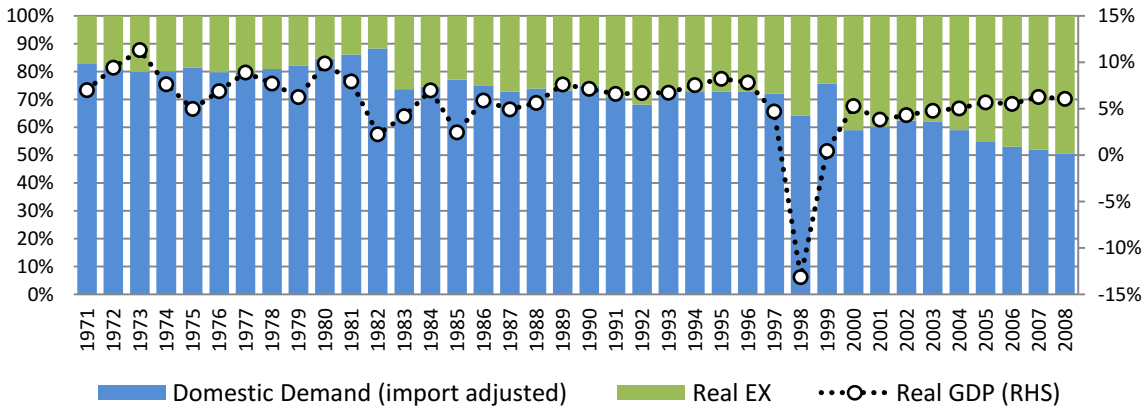


Figure 2.3. Growth of real GDP and share of expenditure components in GDP 1971 – 2008
Source: *World Development Indicators 2009*, calculated.

The 1997/1998 Asian economic crisis was indeed detrimental to Indonesia's GDP

[15] Definition of export-led growth and domestic demand-led growth used in the study as explained in appendix follows definitions proposed by Felipe and Lim (2005). However, instead of using term of *weakly speaking* as they proposed, we prefer a different expression.

leading to a contraction of GDP growth by 13.13%, the sharpest among the four crisis-affected East Asian economies.[16] The crisis occurred initially in second last quarter of 1997 as triggered by financial collapse in Thailand and South Korea affected Indonesian economy deeply, but came with lag. The economy started to decline precipitously in the fourth quarter of 1997, and recorded negative growth over 13.13% (or 14.32% in per capita terms) in 1998 (**Figure 2.3**). The expenditure accounts were dominated by the sharp decline in investment after 1998, and the rising share of consumption during the long recovery period after 2000. The latter was being an economic cushion during the crisis and its recovery period. In the exports sector, there was a competitive boost in exports performance especially on primary exports due to the sharp depreciation in exchange rates.

In the case of Indonesia, exports expansion can be deemed a catalyst for output growth directly as a component of aggregate output, and its share to GDP has been seen as increasing throughout this period. During the period of observation, export contribution rose significantly implying its growing significance to Indonesia's GDP (**Figure 2.1** and **2.2**). From 1986 to 1997 right before the Asian crisis, GDP grew 6.6% on average with the share of exports to GDP rising significantly to 33.7% from the level of 25.7% during ISI era. On average, from 1986 to 2008, exports became the major engines of growth contributing to 56.5% of GDP growth, with share of manufacturing exports in total exports closing at 65% in 2008.[17] In general, an increase in foreign demand for domestic exportable could have a positive impact on overall growth in output via an increase in employment and income in the exports sector and trough provision of foreign exchange

[16] Hill (2007).
[17] Indonesia Statistics or Biro Pusat Statistik (BPS), *Statistical Yearbook of Indonesia 2008*.

which is critical to import capital and intermediate goods and which in turn raises capital formation and thus stimulates output growth.

However, despite its slump during the 1998 Asian economic crisis, real GDP growth recorded far more modest figures compared to the growth of real exports over 38 years of observation (**Figure 2.4**). Based on such casual inspection, one might raise an inquiry whether exports play a significant role as engines of growth. Therefore, it is important to more formally investigate the linkages between exports and economic growth in Indonesia, as well as their causal structure.

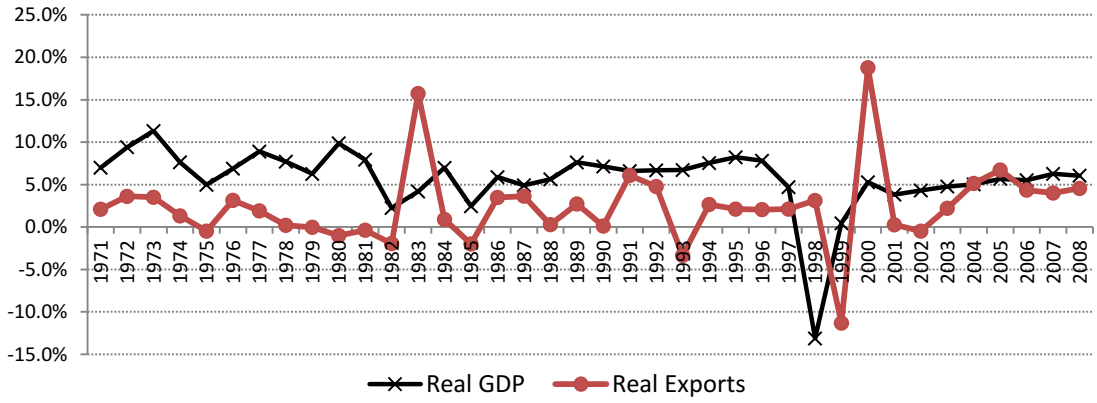


Figure 2.4. Growth of real output and exports (2000=100) 1971 – 2008
Source: *World Development Indicators 2009*, calculated

2.3 Exports and economic growth

2.3.1 Theoretical framework

The ELG hypothesis implies that an increase in exports would lead to an increase in economic growth due to potential positive externalities derived from the exposure to foreign markets. From the model of Keynesian identity of aggregate output, the growth of exports can be attributed to GDP growth. Awokuse (2008) posited that an increase in foreign demand for domestic exportable products could cause an overall growth in output

via an increase employment and income in the exportable sectors.[18] Further, expanded exports could provide foreign exchange which is critical to imports capital and intermediate goods and which in turn could raise capital formation beneficial for meeting expansion of domestic production and thus, stimulating output growth (Balassa, 1978; Esfahani, 1991; Rodrik, 1999). In general, foreign exchange is very important to developing countries for reducing input gaps in development needs. Exports are more efficient to development needs than foreign debt since the latter is subject to adverse shocks of currency that may lead to debt default (ADB, 2005). In a less direct manner, exports can positively contribute to economic growth through various ways. First, an increase in exports could promote specialization in the production of export commodities that in turn may increase the productivity of the export sector. This productivity change could lead to an increase in economic growth. Second, exports expansion may result in efficient resource allocation since it brings incentives for domestic resource allocation closer to international opportunity costs. Hence, it becomes closer to what will generally produce efficient outcome (Bhagwati, 1988). Also, it induces reallocation of resources from the relatively inefficient non-trade sector to the highly productive export sector (Balassa, 1978). Third, exports that are based on comparative advantages would allow the exploitation of economies of scale leading to a consecutive increase in economic growth. Export growth allows firms to take advantage of economies of scale that are external in the non-export sector but internal to the overall economy. This argument, of course, is based on the proposition that world markets are certainly larger than domestic markets allowing

[18] Some scholars might argue an expansion in exporting sectors simply lead to shrinkage in the importing sectors (assuming the production possibility set is unchanged).

for optimal scales to be achieved while increasing returns may take place with access to world markets. Fourth, such exports expansion benefitting from international markets also enables greater capacity utilization by exploiting increasing foreign demands in world markets. Fifth, exports may also give access to advanced technologies, learning-by-doing gains and better management practices, (Tsen, 2010) and stimulation of technological improvements in the economy due to foreign market competition (Helpman and Krugman, 1985) that, consequently, lead to more innovation. In addition, the export-led growth hypothesis could be seen as part of the product and industry life-cycle hypothesis (Tsen, 2010). This hypothesis describes economic growth as a cycle that begins with exports of commodities.

Although exports are important for economic growth, the causal link between them is not necessarily unidirectional as growth in output can also influence exports expansion, or GLE hypothesis. Theoretical justifications for reverse causation from growth to exports have long been discussed in development literature. Kaldor (1967) argues economic growth via increased productivity that in turn translates into reduced unit cost is expected to act as a stimulus to export expansion. Jung and Marshall (1985) point out that internal growth mechanism better explains export growth rather than the reverse. Bhagwati (1988) postulates an idea that the GLE hypothesis is likely, unless antitrade bias results from the economic growth-induced supply and demand. Neoclassical trade theory supports these notions, as it suggests that other factors aside from exports are responsible for economic growth. Economic growth leads to enhancement of skills and technology, and this increased efficiency creates a comparative advantage for the country that facilitates exports.

Venables (1996) further points out that in new trade theory, the market structure and output expansion may trigger significant changes in exports through a process of "cumulative causation." In addition, market failure with subsequent government intervention may also affect GLE hypothesis (Giles and Williams, 2000a, 2000b). Thangavelu and Rajaguru (2004) emphasize that recent research by Clerides et.al. (1998) find little evidence of technological spillovers from exporting activities on domestic firms. In fact, they do find efficient firms self-selecting into the export markets. In this case one would expect causality from economic growth to exports.

A feedback causal (bi-directional) relationship between exports and economic growth might also be the case. Helpman and Krugman (1985) argue exports may rise from realization of economies of scale due to productivity gains. Exports expansion may further enable cost reductions, which in turn may result in further productivity gains. Bhagwati (1988) also points out that an increase in trade will generate more income, which in turn will lead to more trade. Nonetheless, there is potential for no-causal relationship as well between exports and economic growth. This is a plausible case when the growth paths of the two time series are determined by other unrelated variables such as investment in the economy (Giles and Williams, 2000a; 2000b). Thus, to overcome the endogeneity problem, Edwards (1998) suggested time series analysis to study the impact of exports on economic growth.

2.3.2 Review of empirical literatures

The export-growth nexus has been an interesting issue of considerable research in the last two decades. Yet, the empirical evidence on such matters is rather diverse and still

the subject of debate. Awokuse (2008) indicates that, since trade theory does not provide definitive guidance on the causal relationship between trade and output growth, the debate is usually informed by inferences based on anecdotal intuition and empirical analyses.

A large number of empirical studies have been devoted during the last two decades to scrutinize the role of exports on economic growth or ELG hypothesis, using either cross countries or time series data, on the ground of inquiry whether an export-led outward orienting policy is preferable to an inward orienting trade policy. The early studies on this issue scrutinized such relationships based on the simple correlation coefficient between export growth and economic growth.[19] These studies generally concluded that there are strong supports for ELG hypothesis or there is a causative direction running from exports to economic growth based on the fact that export growth and economic growth are highly correlated. The main shortcoming of this group of studies is that high degree of positive correlation between two variables is used as a base to support evidence of ELG hypothesis.

The second group of studies took the approach of whether exports drove output by estimating output growth-regression based on the neoclassical growth accounting techniques of production function analysis, including exports or growth of exports as an additional explanatory variable.[20] The scholars in this group of studies based their conclusion of the evidence of ELG hypothesis on the grounds that firstly, the value of coefficient of export growth variable in the growth accounting Equation exhibited highly significant positive correlations; and secondly, there was a significant improvement in the coefficient of determination in line with the inclusion of export growth variable in the

[19] See for example, Michaelly (1977), Balassa (1978), Heller and Porter (1978), and Tyler (1981).
[20] See, for instance Feder (1982), Balassa (1985), Kavoussi (1984), and Moschos (1989).

regression Equation. The criticism of this group of studies is based on a methodological issue that in general, they authors make *a priori* assumptions that export growth causes output growth and does not consider the direction of causality between the two variables.

The third group of studies had emphasized on the causality between exports growth and economic growth. This approach has been conducted in a number of studies designed to assess whether individual countries showed evidence for the ELG hypothesis using the Granger or Sims tests of causal structure.[21] The recent development in causality test enables scholars to examine both short- and long-run causality between exports and economic growth.

Awokuse (2003) found empirical support for ELG hypothesis for Canada running both in the short and long run. Specific results of Thangavelu and Rajaguru's (2004) study using Granger causality in VAR model for selected Asian countries found empirical evidence of GLE causality in the long run as well as in short run, and no evidence of ELG running either on the short run or long-run for Indonesia. In addition, they found supporting evidence of positive causal structure of imports to economic growth. The results of the study by Mahadevan and Suardi (2008) supported evidence of ELG both in the short and long-run for Japan; bi-directional causality between exports and growth both in short and long run for Korea; GLE and bi-directional in short and long run, respectively for Taiwan; and only GLE in the long run for Hong Kong. Summary of selected previous studies are presented in **Table 2.1**.

[21] Some of such studies include Jung and Marshall (1985), Chow (1987), Bahmani-Oskooee *et al.* (1991), Ahmad and Kwan (1991), and Jin and Yu (1995)

Table 2.1. Selected empirical reviews of ELG hypothesis

Stage	Study	ELG	GLE	2-way	No-cause	Remarks
1st group Model: Mostly OLS	1. Michaelly (1977)	O				Correcting for misspecification in many previous works, he offered either ΔGDP per capita or exports share to GDP
	2. Balassa (1978)	O				It found high correlation between exports shares and ΔGDP
	3. Feder (1982)	O				Exports is significant to growth via increasing MPK and MPL
2nd group Model: Bi-variate Granger's causality model	1. Chow (1987)	O		O	O	1 case of ELG, 1 of no-causality, and 6 of bi-directional
	2. Bahmani-Oskooee et al. (1991)	O		O	O	2 cases of ELG, 2 cases of two-ways, and 15 cases of no-causality among countries.
	3. Riezman et al. (1996)	O	O		O	30 ELGs and 25 GLEs out of 126 countries
	4. Shan and Sun (1998)	O		O		ELG for Taiwan and bi-directional for Hong Kong and Korea
3rd group Model: Multivariate cointegration technique	1. Ahmad and Harnhirun (1995)			O		No co-integration of exports and growth, except in Singapore.
	2. Jin (1995)			O		No co-integration exists.
	3. Islam (1998)	O	O			Out of 15 countries, there is evidence of co-integration in 5 countries. 10 out 15 exist evidence of ELG, and 5 of GLE.
4th group Model: Multivariate co-integration technique with SR and LR causality	1. Ekanayake (1999)	O	O			LR: ELG in all 8 countries, GLE in 7 countries. SR: GLE in 7 countries, and ELG in 2 countries (incl. Indonesia).
	2. Awokuse (2003)	O				ELG exists in Canada both in SR and LR.
	3. Thangavelu & Rajaguru (2004)	O	O	O	O	Mixed results in 9 Asian countries. For the case of Indonesia: GLE in LR and SR
	4. Awokuse (2008)	O	O		O	Columbia: ELG in LR, GLE in SR; Argentina: GLE in SR Peru : no-causality between exports and growth

The major limitation of most causality test results in the first three groups of studies is that the Granger or Sims test used is only valid if the original series are not co-integrated. Therefore one had to check for co-integrating properties of original export and output series before using Granger or Sims tests. Further, this group of studies the mostly employed bi-variate Granger causality test, which failed to consider other relevant determinants of economic growth, such as imports. Riezman *et al.* (1996), Esfahani (1991), and Thangavelu and Rajaguru (2004) all argue that any observed causal link between exports and economic growth may be spurious and thus the interpretation can be misleading since the omission of plausible important variables (imports) may mask or overstate the impact of dynamics between exports and economic growth.

In addition to such criticisms already mentioned above, the particular insights mentioned below are worth considering when scrutinizing ELG hypothesis. First, earlier studies over a cross-section of countries were criticized for their restrictive assumption of parameter constancy across different countries (Awokuse, 2005). This assumption is not always plausible because it implies similar economic structure for diverse sets of countries as well as other important determinants such as similar trade policies across countries observed. As more data becomes available, more recent analyses have focused on single-country studies using time series modeling techniques (Marin, 1992; Awokuse, 2003; 2005). Second, Sheehey (1990) argues that most previous causal link studies in exports and economic growth suffered from improper definition of export expansion and economic growth used in the analyses since exports are components of economic output in GDP accounting identity. The same argument was also pointed out by Greenaway and Sapsford

(1994), who defined such problems as arising due to the endogeneity of the export growth within an output growth Equation. Therefore, any export-growth study which does not consider the endogenous nature of the growth process may be subject to simultaneity and specification bias. Islam (1998) further argues that improper definition of export expansion and economic growth will result in the inevitable high correlation between export and output growth that merely becomes a statistical artifact.[22] Third, previous empirical studies have focused on the HPAEs and other developing economies, and most of them are smaller in terms of economic size, so the question is whether the export-led growth model is valid for a large developing economy. As pointed out by Perkins and Syrquin (1989), there are some differences between large and small economies in adopting the export-led growth model, namely, (i) the larger the size of one country, the stronger the pressure on developing agriculture instead of foreign trade; (ii) the larger nations tend to have less dependency on the overseas market for gaining economic efficiency; and (iii) the larger the economies, the more the variety of goods and services as well as relatively more abundant resources thereby, a lower requirement for trading with other nations.

2.4 Empirical model and data description

2.4.1 Data description

The analysis used in this study covers annual time series between 1971 and 2008 or 37 observations,[23] which should be sufficient to capture the long- and short-run

[22] Alternatively, Islam (1998) proposes to use of exports proportion to GDP following Michaelly (1977), or economic growth is measured by real GDP per capita (or its annual growth). It is also logical to represent economic growth in the non–export component of GDP as suggested by Heller and Porter (1978).

[23] We also considered alternative period of estimation to capture the possible impacts of different trade regime, such as 1971 to 1985 for ISI strategy and 1986 to 2008 for EP strategy, just as what we did in decomposition analysis. However, the former cannot be further processed due to insufficient number of

correlations between exports and economic growth while controlling imports in the model. As indicated by Thangavelu and Rajaguru (2004) and others, detecting the long-run relationship depends more on the relationship between total sample length and the length of the long-run than the mere number of observations. In addition, shorter sample periods in multi-variate VAR might be acceptable since it provides additional observations on the long-run fluctuations.[24] The data set consists of observations for GDP per capita (*GDPC*), gross capital formation (*GCF*), or investment as a proxy for capital (*K*), labor (*L*), exports (*X*), and intermediate imports (*IM*). All data sets, except imports of intermediate goods, are taken from the *World Development Indicators 2009* CD-ROM. Data of imports of intermediate goods, (in US$) are obtained from the *Statistical Yearbook of Indonesia* in various years and is converted into Indonesian rupiah (IDR) using the exchange rate in the period average obtained from IMF-*International Financial Statistics* (IFS). All variables are in natural logarithms. All data, except labor, are deflated using appropriate deflator for each variable to obtain real values in IDR (2000=100). Note that to avoid misspecification in exports-growth definitions argued by Sheehey (1990), this study employs GDP per capita to represent economic growth, which is also as similar of that in previous studies.[25]

2.4.2 Empirical model

Early empirical formulations tried to capture the causal link between exports and economic growth by incorporating exports into the aggregate production function (Balassa,

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observation in VAR system, while the latter one did not perform very well in the empirical work. Therefore, we considered the period of observation used in this study as the best estimate for our objectives.

[24] Masih and Masih (1996) utilize sample of 37 annual observations to study the impact of monetary aggregates on output growth in a VAR framework for the Indonesia economy. Thangavelu and Rajaguru (2004) employ 37 annual observations to study the ELG and ILG hypotheses in selected Asian economies. The sample in this study is comparable with other time series studies related to economic growth.

[25] Ahmad and Kwan (1991), Ahmad and Harnhirun (1995) and Tsen (2010).

1978; Feder, 1982; Kavoussi, 1984; Moschos, 1989). We expand on the growth equation by employing other important variables such as exports and imports in multi-variate time series model. We also include the 1998 Asian economic crisis as a dummy variable to capture the effect of such economic crisis to the explained variables in the VAR model. Therefore, the aggregate production can be expressed in VAR as:

$$S_t = A_0 + A_1 \sum_{j=1}^{p} S_{t-j} + \delta DC_{98} + \varepsilon_t \tag{2.1}$$

Where *St* is a *5 x 1* vector of non-stationary *I*(1) variables of *GDPC*, *GCF*, *L*, *X*, and *IM*. A_0 is a *5 x 1* dimensional vector of constants. A_1 is *5 x 5* matrices of estimable parameters. δ is a *5 x 1* dimensional vector of parameter of DC_{98}. DC_{98} is dummy variable of the Asian crisis of 1998, treated as exogenous with condition during crisis = 1, zero for others. ε_t is vector of independent and identically distributed error terms with white noise properties $N(0,\sigma^2)$.

The use of investment (flow data) as proxy of capital (stock data) in augmented production function within VAR context is justified in Mallick (2001), who postulates that

$$Y_t = A_t K_t^{\gamma} L_t^{\lambda} \tag{2.2}$$

where $\gamma + \lambda > 1$ for endogenous growth, and level of technological progress (*A*) can be influenced by exports (*X*) and imports of intermediate goods (*IM*), so that

$$A_t = X_t^{\theta} IM_t^{\tau} \tag{2.3}$$

At steady state level, capital stock can be approximated by the level of investment, by assuming that

$$\Delta K_t = I_t - \Psi K_t \tag{2.4}$$

Thus, at steady state point, growth of capital is zero ($\Delta K_t=0$) and capital stock converges to equilibrium level (K*), condition of which

$$K^*=\frac{1}{\Psi}I^* \tag{2.5}$$

This implies that in steady state (long-run) the process of capital accumulation is investment-driven. Substituting (2.5) to (2.2) and (2.3), and taking logarithms both sides, yield the following long-term output model (with the inclusion of *X* and *IM*):

$$\ln Y_t=\frac{\gamma}{\Psi}\ln I_t+\lambda\ln L_t+\theta\ln X_t+\tau\ln IM_t \tag{2.6}$$

Now, eq. (2.6) can be estimated empirically within VAR context, which is exactly as (2.1).[26]

The causal linkage between exports and output growth is a long-run behavioral relationship that requires appropriate estimation techniques and properties for long-run equilibrium. Therefore, it is necessary to first test for data properties and co-integration, prior to running the Granger causality analysis.

2.4.2.1 Unit root test

All variables are tested for stationary condition before estimating the VAR model. Stationary test of the variable is first conducted by employing Augmented Dickey-Fuller (ADF) test for testing the null hypothesis of non-stationary (unit roots). Dickey and Fuller (1979) show that under the null hypothesis of a unit root, the appropriate statistic does not

[26] Such a justification, however, may only be valid for long-run perspective as Mallick (2001) strictly assumed. Our current empirical model of (2.1) accepts such a specific yet restricted 'steady state' assumption of capital in long-run. The use of investment (flow) as proxy of capital (stock) data, however, may not perfectly capture export-growth linkage in less long-run time horizon and may cause serious potentiality bias from actual capital growth. Any interpretation for the result generated in short-run perspective should take this limitation into account.

follow the conventional Student's *t*-distribution. Thus, Mackinnon's (1991, 1996) critical values are utilized to test for the significance of the coefficient of the lagged variables. The ADF test constructs a parametric correction for higher-order correlation by assuming that the *y* series follows an autoregressive, AR (*p*), process and adding *p* lagged difference terms of the dependent variable *y* to the right-hand side of the test regression:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \beta_t \Delta y_{t-1} + \beta_t \Delta y_{t-2} + ... + \beta_t \Delta y_{t-p} + \upsilon_t \quad (2.7)$$

Next, Kwiatkowski, Philips, Schmidt and Shin (henceforth, KPSS) test for the null hypothesis of stationary is also performed. The KPSS test is based on the residuals from OLS regression of y_t on the exogenous variables of x_t:

$$y_t = x_t'\delta + \upsilon_t \quad (2.8)$$

The Lagrange Multiplier (LM) statistic is defined as follows:

$$LM = \sum_t S(t)^2 / (T^2 f_0) \quad (2.9)$$

where f_0 is an estimator of the residual spectrum at frequency zero and where $S(t)$ is cumulative residual function:

$$S(t) = \sum_{r=1}^{t} \hat{u}_r \quad (2.10)$$

based on the residuals $\hat{u}_t = y_t - x_t'\hat{\delta}(0)$.

The combination of ADF and KPSS makes it possible to test for both the null hypothesis of non-stationarity and stationarity, respectively. This approach, thus, is very robust in determining the presence of unit roots (Awokuse, 2008). Both ADF and KPSS tests are performed on the levels of $GDPC_t$, GCF_t, L_t, X_t, and IM_t, respectively. The results

of this test at the levels indicated that all the series were non-stationary at five percent level of significance, thus led to test at first differences, which indicated all variables were stationary and integrated of order one or *I*(1). This implies the possibility of co-integrating relationship among the variables. The results of ADF and KPSS test at the levels and first differences are presented in **Table 2.2**.

Table 2.2. Stationary tests

No.	Variable	Augmented Dickey-Fuller test				KPSS test	
		I (0)		*I* (1)		*I* (0)	*I* (1)
		t-statistics	prob.	*t*-statistics	prob.	LM stats	LM stats
1	GDPC	-2.2226	0.2020	-4.1923	0.0023 **	0.7365 **	0.2133
2	GCF	-2.8487	0.0613	-3.9488	0.0043 **	0.6643 **	0.3897
3	L	-0.8856	0.7817	-6.0116	0.0000 **	0.7418 **	0.1889
4	X	-0.4178	0.8957	-6.5085	0.0000 **	0.7318 **	0.0936
5	IM	-2.5204	0.1189	-5.2178	0.0001 **	0.6973 **	0.2390

Notes: 1. ** denotes rejection the null hypothesis of unit roots for ADF test at the 5% significance with 2.945842 critical value.
2. Both stationary tests indicate all series are stationary in first-differenced *I* (1).

2.4.2.2 Co-integration test

In order to capture the dynamics of the relationship between the observed variables, their co-integration relationship was tested through a multi-variate co-integration methodology proposed by Johansen (1990) and Johansen and Juselius (1991). Since the co-integration and error correction model are fairly common and well-documented elsewhere (Engle and Granger, 1987; Johansen and Juselius, 1990; Johansen, 1991), only a brief overview is explained here. Johansen (1991) modeled time series as a reduced rank regression in which they computed the maximum likelihood estimates in the multi-variate co-integration model with Gaussian errors. The advantage of this technique is that it allows one to draw a conclusion about the number of co-integrating relationship among observed variables. Since all the data series in the model were integrated processes of order one or

I(1), the linear combination (co-integrating vectors) of one or more of these series may exhibit a long-run relationship.

In order to use Johansen test, the VAR model of Equation (2.1) needs to be turned into a vector error correction model (VECM). The VECM with co-integration rank *r* for model used in the current study can be expressed as:

$$\Delta S_t = B_0 + \Pi S_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta S_{t-j} + \delta DC_{98} + \upsilon_t \tag{2.11}$$

where Δ is the difference operator. *St* is a *5 x 1* vector of non-stationary *I*(1) variables of $GDPC_t$, GCF_t, L_t, X_t, and IM_t, respectively. B_0 is a *5 x 1* dimensional vector of constants and δ is a *5 x 1* dimensional vector of parameter of dummy variable. DC_{98} is the 1998 Asian economic crisis dummy variable, which is treated as exogenous with condition during crisis equal to 1, others are zero. *Π* is the long-run matrix that determines the number of co-integrating vectors, that consist of α and β' representing speed of adjustment towards long-run equilibrium and long-run parameter, respectively. *Γ* is the vector of parameters that represents the short-term relationship. υ_t is vector of independent and identically distributed error terms with white noise properties $N(0,\sigma^2)$. Equation (2.11) and the residuals are used to compute two likelihood ratio test statistics, the maximum eigenvalue (λ_{max}) statistic, and the trace (λ_{trace}) statistic. The λ_{max} is test the null hypothesis that there are exactly *r* co-integrating vectors in the system. Formula of λ_{max} is given by:

$$\lambda \max = -T \ln(1 - \lambda_r) \tag{2.12}$$

Alternatively, the trace test assesses the hypothesis that the rank of *Π* is less than or equal to *r* co-integrating vectors (i.e. there are at most *r* co-integrating vectors). It can be

expressed as:

$$Trace = -T \sum_{i=r+1}^{n} \ln(1-\lambda_i) \tag{2.13}$$

The results of co-integration tests are presented in **Table 2.3**. The optimal lag length (p) is determined using the Schwartz Information Criterion (SIC), which indicates an optimal lag length of one year.

Table 2.3. Johansen co-integration test

Eigenvalue	H_0	λ_{trace}		λ_{max}	
		Stat	5% CV	*Stat*	5% CV
0.72535	None**	91.5825**	69.8189	46.5212**	33.8769
0.50011	At most 1	45.0613	47.8561	24.9610	27.5843
0.29560	At most 2	20.1003	29.7971	12.6145	21.1316
0.15935	At most 3	7.4859	15.4947	6.2488	14.2646
0.03378	At most 4	1.2370	3.8415	1.2370	3.8415

Notes: 1. ** denotes rejection the null hypothesis of co-integration rank at the 5% significance level.
2. Lag criterion used is based on the Schwartz Information Criterion (SIC).

The results of λ_{max} test and λ_{trace} test both indicate that, there is one co-integrating vector at the 5% level of significance. This means that, there exists a long-run (equilibrium) relationship between exports and economic growth. According to Granger's representation theorem (Engel and Granger 1987), such a co-integrated system can be expressed and estimated as an error correction model (ECM).

2.4.2.3 Multi-variate Granger causality and error correction model

Since all the variables are co-integrated, a proper VAR framework to examine the dynamic relationship between variables must include an ECM (Granger, 1988). It is worth noting that co-integration is a property of long-run equilibrium, while Granger causality is a short-run phenomenon. In this case, the Granger causality in a co-integrated system

involves an estimation of the co-integration relationship and later is followed by testing for non-causality in an ECM framework.

Using an ECM framework one may determine the direction of causation between observed variables while providing estimates on both long-run and short-run patterns. Co-integration provides information about long-run relationships among variables while Granger causality test provides information on short-run dynamics. In the above VECM framework, $\Delta GDPC_t$, ΔGCF_t, ΔL_t, ΔX_t, and ΔIM_t are influenced by both long-term error correction terms contained in Π and short-term difference lagged variables of $\Delta GDPC_{t-j}$, ΔGCF_{t-j}, ΔL_{t-j}, ΔX_{t-j}, and ΔIM_{t-j}. Using ECM formulation in Equation (2.11), the coefficient matrix Π reintroduces the long-run information in the levels of the variables that are lost in first differencing, and thus providing an additional channel for detecting causal linkages. Further, the standard Granger causal structure can be examined by testing the joint significance of the coefficient matrix. Hence, by using an ECM framework, one can test causal relationships between exports, imports, and economic growth through two potential channels. Awokuse (2008) further argued that for each variable in the system, at least one channel of causality is active: either in short-run through joint test of lagged differences or via a statistically significant lagged error correction term (ECT). Following insights of Thangavelu and Rajaguru (2004), the long-run causality between variables are determined by joint significance of the respecting co-integrating vectors (β) and the error correction coefficient (α). The Wald test statistics (χ^2) was employed to establish the short-run causality between two variables. The direction of the short-run causality was established by the sign of sum of estimated coefficient Γ_j in the VECM.

However, just like most standard VAR, the individual coefficient of an ECM is sometimes difficult to interpret. According to Lutkepohl and Reimers (1992), impulse response function (IRF) can also be utilized to summarize the relationship between variables in a co-integrated system. Riezman *et.al.* (1996) points out after the detection of causal pattern, the magnitude of the causal structure could be scrutinized either by analysis of IRF or through using forecast error variance decompositions (FEVD). To ensure that the VECM innovations are not correlated contemporaneously, the generalized impulse response function (GIRF) proposed by Koop *et.al.* (1996) and Pesaran and Shin (1998), was used in the study to identify the structure of VAR innovation.

Awokuse (2008) emphasizes the preference of GIRF approach to application of Choleski factorization of the reduced form error covariance matrix due to its invariance to variables ordering. He further argues that such an approach is preferable especially when the residual covariance is non-diagonal, which makes it to be less subjective or arbitrary, as theory does not always yield a clear identification of causal structure.

2.5 Empirical results and discussion

2.5.1 Long- and short-run relationship among exports, imports and GDP per capita

Result of previous co-integration tests as presented in **Table 2.2** indicates that there exists a long-run (equilibrium) relationship between exports and economic growth, and such long-run relationship (co-integrating equation) can be expressed as follows:

$$\begin{array}{lcccccc} \mathbf{GDPC} = & \mathbf{-6.782} & \mathbf{+0.340\ GCF***} & \mathbf{+0.170\ L**} & \mathbf{+0.275\ X***} & \mathbf{-0\ .042\ IM} & \mathbf{+\varepsilon} \\ & & [9.66955] & [2.07228] & [8.15423] & [\ 1.08309] & \end{array}$$

Notes: numbers in parentheses are *t*-statistics
*** and ** denote significant at 1% and 5% level of significance, respectively.

This co-integrating equation represents the long-term elasticity among variables implying that there are 0.34%, 0.17%, and 0.275% positive change in GDP per capita due to one percent change in investment, labor and exports, respectively. On the other hand, if there is a 1% increase in imports of intermediate goods, it will reduce 0.042% of GDP per capita in long run. These results, except imports of intermediate goods, are significant at least at the 5% level of significance. Based on these co-integration tests and results of co-integrating equations we can safely conclude that, there is positive relationship between exports and GDP per capita, and negative relationship between intermediate imports and GDP per capita in the long run.

The results of relationships among variables in long- and short-run can be expressed in VECM (1) form as follows:

$$\begin{bmatrix} \Delta GDPC \\ \Delta GCF \\ \Delta L \\ \Delta X \\ \Delta IM \end{bmatrix} = \begin{bmatrix} 0.045 \\ 0.081 \\ 0.034 \\ -0.038 \\ -0.017 \end{bmatrix} + \begin{bmatrix} \boldsymbol{-0.131*} \\ \boldsymbol{-0.326} \\ \boldsymbol{0.005} \\ \boldsymbol{1.118*} \\ \boldsymbol{0.291} \end{bmatrix} \begin{bmatrix} 1.000 & -0.340* & -0.170* & -0.275* & 0.042 \end{bmatrix} \begin{bmatrix} GDPC_{t-1} \\ GCF_{t-1} \\ L_{t-1} \\ X_{t-1} \\ IM_{t-1} \end{bmatrix}$$

$$+ \begin{bmatrix} 0.137 & 0.021 & -0.230 & 0.032 & -0.036* \\ 0.94* & 0.159 & -0.965 & -0.017 & -0.230 \\ -0.245* & 0.035 & -0.019 & -0.015 & 0.003 \\ 1.092* & 0.285 & 1.158 & -0.073 & -0.016 \\ 2.601* & 0.759* & 0.692 & -0.050 & 0.039 \end{bmatrix} \begin{bmatrix} \Delta GDPC_{t-1} \\ \Delta GCF_{t-1} \\ \Delta L_{t-1} \\ \Delta X_{t-1} \\ \Delta IM_{t-1} \end{bmatrix} + \begin{bmatrix} -0.196* \\ -0.551* \\ -0.018 \\ 0.068 \\ 0.275* \end{bmatrix} DC_{98}$$

Notes: * denotes significant at least at the 10% level of significance; numbers in bold and italicized represent coefficient of error correction term (α)

These results suggest that there is negative relationship between intermediate imports and economic growth in the short run, but no evidence of ELG hypothesis in the short run. The coefficient of error correction term (ECT) with *GDPC* as dependent variable is statistically significant at the 5% level of significance and its sign is negative (correct) implying that there is a mechanism to converge such short-run dynamics into long-run

equilibrium. Meanwhile, GDP per capita contributes positively to intermediate imports, which is significant at the 1% level of significance. The adjustment parameter coefficient is 0.131, implying that 13.1% shocks will be converged towards long-run equilibrium in the first period. In the short run, GDPC has a positive relationship with growth of exports, and its ECT coefficient is statistically significant, yet the sign is positive (not correct) implying that the shock occurs merely in the short run. The dummy coefficient of the 1997/1998 Asian economic crisis is negative and statistically significant at the 1% level of significance implying that the economic crisis was significantly detrimental to GDP per capita. All of those findings seem to be in accordance with the theoretical basis.

2.5.2 Causality results

Table 2.4. Multi-variate Granger causality test based on VECM

	Dependent variables				
Independent variables	GDPC	Investment	Labor	Exports	Int. imports
GDPC	-	3.9806** (0.0460)	5.186** (0.0228)	**2.8810*** **(0.0896)**	**5.2974**** **(0.0214)**
Investment	0.2669 (0.6054)	-	0.9890 (0.3200)	1.8193 (0.1774)	4.1737** (0.0411)
Labor	1.0266 (0.3110)	1.2973 (0.2547)	-	1.0008 (0.3171)	0.1159 (0.7335)
Exports	**1.4500 (0.2285)**	0.0293 (0.8641)	0.4445 (0.5049)	-	**0.0435 (0.8349)**
Int. imports	**4.9582**** **(0.0260)**	14.715*** (0.0001)	0.0366 (0.8484)	**0.0391 (0.8432)**	-
ECT	**[-2.015]****	[-1.333]	[0.102]	[3.560]***	[0.496]

Notes: Upper values are χ^2 statistics; numbers in parentheses are value of probability; numbers in brackets of ECT are *t*-statistics; numbers in bold represent evidence of causality/non-causality among *GDPC, X*, and *IM*.
*,**,*** denote significant at 10%, 5% and 1% level of significance, respectively.

Table 2.4 presents the results of the test of the joint significance of the lagged difference variables and the error correction terms using χ^2-statistics[27] and *t*-statistics, respectively. To be consistent with the purpose of current study, the analysis of such results only emphasizes on causality nexus between economic growth, exports, and imports.

The results show that, error correction term for co-integrating equation with GDP per capita as a dependent variable is significant at five percent level of significance, implying that there exists a long-run causality running from exports and imports to GDP per capita. Intermediate import also exhibits an evidence of Granger causality to GDP per capita in the short run. However, there is no evidence for Granger causality running from exports to GDP per capita in the short run.

Meanwhile, the coefficient of error correction term with exports as dependent variable is statistically significant, yet the sign is positive, which is not correct. This finding is in accordance with the results of the co-integration test implying that only one co-integrating equation runs in the long run. However, there is a unidirectional causality running from GDP per capita to exports (or GLE) in the short run and no evidence of anything otherwise.[28] These results of causality confirm the findings of Ahmad and Harnhirun (1996) and Thangavelu and Rajaguru (2004). Interestingly, there is an evidence of bi-directional causality between imports and economic growth in the short run.

[27] We also considered an alternative test of Granger causality test based on VECM using F-stats. In relation to exports and economic growth, the conclusion generated by using F-statistics is not much different with that of using χ^2. However, the result indicates that there is a unidirectional causality between imports and growth running from GDP per capita to imports, and no evidence for otherwise.

[28] As previously notified, using investment as proxy for capital may cause serious potentiality bias from actual capital growth. As a balanced effort, we also conducted an alternative re-estimation of VECM model by employing capital stock rather than investment data. However, our experiment with such an alternative model yielded inferior result as compared to the model considered here. The details are disclosed in **Appendix A.2.2** to the present chapter.

Based on the above results we can construct a summary of the causal relationship between GDPC, exports, and intermediate imports representing long-run and short-run causality as presented in **Table 2.5**. These results indicate that first, the result of the joint significance of the respecting co-integrating vectors (β) and the error correction coefficient (α) confirm that exports positively contribute to economic growth in the long-run thereby, supporting the ELG hypothesis. However, there is no evidence for such causal link in the short run. In fact, it is economic growth that plays a significant positive role in contributing to growth of exports or the GLE hypothesis in the short run. Thus, overall, we can safely conclude that exports and economic growth exhibit a feedback relationship running ELG in the long run and GLE in the short run. This means that in short-run, the performance of exports can in fact be stimulated by increasing the productivity of internal demand to generate more quality export supply as neoclassical trade theory proposes. Meanwhile, in long-run, the performance of exporting behavior will induce more economic growth through accumulative learning process and innovation driven by competition dynamics in world market. Second, imports of intermediates play a significant role in determining economic growth both in long- and short-run, which are negative throughout. Meanwhile, there is a positive role of economic growth that determines growth of imports of capital and intermediate goods in the short run.

Table 2.5. Short- and long-run causality in VECM – GDPC, exports and imports

	X → GDPC	GDPC → X	IM → GDPC	GDPC → IM
Overall	O	O	O	O
Long-run	positive	-	negative	-
Short-run	-	positive	negative	positive

O indicates the presence of at least one Granger causal link

2.5.3 Generalized impulse response function

Those causal analyses can be extended to provide more insight into how shocks to exports and imports affect economic growth, *vice versa*, by examining the impulse response function. An impulse response function traces the effect of a one-time shock to one innovation on current and future values of endogenous variables. For completeness, impulse responses are provided for each of the five variables in the system. Nevertheless, the emphasis is only placed on the relationship between the variables of interest in the study, namely exports, imports and GDP per capita. The simulation in the GIRF covers ten years in order to reflect a typical business cycle and ensure adequate time for tracing the effect of innovations on variables in the system, as presented in **Figures 2.5**.

First panel of **Figure 2.5** contains the response of GDP per capita. It can be seen that a positive shock to real exports results in positive response of the GDPC. In order to examine for reverse causal structure from GDP to exports, the responses of exports and imports are reported in fourth panel. The result indicates that export corresponds positively to a positive shock in GDPC growth throughout all observation periods.

The findings from first and fourth panels provide no strong supporting evidence of merely ELG hypothesis being applicable to the Indonesia case. In fact, they exhibit evidence of a positive feedback causal-effect (bi-directional) between exports and GDP per capita runs throughout all observation periods. This is in accordance with the earlier conclusion for a bi-directional relationship between exports and economic growth generated from Granger causality result. The bi-directional relationship is plausibly true for the case of developing countries whose domestic markets are significant like Indonesia.

This implies that the producers may have the flexibility to shift production from domestic to foreign markets, and vice versa. Thus, both foreign and domestic demands may have positive impact for production of tradable.

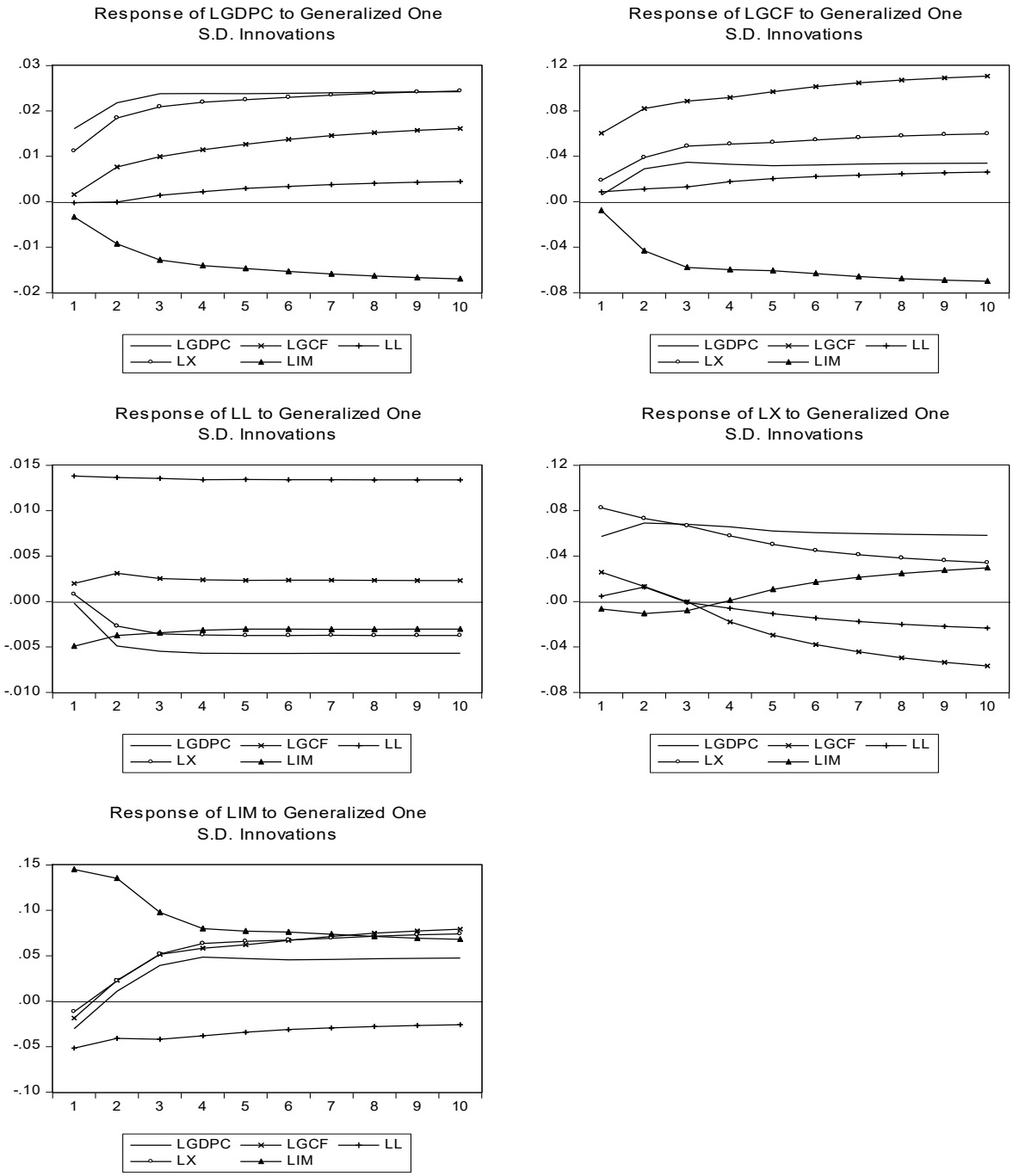


Figure 2.5. Generalized impulse responses to one standard deviation of innovation in ECM

The following reasons are (a) the export sector may have significant impact to fuel the economy when domestic demand is in contraction. As pointed out by Aswicahyono and Pangestu (2000) and Hill (2007), Indonesia's economic condition especially during the recovery process post the 1998 crisis has been dependent on the growth of the export sector since domestic demand collapsed and led manufacturers to shift sales from domestic to export markets; (b) export enables domestic production to achieve economies of scale and to obtain foreign exchange to finance imports for consumption and production of tradable goods. As domestic consumption increases, it then stimulates domestic production and thus, economic growth. Moreover, an increase in domestic production would lead to an increase in the capability of domestic producers to increase their exports (Tsen, 2010); (c) results of GDP decomposition analysis indicated there were changes in growth patterns during the period of observation, which is seemingly domestic demand-led growth during the implementation of the ISI strategy, while during the EP era, the market was dominated by real exports or seemingly export-led growth (**Figure 2.1**).

Intermediate imports also exhibit a bi-directional relationship running negatively from intermediate imports to GDP per capita. From the first panel, it is clear that the response of GDPC to a shock of imports is negative throughout all periods. Meanwhile, intermediate imports have an initial small negative response to GDP per capita shock that becomes positive after the second period as indicated in the fifth panel. This evidence is consistent with our earlier findings from the Granger causality test, which provided evidence supporting a bi-directional relationship between imports and economic growth. It is worth noting that in contrast with study of Thangavelu and Rajaguru (2005), who

conclude that imports tend to have a significant positive effect on productivity growth (ILG) for most of the Asian countries under study, this paper does not support one channel through which trade may raise the standard of living, since we found no supporting evidence of positive causality from intermediate imports to GDP per capita. Nevertheless, such finding is in accordance with part of their results, which did not find any ILG for Japan.

In addition, the relationship between exports and imports are also examined using the GIRF analysis. In the fourth panel, a negative shock to imports of intermediate goods resulted in an initial "small" negative, response from the growth of real exports, which became positive after four years. On the other hand, the response of imports of intermediate goods to a shock in exports is a relatively larger and positive response throughout the period as indicated in the fifth panel. This is plausibly due to the significant role of intermediate imports component in the exports' product structure, which is also argued by Aswicahyono and Pangestu (2000). This is especially true for exports of more technology- and capital-intensive commodities such as processed food; electronics (including semiconductors); and automotive parts. Data from the Statistical Yearbook of Indonesia 2008 indicates that the average of import value registered as US$ 41,942.1 million annually for the last ten years. Import of raw material/auxiliary goods registered as US$ 32,236.1 million, and import of capital goods was US$ 6,250.7 million. This means that they contributed 76.78%, and 14.96% of total imports, respectively. In this period, import of raw material/auxiliary goods and import of capital goods had a positive growth amounting to 8.92% and 7.71% annually. In similar vein, data from *OECD Structural*

Analysis (STAN) I-O database as presented in **Table 2.6** indicates that overall Indonesian export of manufactures requires 23,2%, 27,8%, and 24,5% of import contents during mid 1990s, early 2000s, and mid-2000s, respectively. The figures of import content are even higher for high- to med-high technology manufactures, which exhibits 38.4% and 35.5% for mid 1990s and mid 2000s respectively.

Table 2.6. Import contents of Indonesia export of manufactures

Industry	ISIC	mid-1990s	early 2000s	mid-2000s
Textiles, textile products, leather and footwear	17, 19	26.40%	29.27%	24.41%
Wood and products of wood and cork	20	10.00%	15.03%	14.84%
Pulp, paper, paper products, and printing	21, 22	22.79%	34.22%	25.14%
Chemicals and chemical products	24	32.00%	26.89%	33.10%
Rubber and plastics products	25	23.00%	30.31%	30.09%
Other non-metallic mineral products	26	12.62%	14.69%	15.70%
Basic metals	27	22.15%	23.93%	22.48%
Fabricated metal prod. exc. machinery and equip	28	22.80%	30.24%	27.67%
Machinery and equipment n.e.c	29	49.86%	56.72%	50.41%
Office, accounting and computing machinery	30	58.98%	43.94%	..
Electrical machinery and apparatus n.e.c	31	29.20%	35.18%	30.59%
Radio, television and comm. equipment	32	41.14%	31.78%	33.24%
Medical, precision and optical instruments	33	57.95%	26.92%	27.05%
Motor vehicles, trailers and semi-trailers	34	42.69%	13.04%	39.60%
Other transport equipment	35	22.72%	28.52%	27.13%
Manufacturing n.e.c; recycling	36, 37	31.63%	21.75%	19.12%
MANUFACTURES	15 – 37	23.19%	27.76%	24.46%
HIGH/MED HIGH TECH. MANUFACTURES	24, 29-33, 35	**38.35%**	**35.72%**	**35.47%**
LOW/MED. LOW TECH. MANUFACTURES	15-23, 36	**19.57%**	**24.30%**	**21.27%**
ICT MANUFACTURES	30, 32, 33	43.01%	31.81%	32.91%

Source: OECD *STAN I-O* database

Consistent with our previous findings of negative causality from intermediate imports to GDP per capita, such heavy reliance on imported inputs may have detrimental

effect to long run economic growth if such intermediate imports consume much of the country's foreign reserves. This might be worse if at the same time, there is no expansion in exports value generated from increasing exports volume or favorable export-commodity prices as well as an expansion in the country's exports market.

2.5.4 Policy implications

For policy implications, it is worth noting that although there are empirical evidences of ELG in previous studies, we find supporting evidence of ELG in Indonesia merely in the long run, while confirming evidence for GLE in the short run. Our findings indicate the significance of both exports and economic growth to the economy of Indonesia as indicated by the GIRF analysis. Therefore, a balanced emphasis on the role of exports as well as the importance of the domestic market can be crucial for successful and sustained economic development. Despite its benefits, the intermediate imports should be well-managed. This is because, in the long run, high dependence on imported inputs may be detrimental to economic growth in Indonesia if such intermediate imports consume too much of the country's foreign reserves. Therefore, the government should be able to induce more export revenues by promoting competitive export sectors as well as encouraging exporters to enhance export penetration. In accordance with insights of Aswicahyono and Pangestu (2000), it has been suggested that the government of Indonesia should continue with the ideal strategy for reducing tariff levels that affect core inputs and components used in export production. It can be simultaneously enhanced by providing right incentives for the development of an efficient and viable export-supporting industry.

2.6 Concluding remarks

In this paper, we review the ELG hypothesis in Indonesia using a neoclassical growth modeling framework and multivariate co-integrated VAR methods. The analyses focuses on dynamic causal relationship between GDP per capita, exports, intermediate imports, capital, and the labor force.

The result of the joint significance of the respective co-integrating vectors and the ECT further confirmed that exports positively contributed to economic growth supporting the ELG hypothesis in the long run. However, results from the Granger causality test on VECM suggest GLE causal structure in the short run. From these findings, we can safely conclude that exports and economic growth exhibit a feedback (bi-directional) relationship running ELG in long run and GLE in short run. The result of the GIRF reinforces the conclusion of the Granger causality analysis which provides support for bi-directional causal structure between exports and economic growth. In relation to import and growth, intermediate imports also exhibit a bi-directional relationship with GDP per capita. This evidence confirms the importance of imports of capital and raw material goods in the production of tradable goods as well as in the exports product structure in Indonesia. Nevertheless, highly propensity of intermediate imports may be detrimental to long run economic growth as is confirmed by co-integration test and VECM result. Thus, further development in exports-supporting sectors especially in manufacturing related industry is required for maintaining sustained economic growth.

Generally, the findings in this study may shed some light in confirming Perkins and Syrquin's (1989) argument that a bigger country may rely to a lower extent on foreign

markets. Even though, ELG hypothesis may still valid for propelling economic development in developing countries with large domestic market like Indonesia, the evidence of bi-directional causal structure between export and economic growth, yet, suggests that maintaining some sound balance between foreign demand and domestic demand management is deemed compulsory to supplement for export promotion strategy in Indonesia. In addition, imports of capital and intermediate goods should be well-managed since it is detrimental to long-run economic growth. Thus, the development of an efficient and viable export-supporting industry becomes important.

At present moment, all evidences in this chapter are just preliminary results of the importance of exports on economic development in Indonesia by showing that the ELG hypothesis is valid for Indonesia with the conditionality of ELG in long-run and GLE in short-run. The bi-directional causality between exports and economic growth provides some imperative to pursue extended analysis on how and to what extent foreign- and domestic demand contribute to export performance.

The following **Chapter 3** will be devoted to scrutinize the impact of foreign and domestic demand on economic performance.

A.2 Appendix

A.2.1 Decomposition analysis of demand-side growth accounting

In this section, we perform a growth accounting analysis on the component of demand side of real output, given by the national income and product account as:

$$GDP \equiv Y \equiv C_p + C_g + I + X - M \tag{A.2.1}$$

where GDP stands for gross domestic product, Cp is private consumption, Cg is government consumption, I is gross domestic investment or gross domestic capital formation, and X and M are exports and imports of goods and service, respectively. In growth rate terms:

$$GDP \equiv (\frac{C_p}{GDP})x\hat{C_p} + (\frac{C_g}{GDP})x\hat{C_g} + (\frac{I}{GDP})x\hat{I} + (\frac{X}{GDP})x\hat{X} - (\frac{M}{GDP})x\hat{M} \tag{A.2.2}$$

where, the symbol ^ denotes growth rate of respective variable.

The above simply states that the growth rate of GDP is the sum of the products of the shares in GDP times the growth rate of private and government consumption, growth domestic investment and exports, less the product of the share of imports and its growth rate. However, in spirit of Kranendonk and Verbruggen's work (2008), we modify above Equation to differentiate between total domestic and foreign demand (proxied by exports) so that the growth rate of GDP is the sum of the products of the shares in GDP times the growth rate of private and government consumption, and domestic investment less the product of the share in GDP times the growth rate of imports, which represent total domestic demand, plus the products of the share of exports to GDP times its growth rate.

Average annual growth rate of a variable, denoted $\hat{x}$, was derived, say for 1971 to 1985 (under ISI strategy), as: $\hat{x} = (((x_{1985} - x_{1971}) / x_{1971}) * 100) / 15$

The rest definitions provided here are following Felipe and Lim (2005). We will refer to an exports-led development growth strategy as one that results in:

a) high export growth accompanied by high GDP and income growth;

b) improvement in export growth.

Conversely, we will say that growth is *strictly speaking* domestic demand-led if domestic demand is growing, accompanied by GDP and income growth. The right-hand side of growth identity or consumption of private and government sector plus investment are domestic demand, then minus imports is net domestic demand component, while exports represents foreign demand that positively contributes to GDP growth. Thus the following cases can arise:

1. Domestic demand is growing and exports are deteriorating (becoming a smaller positive number or larger negative number). If GDP growth is positive then growth must be domestic demand-led.

2. Domestic demand and exports are growing. Thus, growth is due to both domestic demand and exports. Which one is contributing more to economic growth is simply the matter of an empirical issue. If domestic demand is growing faster, we will say that growth is *weakly speaking* or *seemingly* demand-led.

3. Domestic demand is deteriorating and exports are increasing. If growth is positive (which is often not the case since domestic demand is usually a much larger

component of GDP), growth must be export-led. If growth is negative, the recession is due to decline in domestic demand.

4. Both domestic demand and exports are decreasing. Obviously, we have an economic recession and negative growth rates are due to declines in both domestic demand and exports.

A.2.2 Result of VECM using capital stock data

Considering the restricted 'steady state' assumption of capital stock data (as discussed in Mallick, 2001) may only be appropriate for long-run estimation, we altered our empirical model of (2.1) using capital stock data (CAP) to replace investment (GCF) to observe whether the result become significantly different. The non-residential capital stock data of Indonesia in IDR (2000=100) was taken from van der Eng (2010). Capital stock data was transformed into natural logarithm prior to be employed in the estimation model of Equation (2.1). The results are as follows.

Table A.2.7. Stationary test for capital data

No.	Variable	Augmented Dickey-Fuller (ADF) test				KPSS test	
		I (0)		*I* (1)		*I* (0)	*I* (1)
		t-statistics	prob.	*t*-statistics	prob.	LM stats	LM stats
1	CAP	-0.3098	0.9139	-2.7933	0.0695 *	0.5526 **	0.1634

Notes: 1. * and ** denotes rejection the null hypothesis of unit roots for ADF test at the 10% significance with 2.6129 critical value, and for KPSS test at the 5% significance level with 0.463 critical value, respectively.
2. Both stationary tests indicate all series are stationary in first difference I (1).
3. The result for other variables remains the same with that of **Table 2.2**.

The stationary test result based on ADF and KPSS tests at the level and first-differenced data indicates that capital stock data is stationary and integrated of order one or *I*(1). Along with other *I*(1) variables of GDPC, L, X and IM, it implies the possibility of

co-integrating relationship among the variables. The result of co-integration test is presented in **Table A. 2.8** with optimal lag length (*p*) of two year based on SIC.

Table A.2.8. Co-integration test after employing capital stock data

Eigenvalue	H_0	λ_{trace}		λ_{max}	
		Stat	5% CV	*Stat*	5% CV
0.71465	None**	87.7180 **	69.8189	43.8919**	33.8769
0.55073	At most 1	43.8262	47.8561	28.0058**	27.5843
0.29717	At most 2	15.8216	29.7971	21.1316	21.1316
0.08718	At most 3	3.4795	15.4947	14.2646	14.2646
0.00817	At most 4	0.2870	3.8415	3.8415	3.8415

The result of co-integration test produced conflicting result. The result of λ_{trace} test indicates of one co-integrating vector, while result of λ_{max} test conclude of two co-integrating vector at the 5% significance level. Cheung and Lai (1993), among others, suggest the preference over the λ_{trace} test due to its ability to show more robustness to both skewness and excess kurtosis in the residuals than the λ_{max} test.[29] In view of its better properties, we are in favor of the result of λ_{trace} test, which suggests a unique one co-integrating vector similar to that of our previous co-integrating result using investment data.

Result of previous co-integration tests as presented in **Table A.2.8** indicates that there exists a long-run (equilibrium) relationship between exports and economic growth that can be expressed as follows:

$$\mathbf{GDPC} = \underset{}{\mathbf{18.981}} + \underset{[9.3113]}{\mathbf{0.136CAP}^{***}} + \underset{[17.3378]}{\mathbf{1.316\ L}^{***}} + \underset{[4.6620]}{\mathbf{0.138\ X}^{***}} + \underset{[\ 3.8124]}{\mathbf{0\ .070\ IM}^{***}} + \boldsymbol{\varepsilon}$$

Notes: numbers in parentheses are *t*-statistics
*** denotes significant at the 1% level of significance.

[29] Enders (1995), on contrast, asserts that the λ_{max} test has a sharper alternative hypothesis than λ_{trace} test and thus should be preferred in deciding the number of co-integrating vector (pp. 393). If we accept such a proposition, however, we are required to conduct over-identifying restriction on each co-integrating vector of VECM model, approach of which should only be guided by any plausible, related theory. This may cause some additional complexities in our estimation attempt.

This co-integrating equation represents the long-term elasticity among variables implying that there are 0.136%, 1.316%, and 0.138% positive change in GDP per capita due to one percent change in capital, labor and exports, respectively. On contrast to our previous VECM result using investment data, there is a significant influence of intermediate imports at the 1% significance level on GDP per capita resulting 0.070% positive changes in the long run. This result, in regard to export-economic growth linkage, is in accordance with our previous result employing investment data, which indicates the significant evidence of positive influence of exports promotion on long-run income per capita growth. Nevertheless, the following result of relationships among variables in long- and short-run within VECM (2) framework indicates that the coefficient of ECT is not significantly different from zero. This implies that there is no significant dynamic adjustment or mechanism to converge such short-run relationship dynamics among variables into long-run equilibrium.

the insignificant ECT of first co-integrating equation

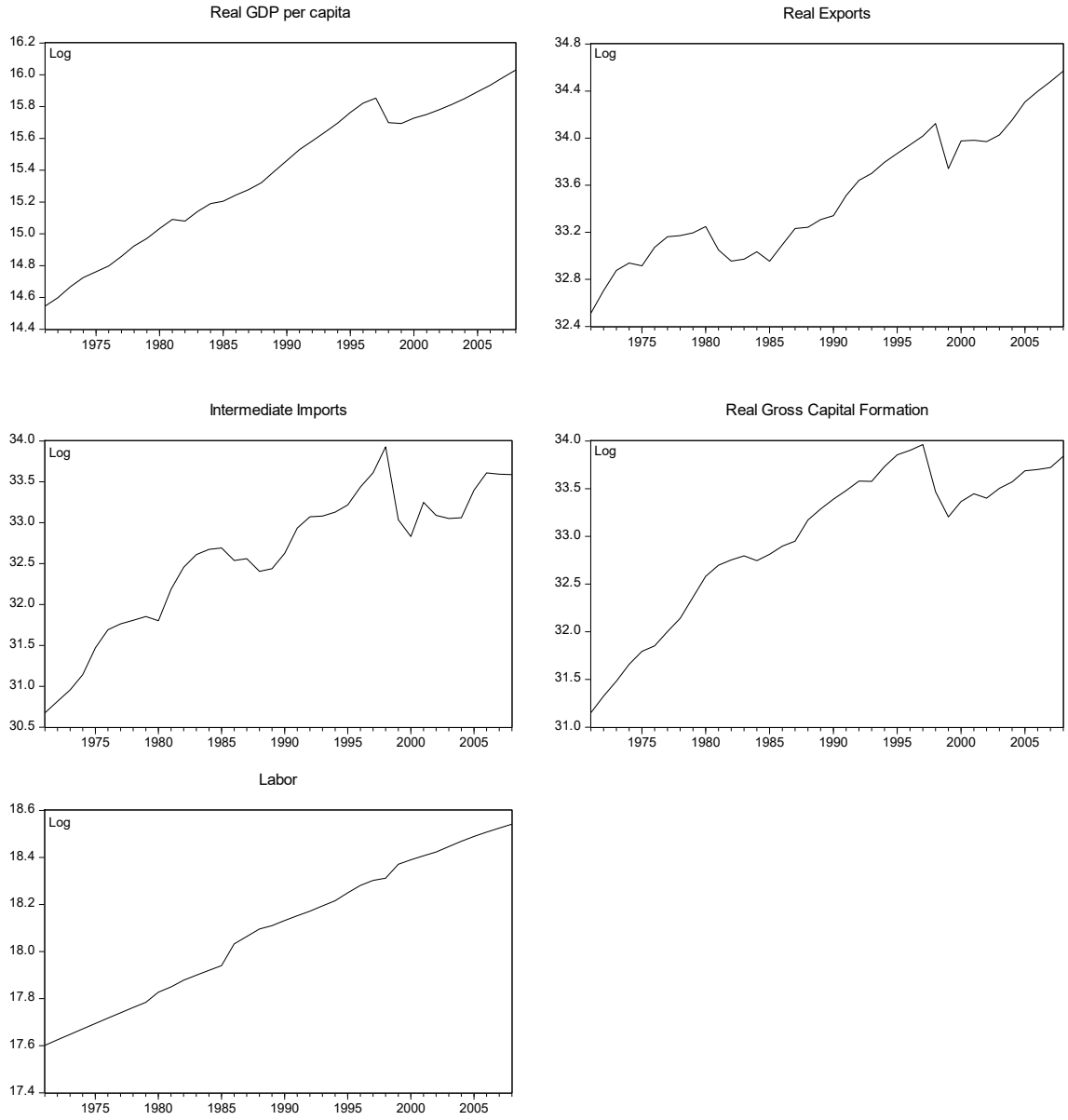
$$\begin{bmatrix} \Delta GDPC \\ \Delta CAP \\ \Delta L \\ \Delta X \\ \Delta IM \end{bmatrix} = \begin{bmatrix} 0.048^{*} \\ 0.030 \\ 0.043^{*} \\ 0.056 \\ -0.196^{*} \end{bmatrix} + \begin{bmatrix} \boldsymbol{-0.081} \\ \boldsymbol{1.547^{*}} \\ \boldsymbol{0.249^{*}} \\ \boldsymbol{-0.998^{*}} \\ \boldsymbol{-1.585^{*}} \end{bmatrix} \begin{bmatrix} 1.000 & -0.136^{*} & -1.316^{*} & -0.138^{*} & -0.07^{*} \end{bmatrix} \begin{bmatrix} GDPC_{t-1} \\ CAP_{t-1} \\ L_{t-1} \\ X_{t-1} \\ IM_{t-1} \end{bmatrix}$$

$$+ \begin{bmatrix} 0.273^{*} & 0.002 & 0.065^{*} & 0.004 & -0.359 & -0.034 & 0.049 & -0.046 & -0.020 & 0.016 \\ -1.309^{*} & -0.741 & 0.289^{*} & 0.176 & -2.219 & 1.537 & 0.707^{*} & 0.205 & 0.164 & -0.190^{*} \\ -0.419^{*} & -0.005 & -0.021 & 0.025 & 0.080 & -0.188 & 0.020 & 0.083^{*} & -0.018 & -0.019^{*} \\ 2.455^{*} & -0.834 & 0.262 & 0.100 & -0.392 & -0.878 & -0.174 & -0.33. & 0.068 & 0.011 \\ 6.057^{*} & 1.837 & -0.074 & -0.048 & 1.523 & -0.790 & -0.601^{*} & -0.965^{*} & 0.163 & -0.077 \end{bmatrix} \begin{bmatrix} \Delta GDPC_{t-1} \\ \Delta GDPC_{t-2} \\ \Delta GCF_{t-1} \\ \Delta GCF_{t-2} \\ \Delta L_{t-1} \\ \Delta L_{t-2} \\ \Delta X_{t-1} \\ \Delta X_{t-2} \\ \Delta IM_{t-1} \\ \Delta IM_{t-2} \end{bmatrix} + \begin{bmatrix} -0.201^{*} \\ -0.243^{*} \\ -0.018 \\ 0.084 \\ 0.309^{*} \end{bmatrix} DC_{98}$$

Note: * denotes significant at least at the 10% level of significance; numbers in bold and italicized represent coefficient of error correction term (α).

Since the ECT of first co-integrating vector (-0.081) is not significantly different from zero, we are not able to draw further conclusion upon the impact of relationship among variables differentiated in long- and short-run time perspective. Following our initial objective, the interpretation of the present chapter thus is derived based mainly upon the result of VECM employing the investment data.

A.2.3 Data pattern (in natural logarithms)



CHAPTER 3

FOREIGN- AND DOMESTIC-DEMAND INFLUENCE: DO THEY MATTER FOR EXPORTS PERFORMANCE?

Preceding chapter was able to provide supporting evidence on the validity of ELG hypothesis for developing countries with large economic size like Indonesia. As previous causality evidence exhibited bi-directional causal structure between exports and economic growth, maintaining some sound balance between foreign demand and domestic demand management, accordingly, is important to supplement for ELG strategy. The present chapter is thus devoted to further scrutinize the impact of foreign- and domestic demand on export performance. In order to grasp a fruitful inference based on clear and reliable economic analysis, such foreign and domestic demand factors are best approximated by typical trade variables of price and income factors within the context of demand and supply model of exports.

3.1 Background

A large number of empirical studies have been devoted during the last three decades to scrutinize the role of exports on economic performance, using either cross countries or time series data, on the ground of inquiry whether an outward oriented or EP policy is preferable to an inward-oriented or ISI trade policy. These studies even had their

amplification, as in particular, the successful economic performance of the so-called HPAEs lent support to the idea that export promotion can be an effective development strategy. Nevertheless, the preference over either EP or IS policy requires a thorough comprehension on the demand and supply of a country's trade. Koshal *et.al.* (1992) emphasize that the success of either imports substitution or export promotion strategy depends crucially on a clear knowledge of the demand function and the magnitude of the relevant elasticities. In addition, the direction in which the trade balance changes over period, as pointed out by Houthakker and Magee (1969), significantly depends on the country's income and price elasticities of demand for imports and exports. For the stability of the balance of payments in Marshall-Learner condition, they suggest for a country to have the sum of import and export demand price elasticities in absolute term to be higher than one. They further argue that a country, whose income elasticity of import demand is higher than its foreign income elasticity of export demand, will experience a more rapid import growth. If such a condition persists, it will deteriorate country's balance of trade and, eventually, that will put much pressure on its exchange rate. Therefore, an efficient trade management of a growing economy truly requires a sound comprehension on the elasticities of imports and exports.

Many previous studies of the exports behavior have been conducted based on single equation model. Estimates of export price elasticities mostly focus on the demand side as a single equation basis, while supply relationship have typically been handled by simplified assumption, the usual practice being to assume that the export and import supply

price elasticities facing any individual country are infinite or at least large[30]. Goldstein and Khan (1978) argue the assumption of an infinite price of elasticity seems reasonable a priori in the case of world supply of imports to single country, but, is far less applicable to supply of exports of an individual country. It is less likely that increases in demand for a country's exports can be met by expanded supply without a rises in export price unless a large pool of unemployed resources exists in the export industry or elsewhere in the economy. Thus, according to Goldstein and Khan (1985), single-equation estimates of the price elasticities of demand and supply can be a weighted average of the true demand and supply elasticities, and consequently may be biased downward. In addition, Dunlevy (1980) points out the reliance on single equation methods has obscured the distinction between push (foreign demand) and pull (cost or supply) factors of exports. Thus, the inclusion of driving forces of foreign and domestic demand in exports analysis is deemed necessary since the former affects export performance from the demand side and the latter from the supply side. As consequence, an appropriate empirical investigation should take this issue into consideration.

The purpose of this chapter is to investigate the price and income responsiveness within demand and supply frameworks, both of which represent foreign demand and domestic demand impacts on Indonesia export commodities using aggregate data of the period of 1971 to 2007. Our study proposes contribution to the existing literature in several ways. First, in contrast to most previous empirical studies employing a single equation model, which assumed exports supply as perfectly elastic, the current study estimates

[30] Some are including Houttakker and Magee (1969), Bahmani-Oskoee (1986), and Faini (1994). For the case of Indonesia see Hossain (2009).

elasticities of demand and supply for exports in a simultaneous Equation framework using two-stage least squares. Second, the study also makes a separation of trend and cyclical movements of real income to further explore the different impacts of each factor on export supply. By separating real income into secular and cyclical movements, one enables to test for domestic pressure hypothesis as argued by Dunlevy (1980). To our best knowledge, this attempt has not been explicitly conducted in empirical trade study of Indonesia. This study attempts to fill this gap. Third, it captures the possible related important events during period of observation into the model that might affect to exports behavior. Lastly, the findings add inputs to policy formulation, for Indonesia in particular.

3.2 Exports of Indonesia from 1971 to 2007 at glance

Indonesia experienced an economic boom over the period 1974 to 1981 owing to an improvement in the country's external terms of trade, which originated from soaring oil price of the 1970s. Oil export performance gave impetus to propel impressive economic growth at a rate about 8 percent per annum. Nevertheless, there had not been significant improvement in industrial development and manufacturing exports performance during this period. Mostly relying economic development on oil exports revenue, government's trade and investment policy under ISI strategy became restrictive and interventionist until mid-1980s.

Indonesia, in mid-1980s, faced two large external shocks: a decline in oil price resulting significant reductions in country's revenue and a large movement in exchange rates (i.e. devaluation of US dollar vis-à-vis Japanese yen) increasing Indonesia external debt. The country then had to deal with the dual challenge of stabilization in the short-term

and finding a new non-resource based engine for long-term growth. Indonesia successfully met both challenges by conducting series of structural adjustment programs, some of which were trade and investment liberalization under EP development strategy.

The era of outward-oriented or EP strategy in Indonesia was embarked in the aftermath of the decline in oil price in the mid-1980s. During this period, the private sector and exports became the main engine of the development of the manufacturing sector for the first time ever. Exports of manufactures grew five-fold over 9 years from that of 1985 owing to a string of liberalization packages on trade and investment, including the relaxation of restrictions on foreign investment, tariff cuts and the abolition of non-tariff trade barriers such as import restrictions unleashed by government. Companies designated as export-oriented firms based on the export ratios of products were accorded preferential treatment in the equity ratio of foreign capital, operations in bonded export processing zones and procurement of raw materials. The government also restored the drawback system, under which import tariffs imposed on raw materials and parts are refunded when finished products are exported. These significant reforms may have some significant effect to the increases in exports of manufacturing. The portion of exports of manufactured commodities in total exports increased overtime and reached its peak of 68% in 2007. Since 1991, the performance of manufacturing exports has outperformed that of oil-exports (**Figure 3.1**). During this EP era, in average, growth of GDP was dominated by real exports. Yet, the existence of Asian economic crises in 1998 along with its long recovery process in Indonesia resulted in slowing GDP growth at 4.9% (average) from 1986 to 2008 due to significant slump in domestic demand.

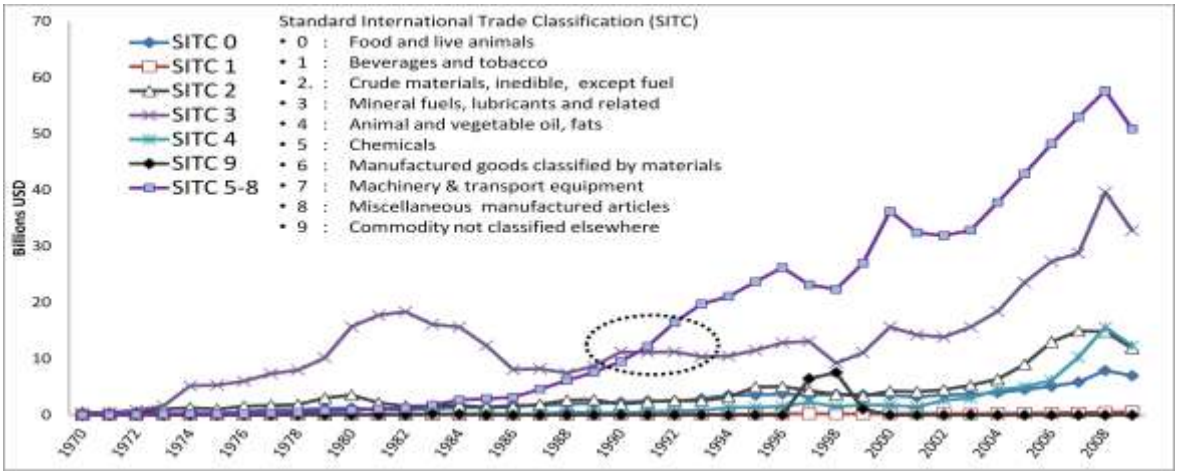


Figure 3.1. Indonesia merchandise exports based on SITC (rev. 1) 1970-2009
Source: *UN-COMTRADE*

Exports could serve as a bolster to Indonesia economic performance during domestic demand slump on the wakening of 1997/1998 economic crisis. Nevertheless, such a condition could not long last. Economic growth was continuously retarded due to sharp decline in consumption and investment following the crisis. As a result, export expansion is impeded due to slowdown in investment. The production of tradable is more disrupted due to other supply disruptions following the crisis. Sharp exchange rate depreciation during crisis, which is supposed to provide some competitive advantage for export performance especially of manufacturing commodities, could not be utilized due to such wretched domestic condition.

Siregar and Rajan (2004) further argue that the rupiah depreciation may have failed to boost exports since no significant competitive price advantage have accrued to Indonesia. Duttagupta and Splimbergo (2004) find that such large exchange rate depreciations in Asian economies following the 1997 Asian crises contribute to exports performance with a notable less effect. They propose two following main explanations, namely first, the competitive depreciation by other countries in the region neutralized the effects on demand

for exports, and second, the pressure in domestic economy in form of contraction in domestic credit affected supply of exports. Athukorala (2006) further adds one explanation for Indonesia's export failure, among other things, is serious infrastructure bottlenecks in the economy. In spirit of the latter, our previous study as indicated in preceding GDP decomposition analysis reveals that throughout period exports grew in expense of domestic demand (**Figure 1.1**). These findings propel this study to formally investigate the plausible significance of domestic demand pressure on export performance in Indonesia.

3.3 Foreign- and domestic demand within demand and supply model

3.3.1 Theoretical framework

The literature deals with relative prices and an activity variable as the key determinants of export demand and supply. This approach follows from the "imperfect substitute" model which assumes that exports are imperfect substitutes for domestic goods (Goldstein and Khan, 1985, pp. 1044 - 1050). The imperfect substitute model postulates that the quantity of export demanded is a function of the level of (money) income in the importing region, its own (export) price, and the price of its substitutes (competitors or the rest of the world). Koshal *et al.* (1992) argue in general, the export price and the export price index of the rest of the world are in co-movement together. Therefore, to avoid problem of multicollinearity when estimating the parameters of demand function, they suggest converting the export price into a relative export price over prevailing price of the rest of the world. Even though some economists cast some doubts on the use of relative prices on the ground that the function may lose the homogeneity assumption required for

all demand functions,[31] they argue such matter is generally not considered as a problem for aggregated data. The specification of the price variable is restrictive because the effect of the change in the two price variables (own price and price of goods of the rest of the world) on the export volumes is considered to be equal in size but opposite in sign (Arize 1990).

Theoretically, relative price and income elasticities are expected to have negative and positive signs respectively. The foreign activity variable can be defined either as the weighted average of trading partner income, gross national product (GNP), or gross domestic product (GDP). Since high foreign activity induces increased demand for exports, the income elasticity of demand is expected to be positive; hence exports may be seen as an engine of growth. Similarly, supply of exports is determined by price of exports, domestic price level and domestic income. Goldstein and Khan (1985) provides a survey of studies on income and price effects in foreign trade, with an excellent discussion of the specification and econometric issues in trade modeling, as well as a summary of various estimates of price and income elasticities and related policy issues.

Macroeconomic analysis often makes a distinction between two (or more) time horizons, with short-run business cycles overlaid on a long-run growth trend. The difference between trend & cyclical movements is attributed to the definition of business cycle that can be found in many literatures (Baxter and King, 1999; Harvey and Trimbur, 2001; Cottis & Coppel, 2005, among others). Cottis & Coppel (2005) define business cycle as a regular and oscillatory movement in economic output within specified range of periodicities which in general are including period of expansions and contraction in the level of economic activity, typically measured by GDP. Such cycles are known as classical

[31] Murray and Ginman (1976); Arize (1987) among others.

business cycles. Focusing on periods of deviations of output from its trends that are secular in nature, which are known as growth cycles (or deviation cycles), is an alternative and generally favored approach to analyzing the business cycle.

The inclusion of trends and cycle movements of real income into export model may generate an interesting inference. Dunlevy (1980) using data of U.S. and U.K., proposes such approach to test for domestic demand pressure on export supply. Goldstein and Khan (1985) posit a convincing argument to test the roles of secular and cyclical income on the supply of exports.[32] Haynes and Stone (1983a, 1983b) argue the trend income can be interpreted as potential income or capacity within the economy, while the cycles factor (the deviation of from trend income) as capacity utilization. Khan and Ross (1975) contend that ignoring the role of secular factors would result, not only in a misleading impression on the determination of exports, but may also involve the estimation of a misspecified specification. They further argue the effect of cyclical factor may well be substantially different from the effects of the trend movement, and therefore using current real income as an explanatory variable would perhaps at best only capture the cyclical influences. Several arguments may explain the different role of secular and cyclical movements in activity variable on export behavior.

Goldstein and Khan (1985) point out a country or industry's ability and willingness to supply exports will not only be captured by the ratio of export prices to domestic prices (or factor costs), but also be dependent on the output capacity of the economy as a whole.

[32] We follow explanation of the roles of secular and cyclical movements on exports performance provided in Goldstein and Khan (1985), and Khan and Ross (1974). However, one may simply consider trend as secular movement and cycle as cyclical movements, respectively. Such definitions in our current study are interchangeable.

In other words, secular movements in the real output will be accompanied by advances in factor supply, infrastructure, and total factor productivity, all of which represent level of productive capacity that eventually will lead to an increase in export level at any given level of export prices. Some empirical studies (Goldstein & Khan, 1978; Geraci & Prewo, 1982) confirm that trend income appeared with the expected positive sign in export-supply equation. On the other hands, the cyclical movement is usually represented by the rate of capacity utilization among exporters. The latter can be employed to test for domestic demand pressure on exports behavior.

Variations in domestic demand pressure may have indirect effect on export performance through affecting the supply-side or availability for exports. Ball *et. al*. (1966) contend that at relatively high levels of domestic demand, *ceteris paribus*, the quantity of resources devoted to exports is lower than would have been the case at lower levels of internal demand. Their argument is based on the view that exports will be relatively unprofitable compared to home sales during condition of high level of domestic demand, and thus, will be particularly sensitive to changes in the margin of unused capacity in the economy. They further assert that a rise in overall demand pressure may create strong competition for resources, which would have been devoted to exports if the pressure of internal demand had been lower even if home and export sales are equally profitable. Thus, the interrelationship between the domestic demand and exports may have some implications on trade policy developments in terms of international business cycle synchronization, domestic and external adjustments, or the impact of trade liberalization on economic growth.

Most of trade literatures in this area are grounded on two premises, namely selling in home market will be more profitable than selling abroad when domestic demand increases, and this augmented profitability is not fully captured by movements in the ratio of domestic to export prices. Thus, based on the former, it is expected that domestic demand exhibit a negative relationship with exports implying that any increase in domestic demand is hypothesized to shift part of the available supply away from exports sector and towards the domestic market. This cyclical tilt toward the home market might reflect the better quality of domestic customer or a perceived higher risk associated with export sales (Goldstein and Khan, 1985, pp. 1061). For the same reason, a fall in domestic pressure is assumed to release goods for exports.

One of the main channels by which domestic demand pressure reduces the quantity of exports is via the former's effect on lengthening delivery delays and hence weakening the exporting country's non-price competitive position (Ball et al., 1966, among others). This is sometimes referred to as the "pull" effect of domestic demand pressure. This suggests that domestic demand variables may play a role in the foreign demand for exports. Dunlevy (1980) argues that change in pressure of capacity may capture development of bottlenecks, which would inhibit the supply of exports. In any event, the prediction is that quantity of resources devoted to export production and the quantity of goods offered to export market will decline when domestic income rises above trend. Although emerged consensus put strong side on the positive effect of domestic demand expansion on export price, no consensus yet emerged on whether the positive export price of domestic demand is larger or smaller than the negative export quantity effect. Therefore, a cyclical income or

other scale variable ought to be added to export supply (and demand) equation.

3.3.2 Review of empirical literatures

Some earlier literatures of trade model in developed countries (Houthakker and Magee, 1969; Goldstein and Khan, 1978; Dunlevy, 1980) find evidence of the significance of relative prices and income, both of which play a role in determining exports performance. In their models of export demand, Houthakker and Magee (1969) provide evidence that the level of real income in importing countries and price competitiveness in exporting countries are the principal determinants of exports for a number of developing countries. Khan (1974) adds an argument that prices play an important role in determining the exports performance in developing countries. He further states if it is anything to go by, the size of the estimated price elasticities were fairly high for most of the 15 developing countries under study. More recent literatures, including Arize (1987, 1990), Riedel (1988), Koshal *et. al.* (1992), Senhadji and Montenegro (1998), Sharma (2003), and Behar and Edwards (2004), show supports for a significant relationship between the two variables. As mentioned earlier, the price and income elasticities are expected to have negative and positive signs, respectively. Studies for emerging economies have generally found foreign trade price elasticities to be sufficient to ensure an improvement in the trade account (Wilson, 2001). Arize (1990) results show evidence that the relative price is a significant determinant of demand for exports in some Asian developing countries. However, such elasticity tends to be low (inelastic) suggesting that large relative price swings are required to have an appreciable impact on trade patterns. We will discuss a small subset of recent studies as presented in brief in **Table 3.1**.

Table 3.1. Empirical reviews on determinants of export performance

References	Country/sample period	Methodology	Result
Goldstein and Khan (1978)	Quarterly data of 8 OECD countries (including Japan) for the period of 1955:1 – 1970:4	Simultaneous Equation method using Full-Information Maximum Likelihood (FIML) and 2SLS	Income elasticities of both US and UK are lower than those of other countries, while price elasticity of supply of US is the highest.
Dunlevy (1980)	Quarterly data of US and UK from 1957 – 1975	Simultaneous Equation method using 2SLS with the inclusion of capacity and capacity utilization variable to test the domestic pressure hypothesis.	Both export supply and demand were found to be characterized by homogeneity in prices and level of income. The level of capacity utilization appears to be positively correlated to exports, contrary to capacity pressure hypothesis.
Haynes and Stone (1983a)	Quarterly data of US and from 1955 – 1979	Simultaneous Equation method using instrumental variable (IV) and cross spectral analysis to compare the results with consideration of time domain method of income decomposition	Both export supply and demand were found to be characterized by prices and level of income. The trend income may not adequately represent secular income Since the time domain method of income decomposition may have limitation, interpretation of trend variable should be with caution.
Haynes and Stone (1983b)	Quarterly data of US and from 1947 – 1979	Simultaneous Equation method using 2SLS to compare on supply-price specification	The study indicates that the more appropriate specification for aggregate supply behavior is supply-price rather than supply-quantity formulation.
Riedel (1988)	Quarterly data Hong Kong for the period of 1972:2 – 1984:2.	Simultaneous Equation method using 2SLS	Price and income elasticity of demand is infinitely elastic, while supply is price elastic
Arize (1990)	Quarterly data of 7 Asian developing countries for the period of 1973 – 1985.	Simultaneous Equation method using 2SLS	The results support the theory. In addition long-run supply elasticities of Asian exports although positively sloped, are not perfectly elastic.
Koshal et. al., (1992)	Annual data of India for the period of 1960 – 1986	Simultaneous Equation method using 2SLS	Demand for export is price unit elastic while supply is price elastic.
Faini (1994)	Annual data of manufacturing exports of Morocco and Turkey for the period of 1968 to 1983.	Simultaneous Equation method using instrumental variable	Capacity and capacity utilization are estimated using theoretical model of constant elasticity transformation (CET) of production function
Senhadji and Montenegro (1998)	Annual data of 70 countries from 1960 to 1993.	Single Equation of export demand in time-series context using Phillip-Hansen Fully Modified (FM) estimator	Price elasticity of demand is significantly negative to export volume with magnitudes vary from less than one to higher than one in short-run and long-run respectively.
Dasgupta *et. al.* (2002)	Quarterly data of Indonesia non-oil exports from 1985 to 1993.	Simultaneous Equation method using 2SLS	Price and income elasticities of demand both are highly elastic. Price elasticity of supply is inelastic.
Sharma (2003)	Annual data of India for the period of 1970 – 1998	Simultaneous Equation method using 2SLS	Real appreciation of the rupee adversely affects export performance. Export supply positively related to relative export price

Behar and Edwards (2004)	Quarterly data of South Africa for the period of 1975 – 2000	Simultaneous Equation of demand and supply function using VAR – VECM method	Price elasticity of demand is >1 and price elasticity of supply is <1
Duttagupta and Splimbergo (2004)	Disaggregated (SITC 5, 6, 7, & 8) of monthly export data of 6 Asian countries during the crises from Jan 1990 to July 2002	Export demand and supply are estimated in panel context using Dynamic GLS	Price elasticity of demand is significantly negative to export volume with magnitudes vary from less than one to higher than one depending on the commodities. The price variable in supply Equation is insignificantly different from zero of all commodities.
Siregar and Rajan (2004)	Quarterly data of Indonesia from period of 1980:1 to 1997:2	Trade volumes (export & import) are estimated by GARCH with the inclusion of exchange rate volatility variable.	Results for the volatility indices indicate that exchange rate volatility negatively impacts both Indonesia trade flows of imports from and exports to Japan.
Hossain (2009)	Annual data of Indonesia for the period of 1963 – 2005	Single Equation of demand function using Bound testing	Income elasticity of demand is >1 and price elasticity of demand is <1
Anas (2011)	Annual data of Indonesia exports of agriculture, manufacturing, mining and oil/gas sector for the period of 1976 – 2008	Cointegration approach using Pesaran bound testing model in the single Equation.	Exports price, production capacity and FDI are significant variables in explaining long term export performance. However, world income does not seem to be a significant variable.

Some above studies are conducted in the case of developed countries. A few notable exceptions in the case of developing countries are worth mentioning, i.e. Arize, (1987, 1990), Bahmani-Oskooee (1986), and Jongwanich (2009). Nevertheless, few studies, except Arize (1990), did explicitly model the supply of exports in their empirical model. This, according to Riedel (1988), is due to the difficulty in modeling the supply side of developing countries' exports since the determinants of export supply differ from country to country. He further argues that even for a single country, to model its export supply is not always one's luxury since, in addition to foreign demand and domestic supply, exports are also determined in part by domestic demand of exportable. Thus, the usual practices are to address such supply side by assumption.[33] Goldstein and Khan (1978) argue that this assumption of an infinite price of elasticity seems reasonable a priori in the case of world

[33] Goldstein and Khan (1985) note that despite the simultaneous relationship between quantity and price in fundamental demand and supply theory, the bulk of the time series studies analyzing import and export equations has addressed the supply side by assumption, which assume that the export price elasticity of supply is infinite (perfectly elastic).

supply of imports to single country. Yet, such assumption is far less applicable to an individual country's supply of exports.

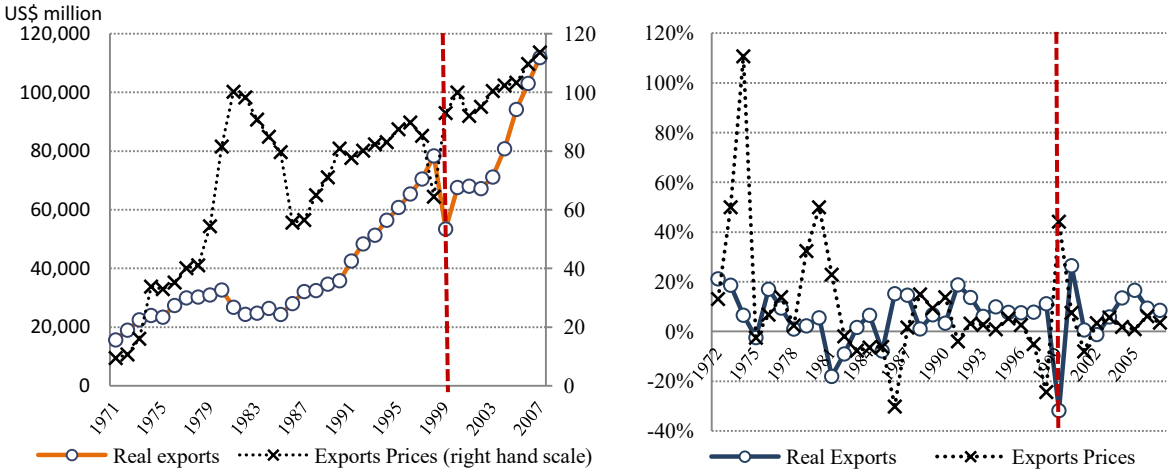
In the case of Indonesia, a few quantitative studies attempt to assess the factors behind the performance of Indonesia exports. Dasgupta *et.al.* (2002), Siregar and Rajan (2004), Hossain (2009), and Anas (2011) were among others. Among them, only Dasgupta did estimate the supply of exports. Nevertheless, they did not make any distinction on domestic activity variable in their explicit model of supply, which enables one to analyze the effect of capacity and domestic-demand pressure on export performance.

3.4 Empirical model and data description

3.4.1 Model specification

In assessing the long-term determinants of exports, this study follows the basic theory of demand and supply, and adopts the standard specification of export demand and supply as in Goldstein and Khan (1985). Quantity of export demanded in a period is defined as a function of the price of exports (PX_t), world income separated into its trend (TYW_t) and cycle movements (CYW_t), and the price of goods in the rest of the world (PW_t). Here, we follow Goldstein and Khan (1978) and Koshal et al. (1992) among others, by assuming exports is homogenous of degree zero in prices. In order to isolate the effect of shock in exports performance during 1999 (see figure 3), we employ a qualitative dummy[34] into demand function.

[34] We set value of 1 for 1999, zero otherwise. This shock might be due to sharp increase in export price in 1999 which suppressed demand of Indonesia exports and some sluggish global economic outputs during 1999 occurred especially in some Indonesia's major exports-destination countries, such as EU and Japan (*International Trade Statistics 2000*), which might reduce quantity demanded of imports Indonesia.



(a) Exports value and price

(b) Growth of exports value and price

Figure 3.2. Indonesia exports value and price in US$ (2000=100), and their growth 1971-2008
Source: *World Development Indicators 2010*

Symbolically, the function may be specified in log-linear with random error term as follows:

$$\log X_t^D = \alpha_0 + \alpha_1 \log(PX/PW)_t + \alpha_2 TYW_t + \alpha_3 CYW_t + \alpha_4 D99_t + \nu_t \qquad (3.1)$$

Since we assumed exports to be homogeneous of degree zero in prices, the effect of the change in the two price variables (exports price and price of goods of the rest of the worlds) on the export volumes is considered to be equal in size but opposite in sign (Arize, 1990). Therefore, the elasticity of relative price (α_1) is expected to have negative sign. On the other hand, the income variable in demand model can also be distinguished into its trend and cycle to analyze for each effect. The elasticity of trend (α_2) and cycle (α_3) of world income are expected to have positive signs.[35]

Similarly, the supply of exports is specified as a log-linear function of the relative price of exports to avoid problem of multicollinearity (the ratio of exports prices, PX_t, to

[35] Usually, we expect the sign of income elasticity to be positive, yet it is not always to be so. Goldstein and Khan (1978) posit that if the exports of a country were simply a residual demand by the rest of the world, then income elasticity might be negative if the increases in world income were attributed with faster growth in production than in the consumption of importable.

domestic prices, PD_t)[36] and domestic activity variable. The domestic activity (real income) variable is separated into TY_t and CY_t thus allowing a distinction to be made between the effects of secular and cyclical movements on the level of exports, both of which allow one to test for domestic pressure hypothesis in Indonesia. As for capturing the unusual events plausibly attribute to export supply performance, we employ a set of qualitative dummy of trade liberalization, *DTL* (1 for 1986 to 2007, zero otherwise), oil price shocks dummy, *DOIL* (1 for 1974, 1981, and 2005, zero otherwise), and dummy for Asian economic crisis, *D98* (1998 equals to 1, zero otherwise). It is worthwhile to explain that, following our previous explanation regarding economy of Indonesia in relation with the plausible significance of trade liberalization policy and impact of economic crises on export performance, the inclusion of oil price shocks dummy is justified since exports of oil and gas still comprised one-quarter of Indonesia's exports.[37] Thus, export supply function with error terms can be written as follows:

$$\log X_t^S = \beta_0 + \beta_1 \log(PX/PD)_t + \beta_2 TY_t + \beta_3 CY_t + \beta_4 DTL_t + \beta_5 OIL + \beta_6 D98_t + \upsilon_t \quad (3.2)$$

Equation 3.2 is the general model of export supply in our study. This specification assumes that firms are price takers and postulates that supply of exports is attributed to relative prices of export and domestic inputs, trend level of real income, the deviations from this trend, and any related economic policy and shocks. The model embodies the hypothesis that as the exports prices increases relative to domestic input prices, exports activities will be more profitable, and accordingly, exporters will have an incentive to supply more. In addition, exports are conjectured to rise, when there is an increase in

[36] It may be noted that domestic price is considered exogenous in this study since the domestic market is relatively large compared to exports market.
[37] Aswicahyono and Pangestu, 2000.

country's capacity to produce, which represents any advances in factor supply, infrastructure, and total factor productivity in the economy. In contrast, any increases in the deviation of secular trend may capture the development of bottlenecks, which would affect negatively to the supply of exports. Therefore, the elasticity of relative price (β_1) and secular income (β_2) are expected to have positive signs, while elasticity of cyclical movements of real income (β_3) is posited to be negative. Equation (3.2) can be normalized for the price of exports, PX_t, to yield[38]

$$\log Px_t = b_0 + b_1 \log X_t^S + b_2 \log P_t + b_3 TY_t + b_4 CY_t + b_5 DTL_t + b_6 OIL + b_7 D98_t + \upsilon_t \quad (3.3)$$

where

$b_0 = -\beta_0/\beta_1$; $b_1 = 1/\beta_1$; $b_2 = \beta_1/\beta_1$; $b_3 = -\beta_2/\beta_1$; $b_4 = -\beta_3/\beta_1$; $b_5 = -\beta_4/\beta_1$; $b_6 = -\beta_5/\beta_1$; $b_7 = -\beta_6/\beta_1$;

In such supply-price specification model, we expect coefficient estimates of b_1, b_2, and b_4 (except b_3) are positive. Coefficient estimate of trade liberalization policy dummy is expected to reduce export price providing more export thrust so that we expect b_5 to be negative. Meanwhile, b_6, dummy of oil price shock is expected to have positive effect on export price. While b_0 is intercept, the effect of Asian 1997/1998 economic crisis dummy (b_7) is ambiguous to exports performance. In some extent, it brings competitiveness impetus via reducing export price due to sharp depreciation of exchange rate. On the other side of coin, such a precipitous depreciation may hamper imports of intermediate goods required in export production in short run.

[38] We employ such a normalization procedure, whose mechanics is provided in appendix, as a matter of convenience in the simultaneous system. Goldstein and Khan (1978) argue that the estimates of parameters from a system method of estimation are invariant with respect to normalization process.

3.4.2 Disequilibrium model

In order to capture the dynamics (disequilibrium) behavior among the observed variables within the demand and supply models for exports, we utilize the adjustment mechanism as proposed by Goldstein and Khan (1978), which suggest that exports do not adjust instantaneously to their long-run equilibrium level following a movement in any of their determinants. Koshal et al. (1992) argue that such a non-instantaneous adjustment is due to several reasons, namely (i) the significant distances between the suppliers and the buyers exist. Consequently, not only delivery times are expanded, but also, information regarding desires of suppliers and buyers are known only with lags (ii) supplies of imported goods are contracted over a period of time, thus, the foreign consumers as well as domestic suppliers may not respond immediately to changes in prices, costs and/or incomes.

Since the disequilibrium demand or supply of exports is not accomplished in one period, following Goldstein and Khan (1978), export quantities are assumed to adjust to the discrepancy between world demand for a country's exports in the current period and the actual flow of exports in the previous period. This implies that quantity of exports adjusts to conditions of excess demand in the rest of the world. Meanwhile for supply model, using supply-price specification, the price of exports is assumed to adjust to conditions of excess supply.[39] These disequilibrium models of demand and supply are as

[39] In our model specifications, we also consider the 'small country' assumption which is well argued by Browne (1982) and Riedel (1990). In their views, an alternative function could be specified where changes in export quantity are related to excess supply so that excess demand would determine the change in the price of exports. However, our experiment with that alternative model yielded inferior result as compared to the model considered here. In this regards, the structural model used in the current paper suggests that an interpretation of the supply equation as a *price-adjustment equation* and the demand equation as a *volume-adjustment equation* is supported by the data. Davidson and MacKinnon (1985) pointed out that one can

indicated in Equation (3.4) and (3.5), respectively.

$$\Delta \log PX_t = \lambda[\log X_t - \log X_t^S] \quad (3.4)$$

$$\Delta \log X_t = \gamma[\log X_t^D - \log X_{t-1}] \quad (3.5)$$

where γ and λ are coefficient of adjustment (assumed to be positive) and Δ is a first difference operator. In Equation (3.5), it implies that an increase in excess supply will reduce the price of exports. On the other hand, a decrease in excess supply will facilitate the price of exports to rise.

Substituting Equation (3.1) to (3.4) yields the following disequilibrium export demand Equation:

$$\log X_t = c_0 + c_1 \log Px_t - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1} + \nu_t \quad (3.6)$$

where

$c_0 = \gamma\alpha_0$ $c_1 = \gamma\alpha_1$ $c_2 = \gamma\alpha_2$ $c_3 = \gamma\alpha_3$ $c_4 = \gamma\alpha_4$ $c_5 = (1 - \gamma)$

The average time lag in such exports adjustment is equal to γ^{-1} and can be derived from the parameter estimates of Equation (3.6) as $1/(1-c_5)$.

Likewise, by substituting Equation (3.3) to (3.5) yields the following disequilibrium export price in supply Equation:

$$\log Px_t = d_0 + d_1 \log X_t + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL + d_7 D98_t +$$

$$d_8 \log Px_{t-1} + \nu_t \quad (3.7)$$

where

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expect to make valid inferences based on a model that appears to be consistent with the data. In addition, our empirical model specification enables one to test domestic demand pressure hypothesis through export price-channel as argued by Goldstein and Khan (1985). Following insights of Goldstein and Khan (1978), the alternative adjustment function discussed above should be considered as approximation.

$d_0 = -\lambda\beta_0/(1+\lambda\beta_1)$ $d_1 = \lambda/(1+\lambda\beta_1)$ $d_2 = \lambda\beta_1/(1+\lambda\beta_1)$ $d_3 = -\lambda\beta_2/(1+\lambda\beta_1)$ $d_4 = -\lambda\beta_3/(1+\lambda\beta_1)$

$d_5 = \lambda\beta_4/(1+\lambda\beta_1)$ $d_6 = \lambda\beta_5/(1+\lambda\beta_1)$ $d_7 = \lambda\beta_6/(1+\lambda\beta_1)$ $d_8 = 1/(1+\lambda\beta_1)$

Equations (3.6) and (3.7) are our final models of disequilibrium demand and supply for exports. These equations, following Arize's (1990) argument, are consistent with the fact that Indonesia is price taker in most export commodities, while being price setters in others. The following reduced-form equations for demand and supply of exports obtained from Equation (3.6) and (3.7) are as presented below.

Reduced form for demand:

$$\log X_t = ((c_0 + c_1 d_0)/D) + (c_1 d_2/D)\log P_t + (c_1 d_3/D)TY_t + (c_1 d_4/D)CY_t + (c_1 d_5/D)DTL_t + (c_1 d_6/D)DOIL_t + (c_1 d_7/D)D98_t + (c_1 d_8/D)\log Px_{t-1} - (c_1/D)Pw_t + (c_2/D)TYw_t + (c_3/D)CYw_t + (c_4/D)D99_t + (c_5/D)\log X_{t-1} \quad (3.8)$$

Reduced form for supply:

$$\log Px_t = ((d_0 + c_0 d_1)/D) - (c_1 d_1/D)\log Pw_t + (c_2 d_1/D)TYw_t + (c_3 d_1/D)CYw_t + (c_4 d_1/D)D99_t + (c_5 d_1/D)\log X_{t-1} + (d_2/D)\log P_t + (d_3/D)TY_t + (d_4/D)CY_t + (d_5/D)DTL_t + (d_6/D)DOIL_t + (d_7/D)D98_t + (d_8/D)\log Px_{t-1} \quad (3.9)$$

Where $D = 1 - c_1 d_1$.[40]

The order conditions of demand- and supply equation are as (8≥1) and (5≥1), respectively, so that both are over-identified. Using ordinary least squares to estimate such over-identified estimations is thus not appropriate. Khan (1974) argued that using an ordinary least square procedure to deal with simultaneity between price and quantity in demand and supply model of exports will generate biased and inconsistent estimates.

[40] The mechanics to get the reduced forms of demand and supply model for exports are provided in appendix.

Therefore, we apply the two-stage least squares (2SLS) method of estimation. Viewed as a system of simultaneous equations, Equations (3.6) and (3.7) have two endogenous variables, X_t and PX_t, and there are 12 exogenous variables, namely PW_t, TYW_t, CYW_t, PD_t, TY_t, CY_t, four dummies, and two lagged of endogenous variables of X_{t-1} and PX_{t-1}, respectively. Note that in Equation (3.6), the absolute value of coefficient of PX_t and PW_t has to be in equal if the relative price model is a valid assumption.

3.4.3 Stability test

To deal with the possibility in any time series study that the coefficients of the variables may be unstable overtime, we employ a formal stability test developed by Farley and Hinich (1970), and Farley et al. (1975). Koshal et al. (1992) argue on the preference of Farley test over Chow test for several reasons, namely (i) Chow test requires one to break the data into two parts with specific a priori knowledge regarding such break; (ii) it is less appropriate for the small number of observations. In this study, we thus apply a Farley's stability test, which assumes the unstable parameter coefficients are linear function of time. The test adds to the basic equation variables of the form tX, where X is a variable whose parameter estimate is suspected to be unstable. In this way, we assume all coefficients are unstable since we have no specific a priori information which coefficients are not stable. Taking demand equation as an example, the following model is tested against basic model of demand in Equation (3.6).

$$\log X_t = c_0 + c_1 \log Px_t - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1} +$$

$$m_1(t \cdot \log Px_t) - m_1(t \cdot \log Pw_t) + m_2(t \cdot TYw_t) + m_3(t \cdot CYw_t) + m_4(t \cdot \log X_{t-1}) + \omega_t \quad (3.10)$$

where $t = 1, 2, 3, \ldots, T$.

The coefficients on above variables are jointly tested for significance from zero, with following joint hypothesis of stability:

$$H_0 = m_1 = m_2 = m_3 = m_4 = 0$$

$$H_1 = m_1 \neq m_2 \neq m_3 \neq m_4 \neq 0$$

A joint test of instability is then performed using following *F*-test:

$$F \text{ ratio} = \frac{\left[(ESS_u - ESS_r)/m\right]}{\left[ESS_u/(T-k)\right]} \tag{3.11}$$

where, ESS_u = residual sum of squares of the unrestricted regression

ESS_r = residual sum of squares of the restricted regression

m = number of restrictions

T = number of observations

k = number of parameters estimated in the unrestricted regression

The calculated values of Farley's *F*-ratio for demand and supply equations are provided in notes attached in **Table 3.2** and **3.3**.

3.4.4 Data description

The analysis used in this study covers annual time series of 1971 to 2007 or 37 observations, which should be sufficient to capture the long-run behavior of exports behavior in the demand and supply model.[41] The data set consists of observation for several variables. These are real exports value as proxy exports quantity (X_t); proxy of exports price index (PX_t) obtained by computing the ratio of real exports value in constant

[41] Koshal *et. al.* (1992) employed 27 annual observations to analyze the demand and supply for India's exports using simultaneous Equation model. Anas (2011) had a sample of 33 annual observations to study the impact of price, capacity and FDI variable on exports performance. The sample in the study is comparable to most time series studies related to export determinants.

US$ to its current US$; trend and cycle of world real GDP (TYW_t) and (CYW_t), respectively; wholesale price index as proxy of domestic price (PD_t); trend level of country's real output obtained by fitting a linear time trend to the logarithm of real output (TY_t); and the deviation from trend income (CY_t).[42] Since our observation period crosses some related events plausibly affect to exports behavior, we also employ several dummy variables, namely exports shock in 1999 ($D99_t$), oil price shocks ($DOIL_t$), trade liberalization (DTL_t), and Asian economic crisis ($D98_t$). All data set, except dummies, are taken from *World Development Indicators* CD-ROM. All variables, except dummies, are in natural logarithms.

3.5 Empirical results and implications

3.5.1 Empirical results

The results of disequilibrium models of demand and supply outlined in the previous section are presented in **Table 3.2** and 3.**3**, respectively. We examine signs of coefficient estimates, their magnitudes and statistical significance by referring to related theoretical foundation and empirical consensus. In addition, several diagnostic criteria for plausible misspecification bias, homogeneity assumption, heteroskedasticity, and autocorrelation problems as well as model stability are subject to deal with.

Statistically, the results of Equation (3.6) and (3.7) as indicated in Table 3.2 and 3.3

[42] Due to the unavailability of production capacity data, following Dunlevy (1980) and Arize (1987) among others, capacity variable is obtained by fitting time trend of real income $y_t = f(t) = Ae^{rt}$ or log $Y_t = c_0 + c_1 t$ (Pyndick and Rubinfeld, 1998). For thorough study of the effects of trend income and capacity utilization on export performance, see Dunlevy (1980). For critical arguments of the use of these variables as well as the time domain method of income decomposition to capture secular and cyclical income movements, one may have interest on Haynes and Stone (1983a). As alternatives, we also considered to fitting the income variable both using Hodrick-Prescott method and by estimating a production function on factor inputs (K and L). Yet, the results of both alternatives did not perform well in the empirical work. Therefore, we use the first method to justify our objective.

are sound and impressive, and all signs of the coefficients are as expected. The values of estimated adjustment parameter of lagged exports and lagged exports price both are also as expected, positively less than one, and significantly different from zero at the 1% significance level implying a degree of dynamic adjustment in demand and supply of exports. Based on the formal test for stability of parameter estimates using Farley's procedure, which generates values of F-ratio of 0.42 and 1.859 for demand and supply equation, respectively, we can safely conclude that all coefficients in both demand supply models are stable over the period under study.

Table 3.2. Two-stage least squares estimates of the demand for exports

Demand	**Variable**	**Coefficients**	***t*-statistics**
Dependent variable: X	*Constant*	– 7.664 ***	[3.781]
	PX	– 0.256 ***	[4.854]
	PW	0.256 ***	[4.854]
	TYW	0.356 ***	[3.098]
	CYW	– 0.002	[0.003]
	D99	– 0.407 ***	[5.815]
	X_{t-1}	0.864 ***	[12.12]
	R^2 = 0.9855	S.E of regression = 0.07	DW stats = 2.143
Diagnostic tests	• RESET = F(0.70) p. 0.41	• Durbin *h* = 0.52	
	• Normality = JB (1.68) p. 0.43	• B-P-G test = F(1.55) p. 0.21	
	• Farley's *F* = 0.72		

1. *** denotes significant at 1% level of significance
2. The values of DW and Durbin's h are provided to check the presence of serial correlation. Durbin's h value in demand equation is less than the critical value of the normal distribution at 5 percent level (1.645 for a one-tailed test). Thus, we can safely conclude that there is no serial correlation problem.
3. B-P-G test is Breusch-Pagan-Godfrey test for heteroskedasticity.
4. All coefficients are stable over the period under study since the calculated value of Farley F-test of 0.72 is less than critical F-value for demand model at 5 percent level (2.90).

Importantly, the empirical findings presented in **Table 3.2** support the hypothesis that the relative export price and foreign income plays a significant role in determining demand for Indonesia exports. The estimated relative exports price elasticity, which is assumed to be homogenous in degree zero, carries the expected negative sign and significantly different from zero at one percent significance level. The estimated long-run

price elasticity of demand for export commodities, whose magnitude is –1.88 (price-elastic), implies that 1% increase in relative price will reduce world demand for Indonesia exports by more than proportionate at 1.88% suggesting that demand is considerably responsive to price movement in long-run. Both long-run elasticities of price and income of export demand as well as supply are presented in **Table 3.4**.

Our result is consistent with study of Dasgupta *et.al.* (2002), who found high price-elasticity of demand for Indonesia's non-oil exports of –2.8 and –4.0 using single and simultaneous equation demand and supply function, respectively. This price-elastic elasticity of export demand implies that Indonesia export commodities have been shifting from basic, natural resource-intensive (NRI) commodities towards more manufactured products[43]. Hossain (2006) notes that since the 1960s there has been a significant structural change in the composition of Indonesia's exports. The share of NRI products to total exports has gradually been decreased from about 77% to 28% during 1981 – 1985, whereas manufactured exports presently contribute about 50% of total exports basket. This makes exports more sensitive to the relative export prices (Hossain, 2009).

The estimated trend income elasticity of demand carries the expected positive sign and significantly different from zero at the 1% significance level, while the cycle income elasticity is not significantly different from zero. The estimated long-run trend income elasticity of demand for export commodities, whose magnitude is 2.62 (income-elastic), indicates that 1% increase in foreign (world) income will facilitate an increase in world

[43] Study of Jongwanich (2010) and data from BPS (various years) indicate that Indonesia exports commodity are shifting continuously from NRI to more manufactured products from minuscule share of 2% in 1980 up to 68% in 2007. The exports are mostly dominated by products of SITC 5 (resource-based), SITC 8 (clothing and footwear), SITC 7 (machinery and transport), and SITC 6 (chemical).

demand for Indonesia exports by 2.62% suggesting that demand is highly responsive to income in long-run. This entails that *ceteris paribus,* a rise in world economic activity raises the demand for Indonesia exports more than proportionate and Indonesia exports are treated as normal to luxury goods by their importing country confirming the condition that Indonesia exports are shifting towards more manufactured exports composition.

Arize (1990) argues such income elasticity might be some function of the income elasticity of the exports of the importing countries. This is plausibly true if exports are largely composed of semi-finished products, which are used to produce final products in other countries. He further posits that a high income elasticity of demand for a country's exports would clearly be advantageous since it implies that as world income grows the country will be in a position to capture a larger percentage of world exports, thus narrowing the balance payment gap. The dummy for exports shock in 1999 is also significant at the 1% significance levelimplying that any economic shock is attributed to affect the Indonesia's demand for export commodities.

The estimated adjustment parameter in demand model is less than one and significantly positive at the 1% significance level implying a degree of dynamic adjustment. It suggests that 86.4 percent of total adjustment of quantity demanded is achieved in first period. The average time lag adjustment for adjustment of exports to changes in the independent variables of 7.35 years is obtained by calculating γ^{-1}, where γ is derived from $(1\text{-}c_4)$. The mean time lag of our demand model is in contention with Goldstein and Khan (1978), which suggest that it is quite short. Nevertheless, this long time lag adjustment is quite similar with that of Arize (1990), who found 6.7 years of average time lag of demand

for Malaysia. In this regard, Goldstein and Khan (1978) pointed out that some of the studies may find very long lags in export behavior especially when relative price appears as explanatory variable. They further argued that this is also plausibly due to the limitation of the partial adjustment model, which imposes the same (declining) geometrically weighted lag for all explanatory variables.

Table 3.3. Two-stage least squares estimates of the supply for exports

Supply	**Variable**	**Coefficients**	***t*-statistics**
Dependent Variable: PX	*Constant*	36.232 ***	[5.983]
	X	0.352 **	[2.578]
	PD	0.975 ***	[7.420]
	TY	– 1.776 ***	[5.397]
	CY	1.717 ***	[5.922]
	DTL	– 0.199 **	[2.482]
	D98	– 0.607 ***	[5.999]
	DOIL	0.130 **	[2.416]
	PX_{t-1}	0.328 ***	[3.541]
	R^2 = 0.98053	S.E of regression = 0.08	DW stats = 1.763
Diagnostic tests	• RESET = F (1.26) p. 0.086	• Durbin *h* = 0.822	
	• Normality = JB (0.33) p. 0.849	• B-P-G test = F(8.27) p. 0.403	
	• Farley's F = 1.859		

1. *** denotes significant at 1% level of significance
2. The values of DW and Durbin's *h* are provided to check the presence of serial correlation. Durbin's *h* value in supply equation is less than the critical value of the normal distribution at 5 percent level (1.645 for a one-tailed test). Thus, we can safely conclude that there is no serial correlation problem.
3. B-P-G test is Breusch-Pagan-Godfrey test for heteroskedasticity.
4. All coefficients are stable over the period under study since the calculated value of Farley *F*-test of 1.859 is less than critical *F*-value for supply model at 5 percent level (2.56).

In the next turn for results of exports supply, the estimates of export supply function as reported in **Table 3.3** also yield useful information. Just as in the demand model, the coefficient on lagged export prices in supply model is also as expected, significantly positive at one percent level of significance and less than one, all of which implies a degree of dynamic adjustment suggesting that this variable may play role in explaining the dynamic changes in export prices. The price-quantity relationship in supply model is positive-sloped, which is in accordance with economic supply theory regarding

the rational behavior of producers (exporters) in response of price movement, and it is significantly different from zero at five percent level of significance. The estimated price elasticity of export supply is estimated from Equation (3.7) by first obtaining values of λ, and then putting it into $(\lambda - d_1)/(\lambda d_1)$ to get β_1, where d_1 is equal to $\lambda/(1+ \lambda b_1)$, or just simply β_1 is as $(1 - d_8)/d_1$. The value of 1.91[44] in long run is as presented in **Table 3.4**. The higher magnitude of price elasticity of supply compared to that of demand suggests that Indonesia exports are more supply-determined. This evidence supports Athukorala (2006) and Anas (2011) conjectures that supply side rather than demand side is the more relevant determinants of Indonesia export performance. In addition, domestic price has a positive and significant effect on export price implying the significance of prices of factor inputs in determining the export price.

Table 3.4. Estimated long run elasticities of Indonesian exports

Variable	Long-run
• Demand	
o Price	- 1.88
o Income (trend)	2.62
• Supply	
o Price	1.91
o Capacity	5.05
o Capacity utilization	- 4.87

Note: Estimated long run elasticities of price (α_1) and income (α_2) in demand are calculated from Equation (3.6). Whereas, estimated long-run price elasticity of supply (β_1) is derived from Equation (3.7).

The estimated coefficients of secular and cyclical income variables, which represent the significance of productive capacity and capacity utilization, respectively, both are significantly different from zero at one percent level of significance and carry expected

[44] There are sparse estimates of export supply elasticity available in the literature for Indonesia case as comparison to our supply estimates. Some, among others, are including Arize (1990) and Dasgupta *et.al.* (2002). we provide a comparison of exports elasticities with those of previous studies in table 5.

signs. The parameter estimate of trend income bears negative sign confirming the argument that an increase in productive capacity, which is associated with advances in factor supply, infrastructure, and total factor productivity, will facilitate to reduce production cost of exportable. These advances in productive capacity will also provide an incentive for exporters to increase production of exportable at any given level of export prices due to increasing profit margin. This argument is confirmed by a positive long-run coefficient of productive capacity (β_2) on exports quantity with magnitude of 5.05 (recall that result of d_3 is negative), which is obtain from $d_3 = - \lambda\beta_2/ (1+ \lambda\beta_1)$ in Equation (3.7). In accordance with Dunlevy's (1980) insights, such a greater than unity magnitude of trend measure of capacity variable also implies a growing openness of the economy, which confirms the significance of the existing trade liberalization program unleashed in mid '80s on facilitating exports in Indonesia.

The coefficient of cyclical income variable carries positive sign. This evidence is in accordance with domestic pressure hypothesis implying that a high level of capacity utilization, which captures development of bottlenecks, is associated with an increase in export price. Recall that $d_4 = - \lambda\beta_3/(1+ \lambda\beta_1)$ and estimated d_4 is positive, thus, the long-run coefficient of cyclical income (β_3) is –4.87, which confirms the customary version of the capacity pressure hypothesis suggesting that a high level of capacity utilization (domestic demand) will choke off production of exportable in Indonesia. This also implies the existence of competition between exports- and domestic-sector towards scarce economic resource in Indonesia.

The result of GDP decomposition analysis in previous chapter (**Figure 2.2**)

displays supporting evidence to our current finding confirming the domestic demand pressure hypothesis on exports performance in Indonesia. It revealed that throughout period of 1971 to 2008 exports grew in expense of domestic demand, except period of 1986 to 1990 (**Figure 2.1**). Our current finding is also in accordance with study of Athukorala (2006), which argues that one explanation for Indonesia's export failure, among other things, is serious infrastructure bottlenecks in the economy.[45]

Table 3.5 provides a comparison of the estimated long-run elasticities of this study with those of other previous studies. In overall, our elasticity estimates are in accordance with consensus of export elasticities for developing countries as indicated in Riedel (1990), and Goldstein and Khan (1985), who argue that price and income elasticity of demand are within -0.5 to -2.5, and (+) 2.0 to (+) 4.2, respectively. Our estimates are also comparable to those of other studies focusing on Indonesia export elasticities. Specifically, our estimate of price elasticity of demand for exports is higher than those of Arize (1990) and Hossain (2009), yet lower than that of Dasgupta *et.al.* (2002). While our estimate of income elasticity of export demand is comparable with those of two others, Arize (1990) did not find any significance of foreign income on demand for Indonesia exports. In supply estimates, our estimated price elasticity of exports supply is higher than that of Dasgupta *et.al.* (2002), yet, it is still lower than that estimated by Arize (1990). Those differences are plausibly attributed to several factors, namely (i) specification of the single equation model, and (ii) data characteristics in terms of composition of exports commodity (aggregated or disaggregated) and data frequency.

[45] A survey conducted in 2005 by the University of Indonesia's Institute for Economic and Social Research (LPEM-UI), as cited in Athukorala (2006), revealed that firms lose about 6% of their potential output due to electrical power shortages.

Table 3.5. Comparison of elasticities of demand and supply for Indonesia exports

Study	Relative price	Foreign income	Domestic capacity	Capacity utilization	Data
	Demand				
Our study					1971 – 2007 (annual)
• Long-run	**- 1.88**	**2.62**			
Anas (2011)					1976 – 2008 (annual)
• Long-run	- 0.19	n.s[b]			
Hossain (2009)					1963 – 2005 (annual)
• Long-run	- 0.22	1.86			
Dasgupta *et. al.* (2002)					1985 – 1993 (quarterly)
• Long-run	- 4.0[c]	3.2			
Arize (1990)					1973 – 1985 (quarterly)
• Long-run	- 0.73[a]	n.s[b]			
Koshal & DeCosta (1989)[e]					1975 – 1984 (quarterly)
• Long-run	- 0.39	0.77			
	Supply				
Our study					1971 – 2007 (annual)
• Long-run	**1.91**		**5.05**	**- 4.87**	
Hossain (2009)					1963 – 2005 (annual)
• Long-run	n.a[d]				
Dasgupta *et. al.* (2002)					1985 – 1993 (quarterly)
• Long-run	0.6[c]		0.16	n.a.	
Arize (1990)					1973 – 1985 (quarterly)
• Long-run	2.15		4.0		

Notes: a. Arize (1990) relaxed the assumption by not using a restriction of homogenous in degree zero of relative price.
b. not statistically significant.
c. Dasgupta *et. al.* (2002) estimates a set of non-oil exports using a simultaneous Equation of demand and supply functions.
d. Hossain (2009) employed a single Equation of demand model by assuming implicitly that supply is not a constraint on exports.
e. The numbers are taken from Koshal et al. (1992).

The government reforms to facilitating trade are significantly attributed to reducing export price at the 5% significance level. This is plausibly due to combination of some factors, i.e. the devaluation of rupiah currency against US dollar in 1986, which was followed by a continuous flexible exchange rate management afterwards; facilitation on foreign investment; a string of trade liberalization packages including significant alleviation on trade barrier such as tariffs reduction and non-tariff barrier relaxing i.e. import quota and licenses. These enabled exporters to import capital and intermediate goods; and efficiency on trade bureaucracy. All of above factors contribute to ease what

so-called "high cost economy"[46] that eventually reducing the exports price. This evidence also confirms previous findings of Anas (2011) on the importance of trade liberalization policy taken by the government of Indonesia (GOI) to facilitate export performance. Along with evidences of higher price elasticity of supply compared to that of demand and the significance of trend and cycle factors on the export performance, this latter evidence confirms previous conjecture that Indonesia's exports is more supply-driven.

Two last other dummies of Asian economic crises and oil price shocks are also significantly contributed to export performance at one percent and five percent level of significance, respectively. The Asian economic crisis carries negative relationship with export price. Part of this negative relationship is contributed to a sharp depreciation on rupiah from 2,500 to 17,500 levels against US dollar by January 1998 –the fastest depreciation of a currency value in any of the crisis countries in the region[47]– that boosts exports during crisis period. During economic crisis, Indonesia's exports especially exports of primary commodities rose significantly resulting to a positive contribution to overall GDP growth. Nevertheless, it is worth noting that the Asian economic crises, not only brought an opportunity to induce exports performance, but generates some structural problems that may inhibit exports as well especially exports of manufactures. Some are included high lending interest; insolvent banking sector; domestic credit crunch; capital flows from export sector; and notwithstanding some political unrest that depress business certainty level.[48]

Dummy oil price shocks positively affect to exports price. This is plausibly due to,

[46] Fane and Condon (1995)
[47] IMF (1999); Hill (2007)
[48] Fane (1999); Aswicahyono and Pangestu (2000); Duttagupta and Splimbergo (2004).

despite of growing significance of manufacturing exports commodities, oil and gas exports still comprised for one-quarter of total Indonesia's exports. From supply perspective, oil price significantly contributes to production cost of exportable since an increase in oil (fuel) and gas price will induce other prices of factor input to rise. Statistics of Indonesia (2008) recorded consumer (wholesale) price level of CPI (WPI) by commodity on gas and fuel of 152.64 (243) was higher than national CPI (WPI) of 150.55 (195) during 2007 (2002=100).

3.1.1 Policy implication

The empirical results reported above address some policy implications. Since demand is price-elastic, it is suggested for the GOI to maintain external competitiveness based on price. Conversely, if price competitiveness is weakened, Indonesia will suffer from a large decline in the volume of exports. Thus, exchange rate management becomes one of critical measures in maintaining export competitiveness. Competitive exchange rate management can be conducted through effective & prudent macroeconomic policy. Hossain (2009), among others, emphasizes on the disciplined economic policies and managed-inflation monetary policy to maintain competitive exchange rate management.

In addition, the highly elastic price elasticity of demand also implies that GOI should facilitate further industrialization process particularly in manufacturing export-oriented sectors and remain less dependent on natural resource based products. Indonesia needs to devise a long-term strategy aimed to improve the quality of exportable. In so doing, GOI may encourage the adaptation of better technology and persistently deliver continuous supports to business climate, all of which can facilitate the productivity

improvement in exports sector.

Apart from price, world income growth will also lead to large increase in demand for Indonesia exports. In the event of a slowdown in world income growth, Indonesia can still maintain high growth of exports by improving its competitiveness. Despite of the significant impact of world economic shocks to export demand that has to be taken into account, Indonesia is worth seeking an alternative to maintain export performance through diversification and expansion of export markets.

The significances of demand and supply price elasticity as well as secular and cyclical movements imply that foreign and domestic demands play roles in determining performance of Indonesia exports. The higher magnitude of secular income than that of cyclical income implies the export performance is more attributed to productive capacity. The higher magnitude of price elasticity of supply than that of demand suggests that Indonesia exports are more supply-determined. This supports previous conjectures arguing that supply side rather than demand side is the more relevant determinants of Indonesia export performance. Based on all these evidences, GOI should facilitate improvements on productivity of factor inputs by removing economic bottlenecks, provide more attention on improvement of infrastructures condition, and facilitate investment in export sector, all of which are in order to boost export performance.

3.6 Concluding remarks

In this chapter, we investigate the impact of foreign-and domestic demand represented by price and income factors on Indonesia's exports for the period of 1971-2007. In contrast with some previous study that treats one function by assumption, we

explicitly deal with simultaneity between exports quantity and price by employing a simultaneous Equation within demand and supply framework. All variables under consideration are significant at least in five percent level of significance, and carry expected signs. Our result suggests that relative price and world income are significant factors playing roles in determining demand for Indonesia's exports. The magnitude of relative price and income elasticities both are higher than one implying that world demand for exports are highly responsive to price and income. Exports price also significantly contributes to the long-run supply for Indonesia exports, whose magnitude of elasticity are higher than that of demand. This supports previous conjectures arguing that supply side rather than demand side is the more relevant determinants for Indonesia export performance. The attempt to dissect income into secular and cyclical movements enables us to test for domestic demand pressure hypothesis. The result confirms the customary version of the capacity pressure hypothesis suggesting that a high level of capacity utilization (domestic demand) will choke off production of exportable in Indonesia This indicates that productive capacity and capacity utilization rate have significant impact on supply of Indonesia's exports. Statistically, the estimated coefficients are stable over the period under study and all findings draw some significant policy implications including macro- and micro-economic policies, all of which are as importance to maintain and improve the demand and supply of Indonesia's exports. Nevertheless, since this study is performed based on aggregated data, it might be useful to extend the analysis to see the behavior and other non-price determinants of exports performance by employing more disaggregated data. The following **Chapter 4** will touch these issues rigorously.

A.3 Appendix

A.3.1. Equilibrium model of demand and supply for exports:

Demand function

$$\log X_t^D = \alpha_0 + \alpha_1 \log(PX/Pw)_t + \alpha_2 TYw_t + \alpha_3 CYw_t + \alpha_4 D99 + \nu_t \quad \text{(A.3.1)}$$

Supply function

$$\log X_t^S = \beta_0 + \beta_1 \log(PX/PD)_t + \beta_2 TY_t + \beta_3 CY_t + \beta_4 D99 + \upsilon_t \quad \text{(A.3.2)}$$

Normalization procedure to obtain exports supply-price specification model:

$$\log X_t^S = \beta_0 + \beta_1 \log(Px/P)_t + \beta_2 TY_t + \beta_3 CY_t + \beta_4 DTL_t + \beta_5 D98_t + \upsilon_t$$

$$\Leftrightarrow \log X_t^S = \beta_0 + \beta_1 \log Px_t - \beta_1 \log P_t + \beta_2 TY_t + \beta_3 CY_t + \beta_4 DTL_t + \beta_5 D98_t + \upsilon_t$$

$$\Leftrightarrow \log Px_t = -(\beta_0/\beta_1) + (1/\beta_1)\log X_t^S + (\beta_1/\beta_1)\log P_t - (\beta_2/\beta_1)TY_t - (\beta_3/\beta_1)CY_t - (\beta_4/\beta_1)DTL - (\beta_5/\beta_1)D98_t + \upsilon_t$$

$$\Leftrightarrow \log Px_t = b_0 + b_1 \log X_t^S + b_2 \log P_t + b_3 TY_t + b_4 CY_t + b_5 DTL_t + b_6 D98_t + \upsilon_t \quad \text{(A.3.3)}$$

A.3.2. Disequilibrium model of demand and supply for exports

Following Goldstein and Khan (1978), export quantities are assumed to adjust to the discrepancy between world demand for a country's exports in the current period and the actual flow of exports in the previous period. This implies that quantity of exports adjusts to conditions of excess demand in the rest of the world. Meanwhile for supply model, using supply-price specification, the price of exports is assumed to adjust to conditions of excess supply. These disequilibrium models of demand and supply are as indicated in Equation (A.3.4) and (A.3.5), respectively

$$\Delta \log PX_t = \lambda[\log X_t - \log X_t^S] \quad \text{(A.3.4)}$$

$$\Delta \log X_t = \gamma[\log X_t^D - \log X_{t-1}] \quad \text{(A.3.5)}$$

Substituting (A.3.1) to (A.3.4) yields

$$\Delta \log X_t = \gamma[\log X_t^D - \log X_{t-1}]$$

$$\Leftrightarrow \log X_t - \log X_{t-1} = \gamma[a_0 + a_1 \log Px_t - a_1 \log Pw_t + a_2 TYw_t + a_3 CYw_t + a_4 D99_t - \log X_{t-1}]$$

$$\Leftrightarrow \log X_t - \log X_{t-1} = \gamma a_0 + \gamma a_1 \log Px_t - \gamma a_1 \log Pw_t + \gamma a_2 TYw_t + \gamma a_3 CYw_t + \gamma a_4 D99_t - \gamma \log X_{t-1}$$

$$\Leftrightarrow \log X_t = \gamma a_0 + \gamma a_1 \log Px_t - \gamma a_1 \log Pw_t + \gamma a_2 TYw_t + \gamma a_3 CYw_t + \gamma a_4 D99_t + X_{t-1} - \gamma \log X_{t-1}$$

$$\Leftrightarrow \log X_t = \gamma a_0 + \gamma a_1 \log Px_t - \gamma a_1 \log Pw_t + \gamma a_2 TYw_t + \gamma a_3 CYw_t + \gamma a_4 D99_t + (1-\gamma) \log X_{t-1}$$

$$\Leftrightarrow \log X_t = c_0 + c_1 \log Px_t - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1} \quad \text{(A.3.6)}$$

Equation (A.3.6) exactly as Eq. (3.6) is our final disequilibrium model for estimating demand for export.

To get final disequilibrium supply model, we substitute Equation (A.3.3) to (A.3.5) yielding (A.3.7), which is exactly as Eq. (3.7):

$$\Delta \log Px_t = \lambda[\log X_t - \log X_t^S]$$

$$\Leftrightarrow \log Px_t - \log Px_{t-1} = \lambda[\log X_t - (\beta_0 + \beta_1 \log Px_t - \beta_1 \log P_t + \beta_2 TY_t + \beta_3 CY_t + \beta_4 DTL_t + \beta_5 DOIL_t + \beta_6 D98_t)$$

$$\Leftrightarrow \log Px_t - \log Px_{t-1} = \lambda \log X_t - \lambda\beta_0 - \lambda\beta_1 \log Px_t + \lambda\beta_1 \log P_t - \lambda\beta_2 TY_t - \lambda\beta_3 CY_t - \lambda\beta_4 DTL_t - \lambda\beta_5 DOIL_t - \lambda\beta_6 D98_t$$

$$\Leftrightarrow \log Px_t + \lambda\beta_1 \log Px_t = \lambda \log X_t - \lambda\beta_0 + \lambda\beta_1 \log P_t + \log Px_{t-1} - \lambda\beta_2 TY_t - \lambda\beta_3 CY_t - \lambda\beta_4 DTL_t - \lambda\beta_5 DOIL_t - \lambda\beta_6 D98_t$$

$$\Leftrightarrow \log Px_t (1+\lambda\beta_1) = \lambda \log X_t - \lambda\beta_0 + \lambda\beta_1 \log P_t + \log Px_{t-1} - \lambda\beta_2 TY_t - \lambda\beta_3 CY_t - \lambda\beta_4 DTL_t - \lambda\beta_5 DOIL_t - \lambda\beta_6 D98_t$$

$$\Leftrightarrow \log Px_t = -(\lambda\beta_0/(1+\beta_1)) + (\lambda/(1+\beta_1)) \log Xt + (\lambda\beta_1/(1+\beta_1)) \log P_t - (\lambda\beta_2/(1+\beta_1)) TY_t - (\lambda\beta_3(1+\beta_1)) CY_t$$
$$-(\lambda\beta_4/(1+\beta_1)) DTL_t - (\lambda\beta_5/(1+\beta_1)) DOIL_t - (\lambda\beta_6(1+\beta_1)) D98_t + (1/(1+\beta_1)) \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t = d_0 + d_1 \log X_t + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 D99_t + d_7 DOIL_t + d_8 \log PX_{t-1} \quad \text{(A.3.7)}$$

A.3.3. Reduced-forms

Procedure to obtain endogenous and exogenous variables in demand and supply model for exports through reduced-form is as follows:

A.3.3.1. Demand reduced-form

$$\log X_t = c_0 + c_1 \log Px_t - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 X_{t-1}$$

$$\Leftrightarrow \log X_t = c_0 + c_1 (d_0 + d_1 \log X_t + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1})$$
$$- c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1}$$

$$\Leftrightarrow \log X_t = c_0 + c_1 d_0 + c_1 d_1 \log X_t + c_1 d_2 \log P_t + c_1 d_3 TY_t + c_1 d_4 CY_t + c_1 d_5 DTL_t + c_1 d_6 DOIL_t +$$
$$c_1 d_7 D98_t + c_1 d_8 \log Px_{t-1} - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1}$$

$$\Leftrightarrow \log X_t - c_1 d_1 \log X_t = c_0 + c_1 d_0 + c_1 d_2 \log P_t + c_1 d_3 TY_t + c_1 d_4 CY_t + c_1 d_5 DTL_t + c_1 d_6 DOIL_t +$$
$$c_1 d_7 D98_t + c_1 d_8 \log Px_{t-1} - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1}$$

$$\Leftrightarrow \log X_t (1 - c_1 d_1) = c_0 + c_1 d_0 + c_1 d_2 \log P_t + c_1 d_3 TY_t + c_1 d_4 CY_t + c_1 d_5 DTL_t + c_1 d_6 DOIL_t +$$
$$c_1 d_7 D98_t + c_1 d_8 \log Px_{t-1} - c_1 \log Pw_t + c_2 TYw_t + c_3 CYw_t + c_4 D99_t + c_5 \log X_{t-1}$$

$$\Leftrightarrow \log X_t = \left((c_0 + c_1 d_0)/(1 - c_1 d_1)\right) + \left(c_1 d_2/(1 - c_1 d_1)\right) \log P_t + \left(c_1 d_3/(1 - c_1 d_1)\right) TY_t +$$
$$\left(c_1 d_4/(1 - c_1 d_1)\right) CY_t + \left(c_1 d_5/(1 - c_1 d_1)\right) DTL_t + \left(c_1 d_6/(1 - c_1 d_1)\right) DOIL_t + \left(c_1 d_7/(1 - c_1 d_1)\right) D98_t +$$
$$\left(c_1 d_8/(1 - c_1 d_1)\right) \log Px_{t-1} - \left(c_1/(1 - c_1 d_1)\right) \log Pw_t + \left(c_2/(1 - c_1 d_1)\right) TYw_t + \left(c_3/(1 - c_1 d_1)\right) CYw_t$$
$$+ \left(c_4/(1 - c_1 d_1)\right) D99_t + \left(c_5/(1 - c_1 d_1)\right) \log X_{t-1}$$

$$\Leftrightarrow \log X_t = \left((c_0 + c_1 d_0)/D\right) + \left(c_1 d_2/D\right) \log P_t + \left(c_1 d_3/D\right) TY_t + (c_1 d_4/D) CY_t + (c_1 d_5/D) DTL_t$$
$$+ (c_1 d_6/D) DOIL_t + (c_1 d_7/D) D98_t + (c_1 d_8/D) \log Px_{t-1} - (c_1/D) \log Pw_t + (c_2/D) TYw_t +$$
$$(c_3/D) CYw_t + (c_4/D) D99_t + (c_5/D) \log X_{t-1} \qquad \text{(A.3.8)}$$

A.3.3.2. Supply reduced-form

$$\log Px_t = d_0 + d_1 \log X_t + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t = d_0 + d_1 \log X_t + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t = d_0 + d_1 (c_0 + c_1 \log Px_t - c_1 \log Pw_t + c_2 TYw_t + c_3 Yw_t + c_4 D99_t + c_5 \log X_{t-1}) +$$

$$d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t = d_0 + c_0 d_1 + c_1 d_1 \log Px_t - c_1 d_1 \log Pw_t + c_2 d_1 TYw_t + c_3 d_1 CYw_t + c_4 d_1 D99_t +$$

$$c_5 d_1 \log\log X_{t-1} + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t - c_1 d_1 \log Px_t = d_0 + c_0 d_1 - c_1 d_1 \log Pw_t + c_2 d_1 TYw_t + c_3 d_1 CYw_t + c_4 d_1 D99_t +$$

$$c_5 d_1 \log X_{t-1} + d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t (1 - c_1 d_1) = d_0 + c_0 d_1 - c_1 d_1 \log Pw_t + c_2 d_1 TYw_t + c_3 d_1 CYw_t + c_4 d_1 D99_t + c_5 d_1 \log X_{t-1} +$$

$$d_2 \log P_t + d_3 TY_t + d_4 CY_t + d_5 DTL_t + d_6 DOIL_t + d_7 D98_t + d_8 \log Px_{t-1}$$

$$\Leftrightarrow \log Px_t = ((d_0 + c_0 d_1)/(1 - c_1 d_1)) - (c_1 d_1/(1 - c_1 d_1)) \log Pw_t + (c_2 d_1/(1 - c_1 d_1)) TYw_t +$$

$$(d_2/(1 - c_1 d_1)) \log P_t + (c_3 d_1/(1 - c_1 d_1)) CYw_t + (c_4 d_1/(1 - c_1 d_1)) D99_t +$$

$$(c_5 d_1/(1 - c_1 d_1)) \log X_{t-1} + (d_3/(1 - c_1 d_1)) TY_t + (d_4/(1 - c_1 d_1)) CY_t +$$

$$(d_5/(1 - c_1 d_1)) DTL_t + (d_6/(1 - c_1 d_1)) DOIL_t + (d_7/(1 - c_1 d_1)) D98_t + (d_8/(1 - c_1 d_1)) \log Px_{t-1}$$

$$\Leftrightarrow Px_t = ((d_0 + c_0 d_1)/D) - (c_1 d_1/D) Pw_t + (c_2 d_1/D) TYw_t + (c_3 d_1/D) CYw_t + (c_4 d_1/D) D99_t +$$

$$(c_5 d_1/D) X_{t-1} + (d_2/D) P_t + (d_3/D) TY_t + (d_4/D) CY_t + (d_5/D) DTL_t + (d_6/D) DOIL_t +$$

$$(d_7/D) D98_t + (d_8/D) Px_{t-1} \qquad \text{(A.3.9)}$$

CHAPTER 4

THE IMPACTS OF EXPORT STRUCTURE AND COMPETITIVENESS ON EXPORT PERFORMANCE: A SECTOR-BASED ANALYSIS

Previous chapter shows evidence that price and income factors play significant roles in determining Indonesia's exports performance. The evidence of highly elastic price elasticity of demand and supply for exports indicates the importance of manufactured commodities in exports structure. In more rigorous view, exports structures, not only can be as form of product composition, but also distribution structure to export market destination. Sustaining high export growth involves an on-going process of expanding shares in world market by increasing the price and quality competitiveness of exports commodities and by specializing in more productive exportable activities that are growing rapidly on world markets (ADB Institute, 2002). In addition to price and income factors of export determinants previously discussed in previous chapter, the present chapter is devoted to analyze non-price factors of export performance in terms of product composition, market distribution and competitiveness.

4.1 Background

After the collapse in oil price in the mid-1980s, Indonesia started to embark on trade liberalization era represented by an outward-oriented or EP strategy replacing ISI

strategy, which was spurred by the oil windfall profit during the mid 1970s. GDP decomposition analysis in previous chapter indicates that growth of GDP during this EP era was dominated by real exports or *seemingly* export-led growth, and the portion of exports of manufactured commodities structure in total exports structure increased overtime outperforming natural resource-intensive (NRI) exports and reached its peak of 68 percent in 2007. During 1987 to 2008, Indonesia manufactured exports (SITC 5 to 8) grew at 15 percent on average with more than 50% of total exports went to Japan, US, NIEs, and ASEAN3.[49] At the same period, world trade has experienced dramatic structural changes in terms of its composition by product category, with a significant increase in the share of high-technology products and a corresponding decrease in that of low-technology commodities.[50]

In regards with export performance, Leamer and Stern (1970) point out changes in a country's exports performance can be influenced by (a) world export demand; (b) geographical destination; (c) product composition; and (d) by changes in country's competitiveness. In regards with exports commodity structure, ADB Institute (2002) argued that upgrading the structure of an economy's exports toward more productive activities plays a critical role in export-led development and sustained high export growth. Therefore, assessing export performance based on its factor determinants and structure is deemed necessary in formulating the effective and competitive trade policy in Indonesia.

The purpose of this present study is to elucidate the evolution of exports structure and competitiveness by quantifying the contribution of the geographical (market)

[49] NIE is newly industrializing economies comprised of Hong Kong, Korea and Singapore. ASEAN3 includes Malaysia, Thailand and Philippines.
[50] Finicelii et. al. (2008)

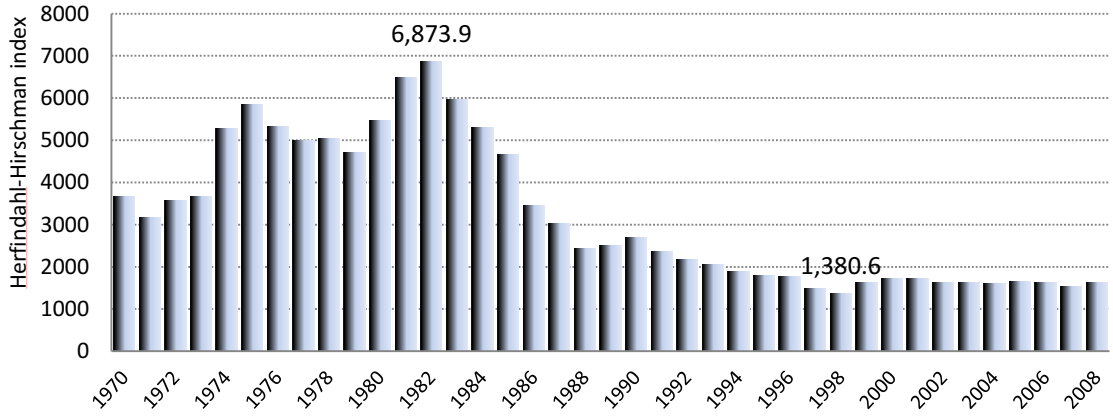
and commodity composition on Indonesian manufacturing exports as well as their comparative advantage. In so doing, we employ analyses of Constant Market Share (CMS) and Revealed Comparative Advantage (RCA) indicators on more disaggregated level of manufacturing commodities classified by factor intensity for period 1987 to 2008. To our acknowledgement, previous studies for Indonesia's case have not taken such combined issues into account.

4.2 Overview of Indonesia's manufactured exports

The era of EP strategy in Indonesia was embarked in the aftermath of the decline in oil price in the mid-1980s. During this period, the Indonesian economy began to feel the impact of the rapid increases in foreign direct investment owing to the bold and decisive series of liberal economic reforms introduced from the mid-1980s onward. The reform covered the exchange rate management, which was including two large nominal depreciations, in 1983 and 1986; prudent fiscal policy; comprehensive tax reform; a more open posture towards foreign investment; and financial deregulation including in banking sector (Hill, 1996; Ishida, 2003). The private sector and exports became the main engine of the development of the manufacturing sector for the first time ever. Exports of manufactures grew five-fold over 9 years from that of 1985 owing to a string of liberalization packages on trade and investment, including the relaxation of restrictions on foreign investment, tariff cuts and the abolition of non-tariff trade barriers such as import restrictions unleashed by government.

The portion of exports of manufactured commodities in total exports increased overtime and reached its peak of 68% in 2007. Meanwhile, its value recorded the highest

of US$ 57.65 billion in 2008. Analyzing exports concentration using Herfindahl-Hirschman Index (HHI)[51], we reveal that Indonesia's exports from 1970 to 1985 were mainly dominated by oil and non-oil primary products such as mined minerals and agriculture and Indonesian export commodities have been more diverse compared to those under previous ISI development strategy (**Figure 4.1**).[52] Using HHI index, we can confirm that there has been a persistent decline in exports concentration from 1985 indicating more product variation in export structures.



Share	Product Category under Standard International Trade Classification (SITC) code
1st	2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
2nd	3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
3rd	0 0 0 0 0 0 0 0 0 0 0 0 0 6 6 2 0 2 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 7 2 2 7

a. The higher HHI index is, the more export is concentrated on certain commodity, *vice versa*.
b. SITC classification:
0: food and live animals; 2: crude, inedible materials; 3: mineral fuels and related materials; 6: manufactured goods classified by materials; 7: machinery and transport equipment; 8: miscellaneous manufactures.

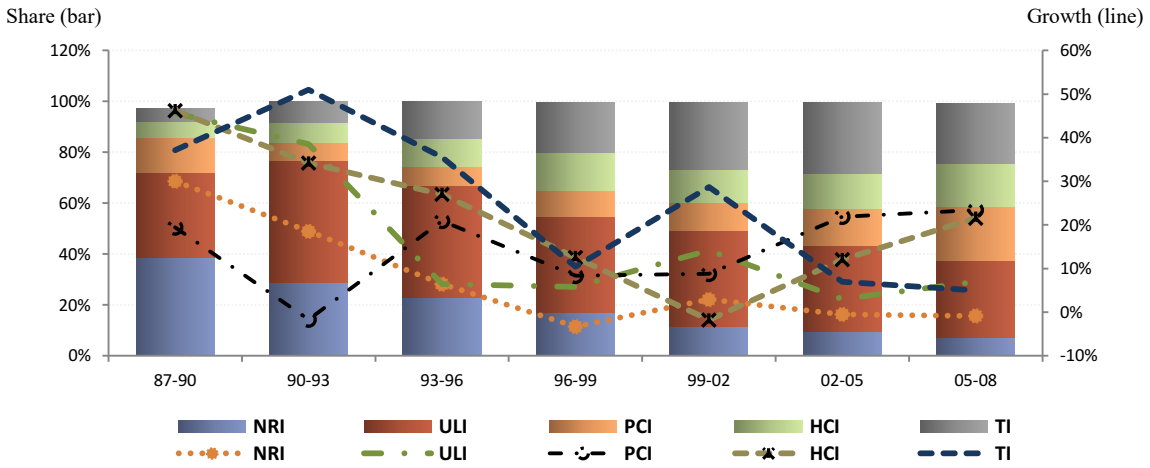
Figure 4.1. Product concentration of Indonesia's exports 1970-2008
Source: *UN-COMTRADE* database, calculated.

At the beginning of trade liberalization era (1987-1990), commodities under natural resource-intensive (NRI) and unskilled labor-intensive (ULI) categories were the two most

[51] HHI index is computed as $\sum_{i=1}^{N} share_i^2$, where *i* is commodity and *N* is number of commodity.

[52] *Statistics of Indonesia 2009*.

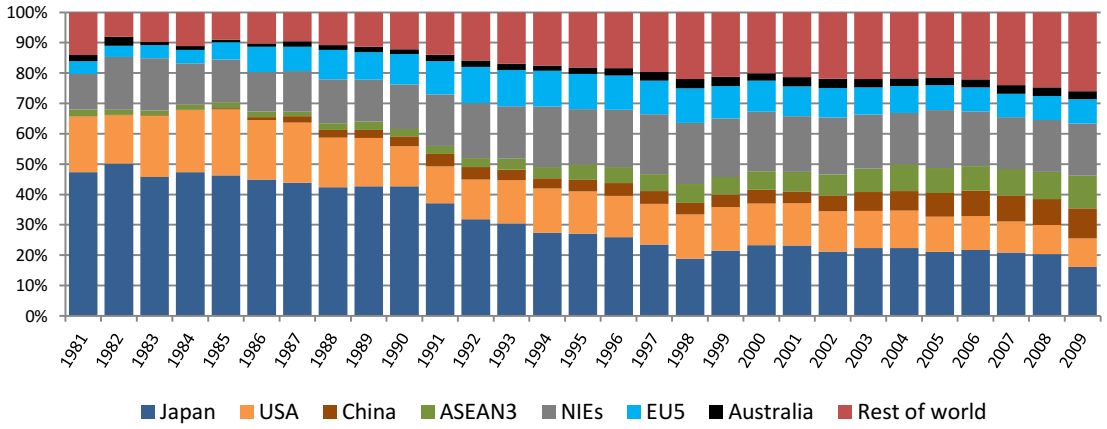
dominant commodities of Indonesia's manufactured exports, with share as to 39% and 33%, respectively. However, the share of NRI exports on total manufactured exports has been diminishing continuously due to its declining growth, and started from 1990 ULI exportable had been the most dominant exports yet with declining growth. Meanwhile, the shares of commodities under physical capital-intensive (PCI), human capital-intensive (HCI) and technology-intensive (TI) were still negligible at the earlier stage of EP period (see **Figure 4.2**).



Note: NRI comprises products such as wood, dyes, cement and leather; ULI products are such as textiles & garments, footwear, glass/ glassware, furniture and miscellaneous manufactures; PCI is for chemicals, iron & steel, non-metallic minerals & machineries. HCI commodities are rubber, paper, road vehicle & other transports, arts etc.; TI includes pharmaceuticals, fertilizers, electronics optics etc.

Figure 4.2. Share and growth of manufactured exports classified by factor intensity
Source: *UN-COMTRADE* database, calculated

In terms of market distribution structure, more than 60% of manufactured exports go to five selected countries/regions comprised of Japan, US, NIE, ASEAN3 and EU5 (**Figure 4.3**). As result, the performance of those markets plays a significant role in determining overall performance of Indonesia's manufactured exports.



Note: 1. ASEAN3 includes Thailand, Malaysia and Philippines.
2. NIE includes Singapore, Hong Kong and Korea.
3. EU5 covers UK, France, Netherlands, Germany and Italy.

Figure 4.3. Major market destinations for Indonesian merchandise exports
Source: *UN COMTRADE* database, calculated

4.3 Exports structure and competitiveness determinants on exports performance

4.3.1 Theoretical framework

The theoretical foundation in analyzing the contribution of factor determinants in terms of commodity composition, market distribution and competitiveness effects is well explained in Leamer and Stern (1970). It is drawn from the idea that demand for exports in a given market from competing sources is a function of the relative prices (elasticity of substitution).

$$\frac{q_1}{q_2} = f\left(\frac{p_1}{p_2}\right) \tag{4.1}$$

Equation (4.1) is recognized as the basic form of elasticity of substitution. Multiplying both sides by p_1/p_2 will obtain

$$\frac{p_1 q_1}{p_2 q_2} = \frac{p_1}{p_2} \cdot f\left(\frac{p_1}{p_2}\right)$$

$$\frac{p_1 q_1}{p_1 q_1 + p_2 q_2} = \left(1 + \frac{p_2 q_2}{p_1 q_1}\right)^{-1} \tag{4.2}$$

Eq. (4.2) implies that

$$= \left(1 + \left[\frac{p_1 f(p_1/p_2}{p_2}\right]^{-1}\right)^{-1}$$

$$= g\left(\frac{p_1}{p_1}\right) \tag{4.3}$$

Equation (4.3) implies that exports share will remain unchanged (constant) over time except as relative price varies. This is as structural term, which later can be dissected into three parts namely (i) the world term; (ii) the commodity term; (iii) the market term, all of which represents demand factor phenomenon (Fleming and Tsiang, 1956, Junz and Rhomberg, 1973, Merkies and Meer, 1988). Thus, changes in exports beyond the constant share norm can be attributed to price changes – or changes in the level of competitiveness, which captures the effect of changing market shares.

In the endeavor for enriching theoretical foundation of CMS in analyzing factor determinants of export growth especially for the structural one, Merkies and Meer (1988) were attempted to link analysis using a two-stage constant elasticity of substitution (CES) demand model. This formalizes demand interpretation of the effects of world export growth and market distribution on export growth. They also pointed out that competitiveness term is interpreted as demand reaction to given price changes which implicitly assumes it as supply-determined. In contrast to customary knowledge considering commodity effect as a demand-determined function, they argued that it should

in fact be given as a supply phenomenon. Later, they applied such an analysis for the case of US and the Economic and Social Commission for Asia and the Pacific (ESCAP) countries.

4.3.2 Review of empirical literatures

Study on assessing competitiveness and sector-based specialization (market distribution and commodity composition) effects on export performance have been done by many economists using Constant Market Share (CMS) analysis, which was initially applied in international trade by Tyszynski (1951) for analyzing countries' market share of manufactured exports from 1899-1950. The summary of some previous empirical literatures is presented in **Table 4.1**.

Table 4.1. Selected empirical studies analyzing exports structure and competitiveness

Study	Objective	Data set and model	Result
Bowen and Pelzman (1984)	To analyze the declining US export growth was due to its competitiveness effect.	US 's 3 digit SITC level 1962-1977 CMS	• Structural effect compensated declining comp. effect.
Fagerberg and Sollie (1987)	To review export growth of 20 OECD countries	OECD Trade series C from 1961-1983 CMS	• Structural effect contributed positively (negatively) to exports of developed (less) economies. • Competitiveness effect is the most important factors.
Merkies and Meer (1988)	To formalize the theoretical base of factor determinants of export growth.	5 SITC categories (one digit) of ESCAP countries CMS & 2-stage CES demand model	• Structural effect is demand-determined, while competitiveness is supply-phenomenon.
Aswicahyono and Pangestu (2000)	To explain Indonesia's pre-crisis export competitiveness	Indonesia' 2 digit SITC level 1986-1996 CMS and RCA	• Pre-crisis Indonesia exports benefitted from comp. due to low labor cost & natural resources.
Juswanto and Mulyanti (2003)	To analyze pattern of Indonesia's export growth	One digit SITC level 1990-1999 CMS	• Exports growth had severe problem due to commodity and market effect.
Sambodo (2004)	To explain changing pattern of Indonesia's exports.	2 digit SITC (Rev. 3) 1962-2002 CMS	• There has been a decline in competitiveness in Indonesia's exports.
Holst and Weiss (2004)	To assess ASEAN-5's exports in the face of China's competition.	5 SITC categories (2 digit) between 1995-2000 CMS and RCA	• A substantial loss market share of ASEAN-5 exports in US & Japan due to China's competitiveness.

Lloyd and Taguchi (2005)	To analyze pattern of 3 East Asian countries' export growth.	2 digit ISIC Rev. 3 (manufacturing) of 1980-1993 CMS	• Remarkable exports growth of such countries came from steady increase in its competitiveness.
Tran (2010)	To assess Vietnam's exports in the face of China's competition.	2 digit SITC level (1997-2004) CMS and RCA	• China did not crowded-out Vietnam's exports. • Vietnam's loss in exports came from its own specialization pattern problem.

Bowen and Pelzman (1984) were using CMS to analyze whether the declining US exports growth was attributed to competitiveness effect. They found that structural effects played roles in compensating decline in competitiveness effect. Fagerberg and Solie (1987) employed a new extension of CMS to review sources of export growth in 20 OECD countries during 1961-1983. Their findings indicated competitiveness effect is the most important determinants for export growth.

In empirical studies of CMS on the East Asian economies, Lloyd and Taguchi (1996), among others, analyzed the competitiveness manufactured exports for China, Korea and Indonesia between 1980 and 1993. The study showed that competitiveness is the most contributed factor on export performance compared to commodity composition and market distribution effect. Tran (2011) analyzes Vietnam's export performance in face of China's emergence as a major competitor in world market by employing CMS and RCA. The author suggests that China's exports did not crowd-out Vietnam's exports even though it has become a huge competitor in similar areas with Vietnam.

Empirical studies devoted to analyze specific case on Indonesia have been sparse. Some are worth mentioning here. Juswanto and Mulyanti (2003) examined Indonesia manufacturing exports (SITC 5-8) during 1990s using one-digit SITC level. The analysis revealed that Indonesia export performance suffered from negative contribution of

commodity composition and low response to world demand. Sambodo (2004) using two-digit SITC level analyzed broader category of Indonesia exports commodities in US, Japan and Singapore markets during 1962 to 2002. The study indicated that Indonesia lost its market share in Japan and Singapore markets and suffered from negative composition effect on US market. The latter indicated Indonesia did not succeed in product differentiation. Nevertheless, aforementioned studies neglected the existence of European economies (EU) and other significant market such as China and could not elucidate the evolution of export structure in such commodities. In addition, they did not classify commodities into main category based on factor intensity. The present study covered in this chapter attempts to fill the gap by proposing more comprehensive assessment in analyzing the underlying factors of exports growth and revealing the changing pattern in manufactured export structure classified by factor intensity. In so doing, it may propose specific policy implication to certain designated export-oriented industries.

4.4 Analytical models and data description

4.4.1 Constant Market Share analysis

In revealing underlying domestic export capabilities in terms of gains in export market share and the upgrading export structure, two respective standard, complementary export performance indicators, namely CMS trends and RCA indices are calculated.

Following formula of Leamer and Stern (1970), among others, the following export-based CMS identity decomposes actual change in a country's exports between two periods as follows:

$$V'-V \equiv \underbrace{\sum_i rV_{i.}}_{\text{(i)}} + \underbrace{\sum_i (r_i - r)V_{i.}}_{\text{(ii)}} + \underbrace{\sum_i \sum_j (r_{ij} - r_i)V_{ij}}_{\text{(iii)}} + \underbrace{\sum_i \sum_j (V_{ij}^{'} - V_{ij} - r_{ij}V_{ij})}_{\text{(iv)}} \quad (4.4)$$

where:

$V\ (V')$ = country A's exports value in period 1 (2)

$V_i(V_i')$ = country A's exports value of commodity *i* in period 1 (2)

$V_{ij}(V'_{ij})$ = country's A exports value of commodity *i* to country *j* in period 1 (2)

r = percentage growth in total world exports from period 1 (2)

r_i = percentage growth in total world exports of commodity *i* from period 1 (2)

r_{ij} = percentage growth in total world exports of commodity *i* to country *j* from period 1 (2)

On the right-hand side, the four expressions of the identity (4.4) represent three-level analysis in which the growth of a country's exports can be decomposed into four effects respectively, as follows:

(i) The world trade effect, which relates any change in country A's actual exports to changes in the world demand for exports. Positive sign of this effect implies that A has maintained its exports share in foreign market *vis-à-vis* the world, *vice versa*.

(ii) The commodity composition effect, which measures the extent to which A's export differential, is due to specializing in specific commodity where demand for exports is growing more rapidly than world average. Positive sign of this effect indicates that A's exports are concentrated in favorable commodity composition, whose demand is growing fast and *vice versa*.

(iii) The market distribution effect, which measures whether concentration on market destination of country A's exports are growing relatively faster than world average. Positive sign of this effect indicates that A's exports are concentrated in favorable

market whose demand is growing fast and *vice versa.*

(iv) The competitiveness term, an 'unexplained' residual reflecting the difference between the actual exports increase and the hypothetical increase if country A had maintained its share with regard to each commodity group.

Merkies and Meer (1988) define (i) to (iii) as the structural term, while (iv) as the competitiveness term. In contrast to the interpretation of such effects under structural term, the interpretation of competitiveness term is not as straight forward as other terms. Beside influenced by relative price, it also captures the influence of several non price-factors such as exports' differentiation and new product development, exports' time-delivery, and efficient financing and marketing measures.[53]

The aforementioned three-level analysis of export growth decomposition can further be derived as follows.

In period 1, the exports value of a country, say A, is defined as

$$\sum_j V_{ij} = V_{i\cdot} \sum_i V_{ij} = V_{\cdot j} \tag{4.5}$$

in other expression, we can also define A's exports in period 1 as:

$$\sum_i \sum_j V_{ij} = \sum_i V_{i\cdot} = \sum_j V_{\cdot j} = V_{\cdot\cdot} \tag{4.6}$$

Analyzing A's exports at the first level of analysis, we may view exports in a theoretical context only as a single good to a single market. At this point, the method suggests that if A maintains its exports share in world market then exports would increase by rV, where r refers to the percentage increase in total world exports during observation period. The

[53] See Leamer and Stern (1970) and Richardson (1971) for further detailed explanation on competitiveness effect.

following identity may thus be expressed as:

$$V_{..}^{'} - V_{..} \equiv rV_{..} + (V_{..}^{'} - V_{..} - rV_{..}) \tag{4.7}$$

Identity (4.7) simply says that the change in export growth from period 1 to period 2, or $V' - V$, is decomposed into a portion associated with the overall growth in world exports (rV) and an unexplained residual ($V'.. - V.. - rV$). This unexplained residual term represents the competitiveness effect (Leamer and Stern, 2009, pp. 173).

In next two-level analysis, the method can be extended to further scrutinize a quite diverse set of exports with *i*th commodities in world market. For the *i*th commodity, thus Identity (4.7) is now equal to:

$$V_{i.}^{'} - V_{i.} \equiv r_i V_{i.} + (V_{i.}^{'} - V_{..} - rV_{..}) \tag{4.8}$$

Equation (4.8) can be aggregated to

$$\begin{aligned} V_{..}^{'} - V_{..} &\equiv \sum_i r_i V_i + \sum_i (V_{i.}^{'} - V_{i.} - r_i V_{i.}) \\ &\equiv \sum_i (r - r + r_i) V_i + \sum_i (V_{i.}^{'} - V_{i.} - r_i V_{i.}) \\ &\equiv \underbrace{\sum_i (rV_{i.})}_{\text{(i)}} + \underbrace{\sum_i (r_i - r) V_i}_{\text{(ii)}} + \underbrace{\sum_i (V_{i.}^{'} - V_{i.} - r_i V_{i.})}_{\text{(iii)}} \end{aligned} \tag{4.9}$$

Equation (4.9) embodies a two-level analysis in which the growth of A's exports are dissected into part associated with the changes in (i) the general rise in world exports; (ii) the commodity composition of A's exports in period 1; and (iii) unexplained residual indicating the difference between the actual exports increase and the hypothetical increase if country A had maintained its share with regard to each commodity group.

The commodity composition effect in identity (4.9) is defined as

$$\sum_{j}(r_i - r)V_i \tag{4.10}$$

It is meant to indicate the extents to which A's exports are concentrated in commodity classes with growth rates higher than that of world average. It implies that if world exports of commodity *i* increase by more than total world exports, then $(r_i - r)$ will have a positive sign. This positive number will receive a heavy weight when added to other terms if $V_{i.}$ is relatively large. The sum indicated by (4.10) would indicate that A's exports were concentrated on the exports commodities whose markets were growing relatively fast. Otherwise, $(r_i - r)$ would be negative if A's exports were concentrated in slowly growing market.

In real world, A will export *i*th commodities to *j*th different market destinations. In this regard, the appropriate norm for constant market share of exports of a particular *i* commodity class to particular *j* region can now be decomposed further as

$$V_{..}^{'} - V_{..} \equiv \sum_i \sum_j V'_{ij} - \sum_i \sum_j V_{ij}$$

$$\equiv \sum_i \sum_j r_{ij} V_{ij} + \sum_i \sum_j (V_{ij}^{'} - V_{ij} - r_{ij} V_{ij})$$

$$\equiv \sum_i \sum_j (r - r + r_i - r_i + r_{ij}) V_{ij} + \sum_i \sum_j (V_{ij}^{'} - V_{ij} - r_{ij} V_{ij})$$

$$\equiv \sum_i \sum_j (rV_{ij} - rV_{ij} + r_i V_{ij} - r_i V_{ij} + r_{ij} V_{ij}) + \sum_i \sum_j (V_{ij}^{'} - V_{ij} - r_{ij} V_{ij})$$

$$\equiv \sum_i \sum_j rV_{ij} + \sum_i \sum_j (r_i - r) V_{ij} + \sum_i \sum_j (r_{ij} - r_i) V_{ij} + \sum_i \sum_j (V_{ij}^{'} - V_{ij} - r_{ij} V_{ij})$$

$$\equiv \sum_i r V_{i.} + \sum_i (r_i - r) V_{i.} + \sum_i \sum_j (r_{ij} - r_i) V_{ij} + \sum_i \sum_j (V'_{ij} - V_{ij} - r_{ij} V_{ij}) \quad (4.11)$$

The Equation (4.11) is identical with Identity (4.4), both of which embody export growth analysis at level three. In such an analysis, A's exports growth in aggregate level is attributed to four components previously explained, namely (i) changes in world demand for exports, (ii) the commodity composition of A's export, (iii) the market distribution of A's exports, and (iv) an unexplained 'competitiveness' residual. The market composition effect in Identity (4.11) is defined as

$$\sum_j \sum_j (r_{ij} - r_i) V_{ij} \quad (4.12)$$

Identity (4.12) implies if the world export of commodity *i* to country *j* increases by more than total world exports of commodity *i*, then ($r_{ij} - r$) will be positive. The positive number will receive a heavy weight when added to other term $V_{ij.}$ The result is that Identity (4.12) would be positive if A maintained its exports concentration in the markets that were growing relatively fast, and it would be negative if A had concentrated in more stagnant regions. In general, the commodity composition and market distribution effect encapsulate the fact that a country may exceed world growth rates without actually gaining market share or competitiveness for any particular commodity or market distribution by maintaining concentration on certain commodities and market destinations whose exports growths are faster than that of world averages. We mainly utilize CMS identity of Equation (4.4) to scrutinize the effect of commodity composition and market distribution on export performance. Simultaneously, we can also analyze the evolution of competitiveness and its contribution to manufacturing exports growth.

Richardson (1971) pointed out some conceptual and empirical shortcomings of CMS application, some of which are (i) export quantity rather than its value as an appropriate measure of export share, (ii) application of country's focused competitors rather than same world standard, (iii) some variations due to arbitrary aggregation level on commodity and market distribution. Despite of aforementioned limitations, CMS approach has been a commonly accepted procedure to assess underlying sources of a country's export growth, depending on the availability of data (Tran, 2010). Along with other complementary indicators such as RCA index, CMS analysis may reveal underlying sources of export performance in terms of gain (loss) in export market share and the upgrading process in a country's export structure. Both indicators may reveal, yet do not measure directly, underlying domestic capabilities in terms of gains in export market share (CMS analysis) and the upgrading of export structure (ADB Institute, 2002).

4.4.2 Revealed Comparative Advantage

In order to reveal the evolution pattern of changing competitiveness strength in export commodity, which represents the dynamics of export structure, this study supplements the former CMS analysis by employing Balassa (1989) export-based RCA index using the following formula:

$$RCA_j^i = \left[X_i^k / X_{tot}^k\right] / \left[X_i^W / X_{tot}^W\right] \tag{4.13}$$

where:

X_i^k = value of Indonesia's exports of commodity *i* in period t

X_t^k = value of Indonesia's exports of total commodity in period t

X_i^w = value of world exports of commodity *i* in period t

X_t^w = value of world exports of total commodity in period t

RCA index is one of the most widely used measures of trade competitiveness. The RCA index of a given product is calculated by the commodity's share in the country's exports relative to its share in world. It is a measure of a country's export structure and it may depict the relative pattern of export specialization for an economy relative to worldwide patterns. RCA_{ij} reveals a comparative advantage if a country *j*'s exports share of a certain commodity *i* is greater than world share, that is, the RCA is greater than 1. The greater a sector's RCA, the more an economy specializes in that sector's exports relative to world specialization patterns revealing a stronger comparative advantage in that sector.

The index allows comparisons between countries at any time, and enables changes in structure of comparative advantage to be tracked over time. RCA indices and their evolution thus provide broad information about country's specialization pattern relatively to the structure of world market. ADB Institute (2002) points out that tracking the structure of RCAs over time reveals an economy's comparative advantage development and export upgrading process. Porter (1990) further argues that upgrading the structure of a country's exports toward more productive activities is an essential element of ELG development and in maintaining sustained high export growth. The similar argument on the importance of technology laddering-up industrial activities in order to maintain sustained and rapid exports growth is also highlighted by Lall (1999).

4.4.3 Data specification

CMS decomposition and RCA indicators using formula (4.1) and (4.10) respectively are computed using compiled data from *UN-COMTRADE* in annual basis at two- to three-digit SITC

commodity level (rev. 2) of manufactured exports. In order to plausibly link the findings with policy implication to specific export-oriented industries, we categorize 42 commodities based on factor intensity into five main category-classes namely natural resource-intensive (NRI), unskillful labor-intensive (ULI), physical capital-intensive (PCI), human capital-intensive (HCI) and eventually, technology-intensive (TI). We follow such factor intensity categorization proposed by Aswicahyono and Pangestu (2000) in order to maintain consistency with national statistics (BPS). Details of commodity classification under five main category classes are as provided in **Table 4.2**.

Table 4.2. Manufactured export commodities classified by factor intensity

No	Manufacturing Industry	Abb.	SITC (Rev. 2)	No	Manufacturing Industry	Abb.	SITC (Rev. 2)
1	***Natural resource-intensive***	***NRI***		***4***	***Human capital intensive***	***HCI***	
	Dyeing/tanning materials	DYE	53		Perfume/cosmetics	COS	55
	Leather manufactures	L	61		Rubber manufactures	RUB	62
	Wood manufactures	W	63		Paper/paperboard	P	64
	Cement, non-metallic mineral	C	66 excl. 664, 665, 666		Metal manufactures	MET	69
2	***Unskilled labor-intensive***	***ULI***			Household appliances	HOU	775
	Textiles	TEX	65		Road vehicles	RV	78
	Glass	GS	664		Other transport equipment	OT	79
	Glassware	GSW	665		Watches and clocks	WAT	885
	Pottery	POT	666		Works of arts	ART	896
	Sanitary, heating and lighting	SAN	81		Jewelry and other precious	JEL	897
	Furniture	FUR	82	***5***	***Technology-intensive***	***TI***	
	Travel goods and bags	TRV	83		Medicine and pharmaceuticals	MP	54
	Garments	GAR	84		Manufactured fertilizers	FER	56
	Footwear	F	85		Plastics in primary forms	PF	57
	Miscellaneous manufactures	OI	89 excl. 896, 897		Plastics in non-PF i.e. cellulose	NPF	58
3	***Physical capital-intensive***	***PCI***			Chemicals materials n.e.s	CM	59
	Organic chemicals	OC	51		Automatic data processing	ADP	752, 759
	Inorganic chemicals	IC	52		Telecommunication equipments	TEL	76
	Iron and steel	IS	67		Electrical machinery	ELE	77 excl. 775
	Non-ferrous metal	NM	68		Photographic and optical goods	PHO	88 excl. 885
	Power-generating equipment	POW	71				
	Machineries	M	72				
	Metalworking machinery	MM	73				
	General industrial machinery	GIM	74				
	Office machines	OM	751				

Source: *UN-COMTRADE* database.

Accordingly, we construct Indonesia's 15 concentrated markets of major

destination for manufactured exports, which can be classified into 4 individual countries (Japan, US, China and Australia) and 4 regions comprised of NIE (Hong Kong, Korea and Singapore), ASEAN3 (Malaysia, Philippines and Thailand), EU5 (France, Germany, Italy, Netherlands, and UK) and rest of world (ROW).

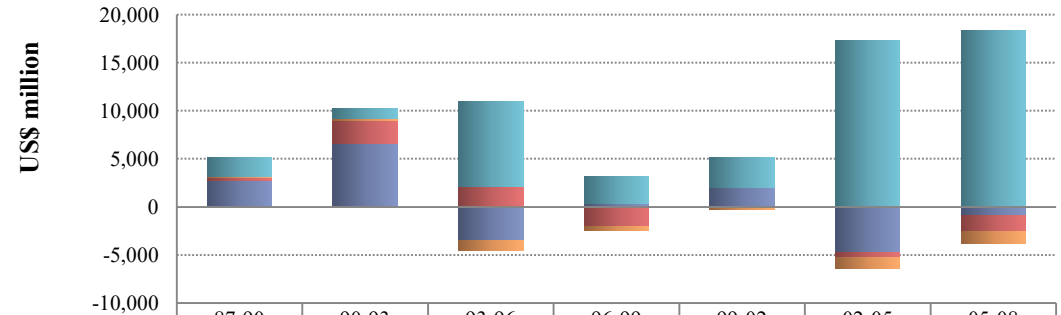
To track the evolution of export structure and competitiveness in manufacturing exports performance since trade liberalization unleashed in 1986, the data of 1987 to 2008 will be classed within seven 4 year-period intervals.

4.5 Empirical results

4.5.1 Export growth decomposition

Figure 4.3 provides results of CMS decomposition for some period intervals during 1987 to 2008. Trade liberalization drove positive contribution on all factors of both structural term and competitiveness term of export performance. Unfortunately, the constructive driver only lasted until beginning of 1993. Started from 1993, Indonesia suffered from loss in market share of its manufactured commodities. Even though it found time for regaining its competitiveness between 1996 until 2002, it could not maintain its market share from 2002 until 2005. During such periods, Indonesia manufactured exports performance was mostly contributed by growth of world exports. This continuous positive contribution of growth of world exports especially determined by growth in world exports of ULI and NRI commodities. Eventhough growths of NRI and ULI commodities are relatively slower than those of PCI, HCI and TI products, the domination of NRI and ULI in total manufactured exports provides larger weights to total export growth (see **Table 4.4**). In recent years, there have been a significant positive contribution of world exports

growth of highly technology, more value added commodities such as TI, PCI and HCI products to total manufactured exports. Nevertheless, such positive gains were masked by lesser weights due to relatively smaller proportion of TI, PCI and HCI products compared to those of NRI and ULI commodities.



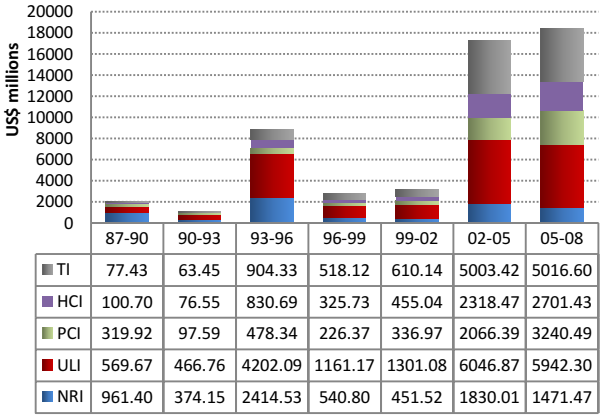
	87-90	90-93	93-96	96-99	99-02	02-05	05-08
World growth	2029.1	1078.5	8830.0	2772.2	3154.8	17265.2	18372.3
Commodity	82.3	186.6	-1024.1	-468.6	-6.3	-1126.0	-1258.9
Market	276.1	2346.2	2159.1	-1987.6	-202.6	-558.6	-1621.8
Competitiveness	2797.7	6621.6	-3499.8	373.4	1986.4	-4712.4	-881.1

Figure 4.4. CMS decomposition of manufacturing exports
Source: Author's calculation based on *UN-COMTRADE* database.

On the other hand, CMS decomposition result reveals that there has been a continuous negative contribution of commodity effect during period under study indicating that commodity composition factor seems to be the main problem for the growth of Indonesia manufactured exports. **Figure 4.5** provides disaggregated results of CMS decomposition enabling us to see the contribution of each commodity class on four effects.

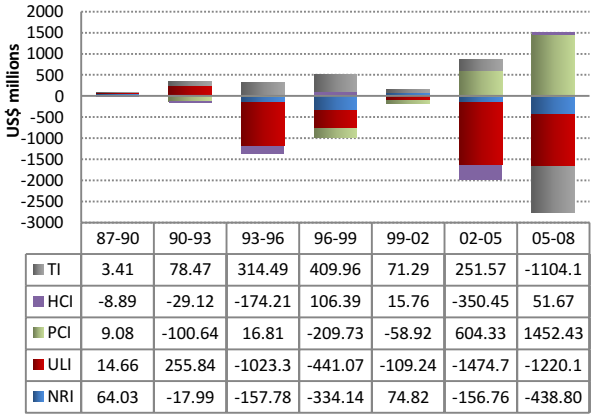
From the distribution of each effect based on commodity class, CMS shows evidence that in all periods of observation, Indonesia exports were contributed by positive world export growth effect. As depicted in panel (a) of **Figure 4.5**, this continuously positive world exports growth mostly were attributed to positive world export growth of ULI commodities. Since ULI commodities take the highest portion in total manufacturing

export comprising of 37.25%., the positive world export growth effect of this commodity class provides is transmitted to total export growth with heavy weight.



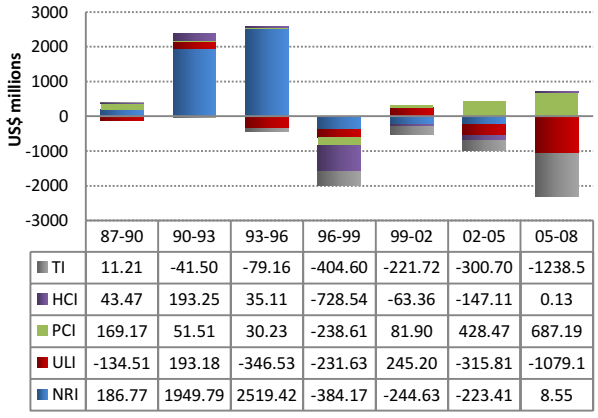
	87-90	90-93	93-96	96-99	99-02	02-05	05-08
TI	77.43	63.45	904.33	518.12	610.14	5003.42	5016.60
HCI	100.70	76.55	830.69	325.73	455.04	2318.47	2701.43
PCI	319.92	97.59	478.34	226.37	336.97	2066.39	3240.49
ULI	569.67	466.76	4202.09	1161.17	1301.08	6046.87	5942.30
NRI	961.40	374.15	2414.53	540.80	451.52	1830.01	1471.47

(a) World exports growth effect



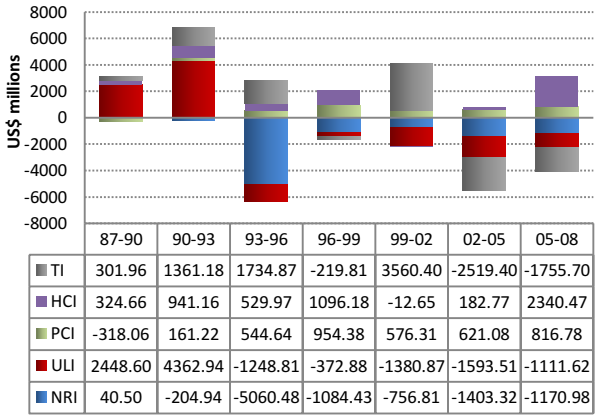
	87-90	90-93	93-96	96-99	99-02	02-05	05-08
TI	3.41	78.47	314.49	409.96	71.29	251.57	-1104.1
HCI	-8.89	-29.12	-174.21	106.39	15.76	-350.45	51.67
PCI	9.08	-100.64	16.81	-209.73	-58.92	604.33	1452.43
ULI	14.66	255.84	-1023.3	-441.07	-109.24	-1474.7	-1220.1
NRI	64.03	-17.99	-157.78	-334.14	74.82	-156.76	-438.80

(b) Commodity composition effect



	87-90	90-93	93-96	96-99	99-02	02-05	05-08
TI	11.21	-41.50	-79.16	-404.60	-221.72	-300.70	-1238.5
HCI	43.47	193.25	35.11	-728.54	-63.36	-147.11	0.13
PCI	169.17	51.51	30.23	-238.61	81.90	428.47	687.19
ULI	-134.51	193.18	-346.53	-231.63	245.20	-315.81	-1079.1
NRI	186.77	1949.79	2519.42	-384.17	-244.63	-223.41	8.55

(c) Market distribution effect



	87-90	90-93	93-96	96-99	99-02	02-05	05-08
TI	301.96	1361.18	1734.87	-219.81	3560.40	-2519.40	-1755.70
HCI	324.66	941.16	529.97	1096.18	-12.65	182.77	2340.47
PCI	-318.06	161.22	544.64	954.38	576.31	621.08	816.78
ULI	2448.60	4362.94	-1248.81	-372.88	-1380.87	-1593.51	-1111.62
NRI	40.50	-204.94	-5060.48	-1084.43	-756.81	-1403.32	-1170.98

(d) Competitiveness effect

Figure 4.5. CMS decomposition of manufacturing exports (disaggregated analysis)
Source: Author's calculation based on *UN-COMTRADE* database.

Nevertheless, disaggregated CMS decomposition result also reveals that there has been a continuous negative contribution of commodity effect. Such a negative effect of commodity composition is due to continuous negative commodity effect in most major commodities under ULI category classes especially textile, garment and footwear started from 1993 to 2008. Since these commodities dominate not only in ULI category class, but

also in overall manufactured exports performance, such negative impacts were transmitted into overall export performance with heavy weights. Average shares of textile, garment, and footwear commodities to total manufactured exports from 1987 to 2008 amount to 10.56%, 14.05%, and 5%, respectively. Overall, ULI commodity class contributes 37.25% share to total exports of manufactures during similar period. However, average world exports growth for ULI commodities of 6.76% were the slowest than those of other commodity classes (**Table 4.3**).

Table 4.3. Average share and growth of manufactured exports

No.	Product category	Avg. share	World growth (1996-2008)
1.	Natural resource-intensive	19.40%	7.04%
2.	Unskilled labor-intensive	37.25%	6.76%
3.	Physical capital-intensive	12.66%	9.67%
4.	Human capital-intensive	12.17%	8.41%
5.	Technology-intensive	17.57%	8.93%

Source: *UN-COMTRADE*, author's calculation

The parallel condition also applies for commodities under NRI category class. Major NRI commodities such wood and cork (mainly plywood) products contribute 17.62% share to total manufactured exports providing impetus for 19.40% share of NRI to total export of manufactures. Unfortunately, world demand for this commodity class grew only slightly better than that of ULI, but is still lower than those of PCI, HCI and ULI commodities. During 1996 to 2008, world exports growth for NRI products was growing merely at 7.04% p.a. on average.

The contrasting conditions were performed by export commodities of highly technology, higher value-added products of PCI, HCI and TI. In detailed analysis on sector-based level, commodities of PCI, HCI and TI classes positively contributes to export

growth in recent period, while those of NRI and ULI had deteriorating effect on export growth. Export of manufactures under these category classes played important role in compensating negative commodity effect of NRI and ULI during 1993-2008. After trade liberalization unleashed in 1986, Indonesia's manufactured exports performance was contributed by positive commodity composition effect from impressive export performance of TI commodity (mainly electronics) from minuscule number of US$ 3.41 million during 1987-1990 to US$ 410 million in 1996 to 1999, 120 times fold in 13 years. Even though the number declined precipitously to below US$ 100 million during recovery period following 1997/1998 economic crisis, it resumed to US$ 252 million during 2002-2005. PCI exports commodity (mainly non-ferrous metals and iron & steels) also recorded impressive performance of during 2005-2008, which contributed to US$ 1.5 billion positive commodity effect, the highest among four other commodity classes. Modest yet still positive commodity composition effect was showed by exports of HCI manufactures, which was mainly contributed by positive contribution rubber manufactures, road vehicle, and jewelry and other precious materials. Such a positive commodity effect of PCI, HCI and TI exports is attributed to higher world exports growth of 9.67%, 8.41%, and 8.93% compared to 7.04% and 6.76% demand growth of NRI and ULI commodities, respectively. Despite of their aforementioned impressive performance, the positive commodity effect of PCI, HCI and TI was only transmitted with small weights to total manufactured exports growth due to their smaller portions on total manufactured exports value. The shares of PCI, HCI and TI exports in 1996-2008 were 12.66%, 12.17%, and 17.57%, lower than 19.40% and 37.25% of NRI and ULI, respectively. Accordingly, larger extent amounted to

57% share of negative commodity effect of NRI and ULI due to their slower growth, was transmitted to total manufacture exports growth resulting in overall negative performance of commodity effect from 1993 to 2008.

On average, world demand growth for NRI and ULI exports commodities is slower than that of PCI, HCI and TI products. According to Lall (2000), such a slow demand growth is triggered by low economies of scale, undifferentiated products, more vulnerable to easy substitution by technical change and market shift, all of which are attributable to middle to low- and low-level of technology characteristic of NRI and ULI commodities. On the other hand, export commodities under PCI, HCI, and TI are products characterized with medium to high- and high technology level providing more product's value-added which results in high income elasticity of exports demand. Despite of slow world demand growth of NRI and ULI commodities, Indonesia still maintains heavy reliance on NRI and ULI export commodities resulting in retarded overall manufactured exports performance.

CMS decomposition also points to the negative role of market distribution effect which exhibited larger extent than that the product composition effect in most over observation period. This negative contribution is generally because of lower exports demand growth throughout Indonesia major export destination countries (mainly Japan and US) compared to other regions (China, Australia and rest of world) especially on commodities under NRI and ULI category (**Table 4.4**). More than 58% Indonesian manufactured exports such as of textile, garment, and electronics went to its traditional export markets such as Japan, US, NIEs and ASEAN. Nevertheless, these countries

recorded slower import growth from world markets during 1996-2008 compared to that of other markets such as China and Australia.

Table 4.4. Average share and growth Indonesia's major manufactured export destinations

No.	Export destination	Avg. share	World growth (1996-2008)
1.	JAPAN	13.26%	5.68%
2.	US	17.53%	6.85%
3.	NIE	19.06%	7.92%
4.	ASEAN	8.54%	6.17%
5.	CHINA	3.80%	13.89%
6.	EU5	12.00%	7.08%
7.	AUSTRALIA	2.29%	8.86%
8.	REST OF WORLD	23.53%	10.73%

Source: *UN-COMTRADE,* author's calculation

China's import demand recorded impressive average growth of 14% p.a. over 1996-2008, the highest among other Indonesia's major destination countries, with most commodities imported are those of TI and PCI products such as plastics in primary forms (33.4%) and inorganic chemicals (21.27%). Yet, China market took only 3.8% of total exports of manufactures of Indonesia where most export commodities were concentrated on commodities with slower world export growth in 1996-2008 such as woods and corks, organic chemicals, and paper and paperboard. In similar manner, exports to Australia also depict minuscule portion to total manufactured exports with commodities are again mainly concentrated in slowly demand growth of NRI and ULI commodities such as textile, woods, and furniture. Overall exports data of 1996-2008 periods reveal that most growing export markets such China, Korea, Australia and EU5 countries mostly consume highly technology, higher value-added commodities under PCI and TI category. Unfortunately, mismatched problems of commodity composition to major export destinations and slowly

world exports growth in such markets resulted in negative market distribution effect to overall Indonesia manufactured exports performance from 1996 to 2008.

There has been a significant improvement in export competitiveness in some following years after trade liberalization was unleashed in 1986. Growths of manufactured exports were mostly attributable to positive contribution of competitiveness effect. From 1990 to 1993, competitiveness effect contributed up to 82% of increases in export of manufactures. Nevertheless, such positive contribution of competitiveness effect only lasted until 1993. There has been a continuous decline in shares of competitiveness gain in manufactured exports after period of 1993 indicating that Indonesia failed to maintain its market share by losing a price and/or non price advantage relative to its competitors on each commodity to each export destination country. Even though during period of recovery following Asian 1998 crisis Indonesia had time to regain its competitiveness until 2002, since that period until recent years, the progress in competitiveness has been mild. It seems Indonesia did not perform well in maintaining its competitiveness after trade liberalization policy started. From the distribution of competitiveness effect among industries, it reveals that from the onset of trade liberalization in 1986 most of competitiveness gain were contributed by PCI, HCI and TI sectors; while in contrast, there has been a continuous decline of competitiveness in NRI and ULI industries. This phenomenon suggests that future development of industrialization should focus on the development of commodities with more advanced technology-embedded (high value-added), and the government of Indonesia should put more emphasis on competitiveness enhancing measures.

4.5.2 Comparative advantage and competitiveness

The RCA index reveals that Indonesia still specializes in NRI and ULI both of

which are characterized with fewer added values. Most of time, commodities with highly comparative advantage were mainly dominated by wood and corks, footwear, garments and textiles. The main drivers of competitiveness of these export categories mostly come from natural resource endowments and low wages from unskilled labor for the former and the latter, respectively. However, world specialization pattern exhibits continuous growth of import demand in more highly added value commodities under PCI, TI and HCI class. This, as Lall (2000) argues, is due to typical highly technology, higher value-added characteristics of those commodity classes, which provides more competitive advantage compared to those of NRI and ULI commodities. As a result, export demand for such commodities grows more than proportionate as income increases. Unfortunately, improvement in comparative advantage for highly technology, higher value-added export commodities has been mild. RCA indicators indicate that number of commodities of PCI category exhibiting upgraded RCA index over five interval period from 1987 to 2008 was merely one out of 10 commodities (non ferrous metal). In HCI category, 4 products (paper and paperboards, rubber manufactures, other transport equipment, and jewelry and other precious materials) out of 10 commodities were enjoying higher export market share indicated by upgraded comparative advantage. Finally in TI sector, 2 products (manufactured fertilizers and telecommunication equipments) out of 10 commodities were having upgraded RCA.

Summary of RCA indicators **as** presented in **Table 4.5** indicates that:

i. The evolution of export structure (RCA >1) from 1987 to 208 are still concentrated (50% to 71%) in commodities under ULI category, even though growth of world

demand of these commodities tend to continuously decline. These commodities include garments, textiles, footwear and other low-technology embedded commodities.

ii. Though such RCA numbers exceed unity, there has been a recurrent decline in the magnitude implying a loss in sector's comparative advantage (market share) relative to its competitors in world market.

iii. There has not been much improvement in productive activities of commodities under PCI, HCI and TI categories represented by no upgrading RCA in such categories either intensively or extensively were taken place.

iv. In contrast, number of products downgraded (RCA less than unity) after 2002 were continuing.

Based on RCA indicators, it seems that Indonesia still maintains heavy reliance on ULI commodities, which were characterized by low technology, unskilled labor intensive commodities and had a problem in upgrading its exports structure toward more productive activities and commodities. Porter (1990) argues that if such problem persists, it could be a disadvantage towards a country's sustained growth and export-led development.

4.5.3 Policy implication

Findings of the present study suggest some implications. Indonesian government should put emphasis to enhance exports of PCI, HCI and ULI to take advantage of highly world demand growth under those commodities. The enhancement process can be as wider product differentiation and diversification as well as product technology deepening. All these efforts do not necessarily mean that such development is conducted by neglecting

exports of NRI and ULI, commodities of which traditional comparative advantage lies, but in fact, more export promotion towards PCI, HCI and TI products is worth pursuing to support ULI and NRI exports whose comparative advantage has already been used up. Development of such highly technology, higher value-added export commodities requires improvement in industrial capabilities, thus, government can promote technological upgrading process towards higher value-added activities by facilitating export-oriented FDI toward PCI, HCI and TI sectors. This effort has to be supported by persistently sound macro- and microeconomic measures to enhance competitiveness such as competitive exchange rate management, provision of excellent industrial infrastructure and so forth. Since CMS result also indicates negative effect of market distribution effect, market diversification toward more growing export destination countries such as China and Australia is worth pursuing.

The main limitation of the CMS and RCA analyses is due to their static approach. Even though, both of these indicators may reveal changing pattern of export structure and competitiveness in manufacturing exports, the models fail to capture the dynamic process of underlying export capabilities in terms of gain in export structure and competitiveness. Since sustaining a rapid exports performance requires efforts to maintain competitiveness (i.e. competitive exchange rate management) and upgrading exports structure needs improvement in industrial capabilities, which can be facilitated by foreign investment (FDI), further research analyzing the impact of exchange rate and FDI on different type of exports of manufactures thus deserves attention.

4.6 Concluding Remarks

Using CMS analysis and RCA indicators, our study reveals, while mostly enjoying benefits from world export growth, Indonesia exports performance were deteriorated by the negative contribution of commodity composition and market distribution, and the role of competitiveness in manufacturing export performance, which was improved significantly right after trade liberalization policy unleashed in 1986 has been diminishing in recent years. In addition, most of Indonesian manufacturing exports were still concentrated in natural resource- and unskilled labor-intensive manufacturing commodities whose world demand growth is relatively slower than that of commodities with highly-embedded technology. Thus, it is suggested for the government of Indonesia to put more integrated efforts on competitiveness enhancing measures and the development of highly technology, higher value-added commodities for maintaining sustained and rapid export performance. Since further development of highly technology, more valued added manufacturing industries requires upgrading in industry's technology capabilities that can be facilitated by FDI and accumulation of domestic capital formation (foreign investment), further analysis on the impact of exchange rate (as a typical proxy of competitiveness) and FDI on the performance of manufacturing exports is worth conducting. With regard to this matter, Todaro (2006) suggests that the use of manufacturing exports of growing technological content emphasizes target with strong development benefits. The analysis will thus be dissected into disaggregated sector so to it can provide estimates of the impact on different type of exports of manufactures. The following **Chapter 5** will meticulously scrutinize these issues.

Table 4.5. The changing pattern of comparative advantage based on RCA indicators (RCA > 1) classified by SITC code

No	1987		1990		1993		1996		1999		2002		2005		2008	
	SITC	RCA	SITC	RCA	SITC	RCA	SITC	RCA	SITC	RCA	SITC	RCA	SITC	RCA	SITC	RCA
1	W	22.09	W	21.16	W	21.71	W	15.83	W	11.32	W	9.29	W	6.23	W	4.13
2	NM	1.33	F	2.60	F	4.65	F	5.10	F	4.28	F	2.79	F	2.62	F	2.43
3	FER	1.21	FER	2.04	GAR	2.59	JEL	2.69	FUR	2.45	FUR	2.53	FUR	2.21	P	2.35
4	GAR	1.08	GAR	1.97	TEX	2.23	GAR	2.25	GAR	2.41	P	2.20	GAR	2.10	GAR	1.93
5			TEX	1.48	FUR	2.01	FUR	2.01	TEX	2.30	GAR	2.11	TEX	1.97	TEX	1.66
6			GSW	1.25	FER	1.63	TEX	1.92	P	2.27	TEX	2.03	P	1.95	NM	1.60
7			FUR	1.24	GSW	1.49	FER	1.60	POT	1.39	POT	1.42	POT	1.61	FUR	1.57
8					JEL	1.39	GSW	1.39	FER	1.39	TEL	1.29	NM	1.59	POT	1.55
9							POT	1.37	GSW	1.27	GS	1.27	RUB	1.28	RUB	1.33
10							TEL	1.11	GS	1.14	FER	1.14	GS	1.21	OT	1.15
11							P	1.01	TRV	1.03	GSW	1.10	GSW	1.00		
12											RUB	1.08				
13											NM	1.02				
Upgraded			TEX, GSW, FUR		JEL		POT, TEL, P		GS, TRV		TEL, RUB, NM				OT	
Downgraded			NM						TEL				FER, TEL		GS, GSW	

Blue: natural resource-intensive Red: unskilled labor-intensive Yellow: physical capital-intensive Green: human capital-intensive Grey: Technology-intensive

CHAPTER 5

THE EFFECT OF FDI AND EXCHANGE RATE ON EXPORTS PERFORMANCE: AN EVIDENCE FROM MANUFACTURING SECTORS

This chapter relates several key determinants of Indonesia manufactured exports, i.e. FDI, domestic investment and exchange rate. Previous chapter shows evidence that product composition plays an important contribution in export performance, and exports of highly technology, higher value-added commodities gave higher impetus to positive export performance than that of low technology, unskilled labor intensive commodities. Lall (2000) argues maintaining sustained and rapid manufactured exports growth requires structural shifts moving from easy to complex products and processes within activities, and from easy to complex technology across industries' activities. Such upgrading movements require continuous development of industry's technological capabilities. FDI can be a tutor for industry's laddering up capabilities toward higher value-added activities. In addition, sustaining rapid exports growth requires persistent efforts in maintaining competitiveness, which can also be attributed to competitive exchange rate management. This chapter further scrutinizes the roles of FDI, domestic investment and exchange rate in determining the performance of sector-based manufacturing exports.

5.1 Background

Following oil price collapse in mid-1980s, Indonesia started to embark on trade liberalization era represented by an outward-oriented or EP strategy replacing ISI strategy that could not be counted on over to promote sustained high growth into the 1990s onward. As the consideration grew that a new growth engine was needed, the policy pendulum swung in favor of export expansion (outward-oriented policy) and non natural resource-based, private-sector-led growth. Indonesian economy later has been partly characterized by significant increases in foreign direct investment (FDI)[54] and continuous growth of manufacturing exports. A closer look into manufacturing exports from 1991 to 2008 indicates that even though commodities under natural resource- (NRI) and unskilled labor-intensive (ULI) sectors, such as wood, textile and footwear, still occupy most of total manufacturing exports value (real US$), their average growth of 2.39% is lower than that of physical capital- (PCI), human capital- (HCI), and technology-intensive (TI) exports commodities (8.24%), which is mainly contributed by exports growth of road vehicles and other transports (including components) and electronics goods. Meanwhile, total foreign investment in manufacturing sector had dominating share in total FDI (realized) in Indonesia from 1990 to 2008. More than 75% of total foreign investments, worth of US$ 108.86 billion, were invested toward PCI, HCI, and TI sectors. Such growing trends of sector-based exports and FDI imply a changing structure on manufacturing industries towards higher value-added activities. Thus, a study on the relative impact of FDI on

[54] Foreign investment may take varied forms such as Greenfield investment, horizontal and vertical merger and acquisition (M&A) and/or portfolio investment via capital market. The data used in present study, however, does not cover the latter definition. The terms of FDI and foreign investment in this chapter are used interchangeably.

Indonesia's manufacturing exports deserves attention.

FDI nowadays may serve as a facilitator of development and technological catch up, and even a source of "leapfrogging technologies" which allow developing countries to ladder up development stages in some industries (Brezis et al., 1993; Petri and Plummer, 1998). Kojima (1973, 1975) stresses the role of FDI as a tutor for technologically laddering-up process in host economies since it may transmit 'package' of capital, management skills, and technology resulting both in improvements of factor productivity of local firms and changes in comparative cost advantage between products. Such a dynamic change in comparative advantage will inevitably affect international trade both in structure and direction. He argues, however, that the two contrasting FDI-export effects as of complementary or substitute may occur depending on whether FDI flows into targeted sector where comparative advantage or disadvantage lies. Given the importance of sector-based difference in the scale and performance of FDI flows, the past studies emphasizing on the overall relationship between FDI and trade at the aggregated level may pose a problem. Although useful, such an approach may fail to capture variation in the FDI interaction at the sector-based level (Kawai and Urata, 1998).

In addition, a sector-based analysis may have imperative implication for designing development strategies and providing guidance for FDI to designated sectors, especially when utilizing direct and indirect linkage of foreign investment for facilitating host country's industrial transformation is deemed as importance. This may even be amplified in the endeavor to seek for appropriate policy implications as appendage to export-led growth model version 2.0 (Haddad and Shepherd, 2011). In addition, the implementation

of ELG strategy needs to be supplemented by country's strategy to soundly manage competitive exchange rate and attract FDI into focused sectors (Thomsen, 1999; Basri and Rahardja, 2010). Nevertheless, empirical studies examining the sector-based contribution of the linkage between FDI, exchange rate, and manufacturing export performance for the special case of Indonesia have been very sparse.[55] The paper attempts to close up this empirical gap.

The purpose of our study is to propose a contribution to the literature by carrying out a sector-based analysis on the impact of FDI on Indonesia's manufacturing exports by employing data of FDI (realized) for 1990-2008. The advantage of realized FDI over approved FDI data to measure the degree to which FDI affect exports performance is acknowledged since the former better represents the actual inflows of foreign investments toward domestic economy after they are actually implemented into projects. Specifically, the paper is devoted to empirically investigate the following issues. Firstly, is growth of Indonesia's manufacturing exports attributable to FDI? Secondly, does FDI have contrasting effect on manufacturing exports of different industry classified by factor intensity? In this sense, it enables one to analyze whether FDI may crowd-in (out) a host country's exports from different industry represented by its comparative advantage (disadvantage) as Kojima (1975) predicts. In so doing, this paper may shed a light whether FDI has contributed to changing structure of manufacturing exports in Indonesia. Lastly, the paper specifies other important determinants of sector-based exports, namely private domestic capital investment, growth of gross domestic product (GDP) and exchange rate. The latter represents as one of typical variable of exports competitiveness, which by

[55] Studies of Ramstetter (1999) and van Dijk (2002) are notable exceptions.

previous result in **Chapter 4** has been indicated as a critical factor of exports growth. The present study focuses on manufacturing sectors due to their dominance in the total value of Indonesia's merchandise exports and these industries account for over 90% of total FDI.

5.2. Indonesia: FDI and exports of manufactures

The era of EP in Indonesia was marked by rapid increases in foreign direct investment owing to the bold and decisive series of economic reforms introduced from the mid-1980s onward. The reforms covered the exchange rate management including two large nominal depreciations in 1983 and 1986, prudent fiscal policy, comprehensive tax reform, a more open posture towards foreign investment, and financial deregulation. A string of liberalization packages on investment and trade will be briefly discussed.

In order to attract more foreign investment, foreign proprietary restriction and divestment requirements were relaxed in 1985-1986 for export-oriented investment and firms located in bonded zone. Government of Indonesia (GOI) unleashed a Government Regulation No. 17 acted in 1992 followed by further investment facilitation programs onwards allowing for 100% foreign proprietary and less stringent divestment requirements for investments targeted in certain regions, bonded zones, and sectors with descending level of investment threshold. Efforts to attract foreign capital were also made on the fiscal front. Government introduced a set of tax incentives and duty exemptions. Another important incentive offered to foreign investors was the provision of legal protection to foreign investment. All these "pull factors" were timely since they coincided with a wave of production relocations in East Asian economies to search for lower-cost production sites triggered by some "push factors" such as appreciating currencies, abolition of foreign

exchange control, and rising wages at home (Aziz, 1998; Pangestu, 2002, Thee, 2005).

As a result, foreign investment increased significantly during such period. The amount of net FDI inflows as recorded in the balance of payment climbed from US$ 385 million in 1986 to US$ 6.2 billion in 1996. After having negative net inflows from 1998 until 2003 primarily triggered by 1997 Asian economic crisis and later worsened by local economic disruptions in some years following, the number has resumed from 2004 onwards. Total realized foreign investments from 1990 to 2011 accounts for 16,038 projects worth of US$ 145.07 billion (see **Table 5.1**).

Table 5.1. Top FDI inflow (realized) by country (1990-2011)

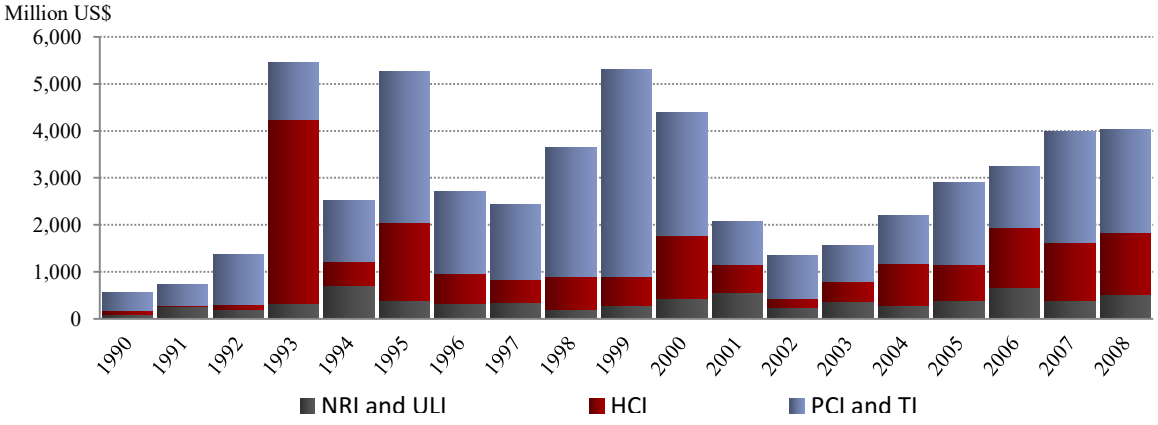
No.	Country	Total	
		Projects	(million US$)
1	Japan	2,458	22,493.5
2	Singapore	1,983	19,279.9
3	United Kingdom	890	10,933.8
4	Mauritius	90	10,703.0
5	USA	618	9,398.0
6	Netherlands	522	6,494.0
7	Seychelles	36	6,010.8
8	South Korea	1,963	5,658.9
9	Hong Kong	459	4,382.5
10	Taiwan	687	4,112.4
11	Malaysia	748	2,006.5
12	Germany	333	1,783.9
13	Australia	485	1,653.6
14	Italy	102	1,374.7
15	France	256	1,323.8
16.	Others (combined)	4,408	37,456.3

Source: Indonesia Capital Investment Coordination Board (BKPM)

Japanese investment has been the biggest portion in total realized FDI over recent 22 years with most investments take place in higher value-added sectors such as basic metal and metal goods, machineries and electronics, road vehicle and other transports, and chemicals and pharmaceuticals industries. During 1990-2008, PCI, HCI and TI sectors were the main destination

for foreign investments in manufacturing sectors which mostly took place in chemicals and pharmaceuticals (CP) and metal, machineries and electronics (MME) industries (see **Figure 5.1**).

To promote manufacturing exports, government has conducted trade liberalization measures, comprising of relaxation of restriction on foreign investment in export-oriented industries, efficiency of bureaucracy including customs reforms, abolition of a broad level of protection including non-tariff barrier (NTB), and significant reduction in tariff structure. The average (un-weighted) tariff rate was cut from 27% in 1986 to 15% by 1995 and the percentage of tariff lines subject to NTB fell from 32% to 12% (Snoodgrass, 2011).



Note: NRI & ULI comprise of wood, textiles & garments, leather & footwear, other manufacturing industry; HCI are rubber & plastics, road vehicle & other transports, pulp & paper; TI includes chemicals & pharmaceuticals, non ferrous mineral industry, medical & optical, and metal, machineries & electronics.

Figure 5.1. FDI of manufacturing sectors
Source: Indonesia Capital Investment Coordination Board (BKPM), calculated

Exporters were also provided with a drawback system of import duty, under which tariffs imposed on imported raw materials and parts were refunded when they later exported finished products. All these measures led to boom in exports performance especially of manufactures commodities. Manufacturing exports (SITC 5-8) grew 24% per annum from the onset of trade liberalization era until 1996 from US$ 4.63 billion in 1987 to over US$ 26.2 billion in 1996 –nearly six-fold increase over 10 years. While portion of

oil and gas to total merchandise exports continuously was diminishing from considerable level of 50% in 1987 to a lesser extent of 25.4% in 2007, share of manufactures in total exports was increasing from 27.5% to 46.7% at the same period (**Figure 5.2**). From 1987-2008, manufacturing exports recorded annual average growth of 15%, the highest among other major commodities of oil and gas and non-oil primary goods.

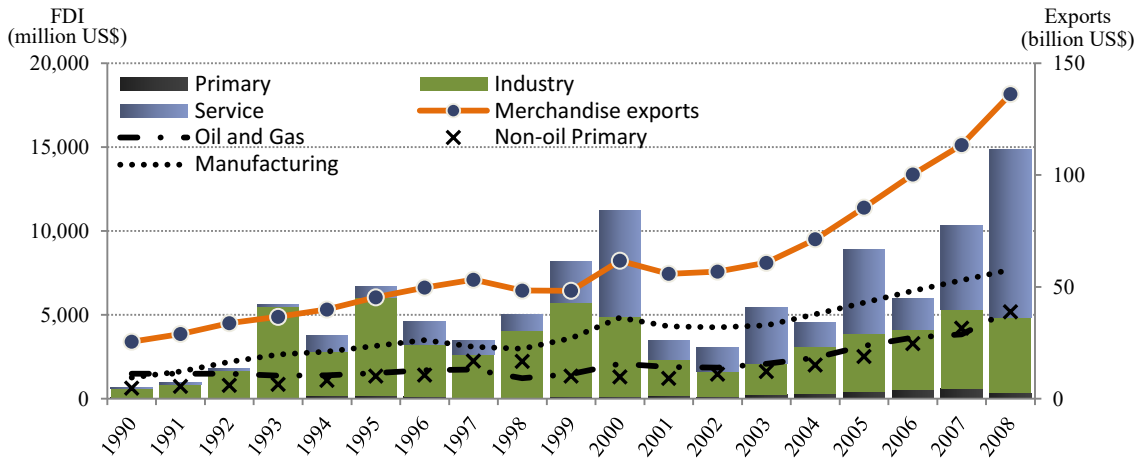
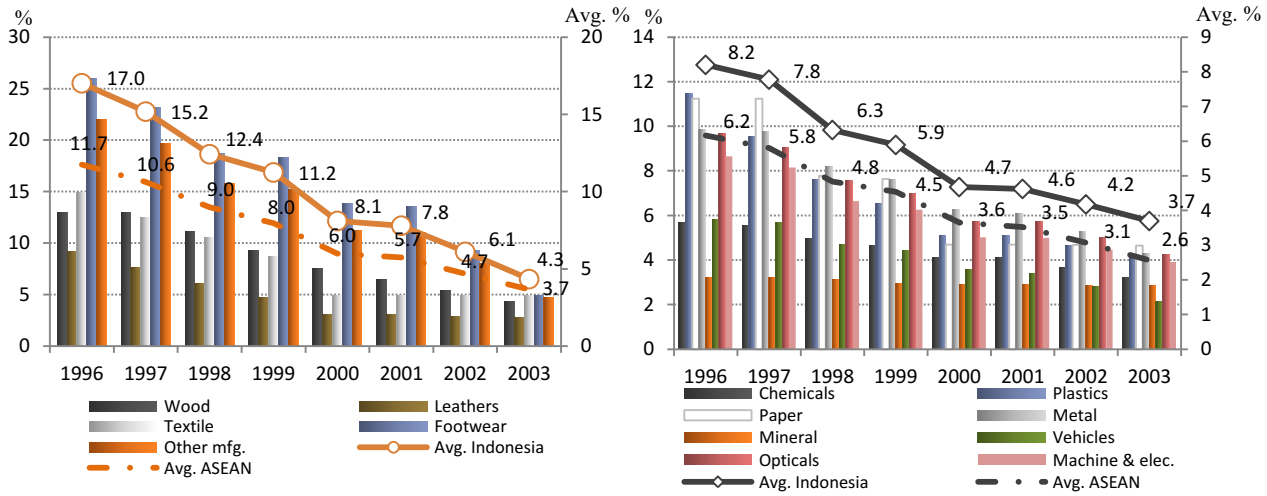


Figure 5.2. FDI inflows (realized) and exports 1990-2008
Source: Indonesia Capital Investment Coordination Board (BKPM) and *UN-COMTRADE*, calculated

The composition of export of manufactures also underwent dramatic change. Historically, as it is endowed primarily with natural-resource and labor abundance, Indonesia's comparative advantage lies in natural-resource- and labor-intensive products. Nevertheless, from 1987 to 2005, the share of natural-resource-intensive exports, which mostly was contributed by wood and cork products (mainly plywood), fell from 44% to 8.0%, whereas those of unskilled-labor- (textiles, and garments) and technology-intensive (metal goods, machineries and electronics) exports increased from 26.1% to 32.2% and from 5.4% to 27.2%, respectively. Pangestu (2002) argues that such a shift in export structure from natural resource- to technology-intensive products may explain the dramatic performance of manufactured exports. Within 19 years, total manufacturing exports have

increased considerably from a small base of US$ 4.63 billion in 1987 to over US$ 42.9 billion in 2005, which amount to an average growth rate of 48.7% per annum. Interestingly, ongoing tariff liberalization in Indonesia under ASEAN Common Effective Preferential Tariff (CEPT) went hand in hand with these impressive growths of unskilled-labor- and technology-intensive exports (see **Figure 5.3a** and **3b**).



(a) NRI and ULI

(b) PCI, HCI and TI

Figure 5.3. Indonesia tariffs under the ASEAN Common Effective Preferential Tariff (CEPT)
Source: ASEAN Secretariat (www.asean.org.10101.htm), calculated

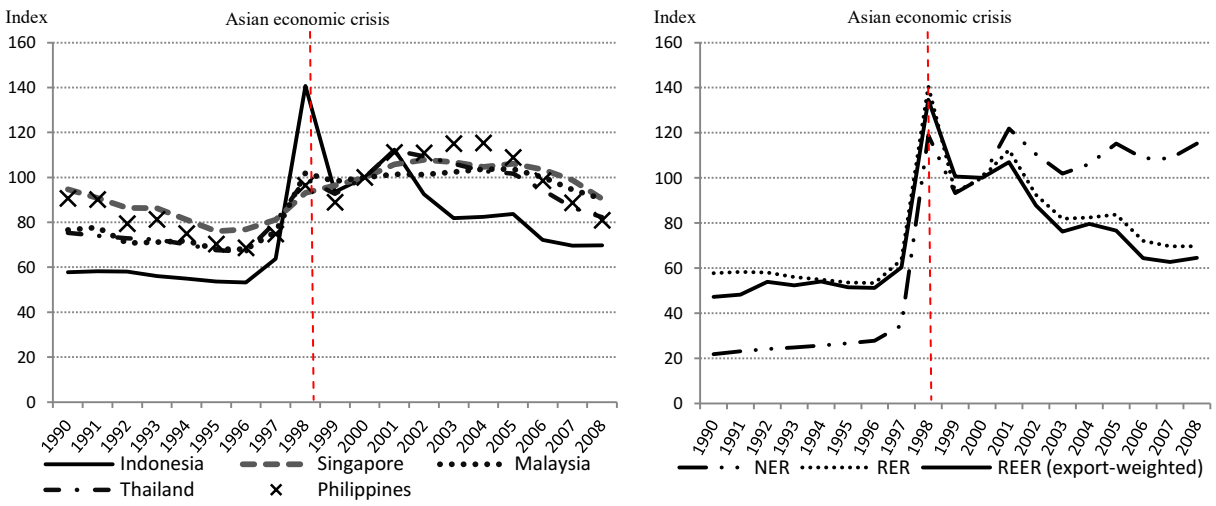
Natural resource-based exports were dominated by wood and cork products (mainly plywood). The rise in labor- and technology-intensive exports can be attributed to the rise in exports of textiles, garments, and electronics. While the value of textile and garment exports increased more than six-fold during 1987–96 with the portion accounting for slightly more than 24.8% of total manufactured exports, the growth of electronics exports increased from negligible amounts to US$ 3.89 billion in 1996 accounting for close to 14.8% share of total manufactured exports. Most of the growth of electronics exports occurred between 1990 and 1996, which was related to the realization of foreign investment towards technology complex, higher value-added sectors, as previously

discussed. Fascinatingly, upward trend of exports growth of PCI, HCI and TI exports commodities went hand in hand with increasing competitiveness in such industries, whereas during 1993-2002, there had been recurrent negative competitiveness effect of natural resource- and unskilled labor-intensive commodities on total manufacturing exports growth (Rahmaddi and Ichihashi, 2012).

Apart from FDI matter, currency exchange value, commonly known as exchange rate, has a very important role in achieving monetary stability and supporting all economic activities including country's trade performance. A stable exchange rate is needed to create conducive climate to boost business activities. Real exchange rate, which represent the relative prices of tradable to non-tradable products, have a potentially strong impact on the incentive to allocate resources (capital and labor for example) between the sectors producing tradable and non-tradable goods. As a real exchange rate captures the relative prices, costs, and productivity of one particular country vis-à-vis the rest of the world, it also determines the real competitiveness of country's exportable. Levels and fluctuations in the exchange rate exert a powerful impact on exports, imports and the trade balance. An appreciation of domestic currency relative foreign currency tends to depress exports, to boost import and to deteriorate the trade balance, as far as these variables respond to price stimuli. On the other hand, any exchange rate devaluation or depreciation should work in the opposite direction, improving the trade balance thanks to soaring exports and falling imports. Movements of exchange rate indices of Indonesia are as depicted in **Figure 5.4**.

In first panel, real exchange rate index of Indonesia (IDR) is relatively stable prior to Asian 1997/1998 economic crisis. This is not surprising as prior to such crisis the

government of Indonesia was effectively maintaining (through managed floating) a quasi-fixed exchange rate with the USD within some particular band, which resulted in a relatively stable macroeconomic environment. Nevertheless, such a stable macroeconomic environment was not supported by the presence of prudent financial system and institutions leading to massive speculative attack to the currency (Hossain, 2006). This led government to widen the IDR's band on July 11, 1997 and floated IDR on August 1997. This was contributed to a sharp depreciation on rupiah by more than 30% against US dollar since July 1997, the fastest depreciation of a currency value compared to its other neighboring countries in the ASEAN region (IMF, 1999; Hill, 2007). This sharp depreciation of IDR had considerably boosted manufacturing exports performance in 1998 (see **Figure 5.5**).



(a) RER indices of Indonesia and ASEAN4 countries

(b) Exchange rate indices of Indonesia

Figure 5.4. Exchange rate index 1990-2008 (2000=100)
Source: IMF-*International Financial Statistics (IFS)*.

Second panel of Figure 5.4 depicts movement of exchange rate indices of Indonesia. We compare trends of nominal exchange rate (NER), real exchange rate (RER) and trade (export) weighted real effective exchange rate (REER). While NER determines the current

market price for which one currency can be exchanged for another, the RER takes the inflation differentials among the countries into account. The latter may determine the real competitiveness of country's exportable based on the relative prices, costs, and productivity of one particular country vis-à-vis the rest of the world. The REER, on the other hand, measures the average price of a home good relative to the average price of goods of trading partners, using the share of trade with each country as the weight for that country. UNCTAD (2011), among others, suggests a preference over the REER as a practical and effective indicator to differentiate between sustainable and unsustainable trade imbalances since it is better suited to grasp real changes in competitiveness among trading partners than one based on consumer price inflation. Thus, we follow this real effective concept in assessing the impact of exchange rate on export performance in the present chapter.

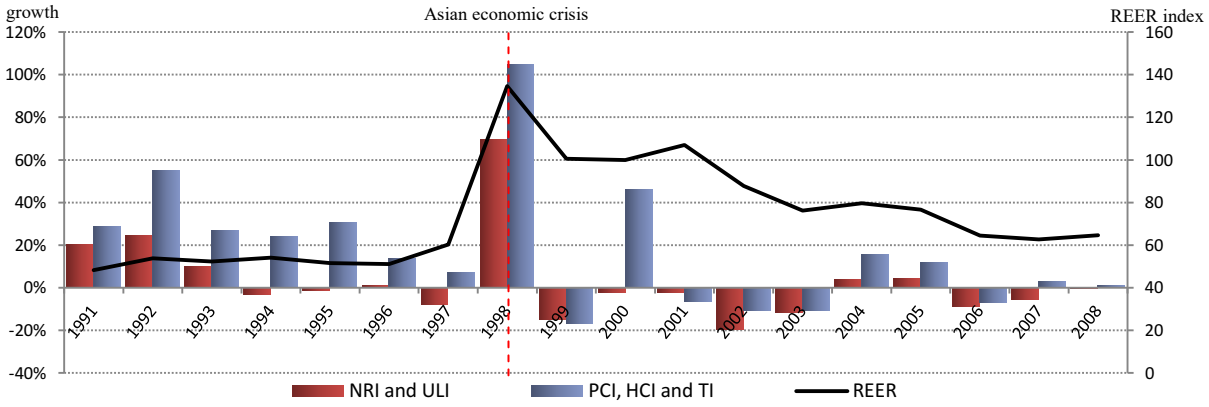


Figure 5.5. REER index and growth of real exports(2000=100)
Source: *UN-COMTRADE, WDI 2010,* and *IFS.*

The above discussions suggest that the linkage between FDI, exchange rate and Indonesia's manufacturing exports performance may exist. Such an issue will be explored in greater details using sector-level data.

5.3 Foreign direct investment and export performance

5.3.1 Theoretical framework

The linkage between FDI and host country's export performance has been long recognized in the literature. Yet, theories on the linkage of FDI and trade do not always give a clear prediction as to whether foreign production is a substitute for, or a complement to international trade. Hill and Athukorala (1998) argue that such a linkage may be as substitute or complementary, depending in part on investor's motive and the nature of the host country investment and trade regimes. Such failure of theoretical prediction also partly reflects the separate development of macroeconomic general equilibrium models of trade and microeconomic approach of foreign investment based around the behavior of individual firms (Pain and Wakelin, 1998).

Under restrictive trade model based on Heckscher-Ohlin-Samuelson (H-O-S) framework, the equalization of factor prices across countries can be brought about either via international trade channel or by means of the international mobility of factors production. Mundell (1957) argues factor mobility may serve as substitutes for trade under restrictive assumption of identical production functions for each good in the two countries. In contrast, Purvis (1972), by emphasizing on the effect of different production functions between country A (capital abundant, investing country) and country B (labor abundant, host country), explains that foreign investment can, in fact, expand trade if it creates and/or expands the opportunity to import one product and export the other. Nevertheless, the author does not clearly explain how and why such a different production functions between the two countries becomes a critical element in factor mobility-trade linkage, and in what

conditions foreign investment may serve as trade complementary.

Later, Kojima (1975) played a seminal role in developing a systematic macroeconomic approach to FDI-trade linkage by further developing both models of Mundell and Purvis, and specifying conditions of which FDI can be complementary to, or substituting for commodity trade. He first clarifies that FDI, distinct from international money capital movements, is in essence the transmission of a set of capital, managerial skills and technology to the host country. In this sense, the author stresses the role of FDI as a tutor for technology ladder-up process in host economies since it may not only transfer capital, but also convey superior production technology through training of labor, transfer of management and marketing know-how, from advanced industrial, investing countries to developing, host countries, all of which lead to improvements in productivity of local firms. To discern types of industry in which FDI may easily transfer technology and improve the production functions in the host country that eventually create more trade opportunities, he proposes differential perspective of comparative advantage/disadvantage between the investing and host countries.

Kojima argues that if FDI flows into industries in which the host country has comparative advantage rather than comparative disadvantage, it tends to improve productivity of the host and thus stimulates more exports, not only of their foreign affiliates, but also from indigenous export-oriented firms. Haddad and Harrison (1993) point out exports of the latter can be stimulated by observing the exporting behavior of multinational enterprises (MNEs). In less direct manner, Kojima argues that transfers of technology, management know-how, entrepreneur skills and productivity spillovers from

MNEs to indigenous firms can be conducted more easily under smaller technological gap between the investing and host countries. Such indirect effect works through product and factor markets. In trade disequilibrium perspective, he assert that FDI flows into host's comparative advantage industry will create a harmonious trade between two countries since each country has excess demand and supply in different, yet *quid-pro-quo*, tradable. Thus, FDI flows into labor-intensive industries of the developing host countries are largely trade-creating. **Figure 5.6** provides explanation of the FDI trade-creating mechanism based on proposition of Kojima. We re-explain herein with some adjustment in figures as well as explanation to suit with our objective in the present study.

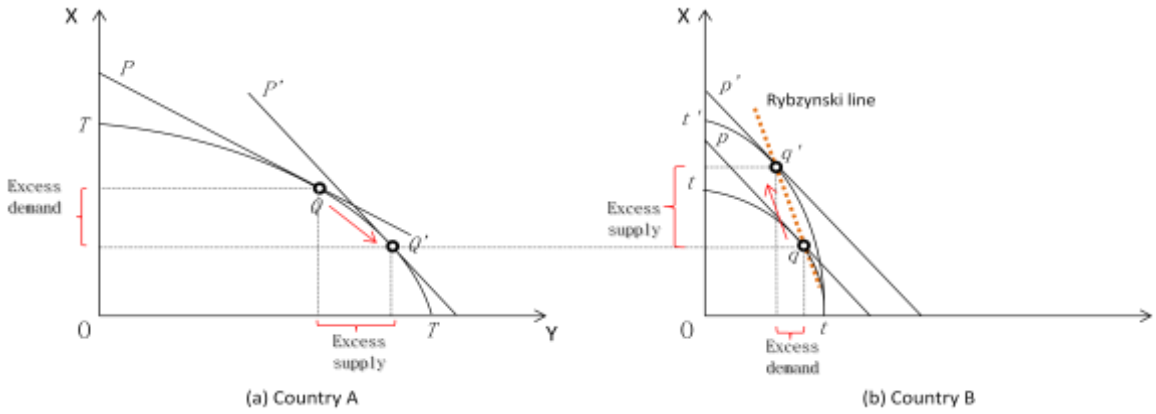


Figure 5.6. Kojima's hypothesis of FDI complementary to trade

In such figure, country A is assumed to be capital abundant and has a comparative advantage in capital-intensive *Y*-industry while country B is labor abundant and has a comparative advantage in labor-intensive *X*-industry. Both countries A and B are assumed so small that international commodity prices are given exogenously. Also, the comparative advantages in improving productivity of the host country is assumed in such a way that the productivity of the host country is upgraded through direct investments greater in labor-

intensive *X*-industry than in capital-intensive *Y*-industry, due to the smaller technological gap and the greater spread effects. The production function of the host country is also assumed to become two times superior if direct investment flows into *X*-industry, and 1.5 times superior if it flows into *Y*-industry. Superiority of production function means that the same amount of output is produced with proportionately smaller inputs of labor and capital resulting in effects similar to the neutral technological improvement a la Hicks.

The initial (before direct investment) production possibility curve is *TT* for country A in left panel of **Figure 5.6** and *tt* for country B in right panel, the latter being smaller than the former, because country B initially has inferior production functions in both industries, although there is no significant difference in the size of countries. The community indifference curve touches the production possibility curve at *Q* in country A and *q* in country B and commodity price ratio at autarky situation is shown by *P* and *p* lines respectively. This means that country A has a comparative advantage in capital intensive *Y*-goods, and country B in labor intensive *X*-goods, in accordance with the Heckscher-Ohlin theorem.

The international commodity price ratio is assumed to be given and being the slope of the *P'* line in left panel of **Figure 5.6** to which both *p* and *p'* lines in its right panel are parallel. Now, country A shifts the production point from *Q* to *Q'* while consumption point remains at equilibrium *Q*, creating an excess demand for *X* importable and an excess supply of *Y* exportable equivalent to the vertical and horizontal distance respectively between *Q'* and *Q*. However, international trade between country A and B is not yet possible for under the international commodity price ratio, shown by *p* line, country B is

in an autarky situation.

FDI then is introduced which is undertaken by a firm in *X* industry of country A so as to improve technology of the same *X* industry in country B. Such direct investment is stimulated by the fact that the production of *X* goods at *Q* under the international commodity price ratio, shown by the slope of *P'* line, gives lower rewards both to labor and capital in that industry as compared with the other industry Y, and labor and capital must shift from the less profitable *X* industry to the more profitable *Y* industry until *Q'* point, where marginal productivity of labor and capital becomes equal in both industries. This is an internal structural adjustment. But there is another possibility for a firm in *X* industry to use its accumulated technology and managerial skills: that is in FDI.

For the sake of simplicity and distinct definition between FDI and portfolio investment, money capital movements are assumed to be negligible. Then, since the technology and managerial skills do not decrease even when they are applied abroad and since labor and capital are assumed to remain unchanged in country A, the *TT* curve remains intact. In country B, as it is assumed, the production possibility curve is expanded two times as large vertically from *tt* to *tt'*. Now, the international commodity price ratio, shown by *p'* line, touches the expanded production possibility curve, *tt'* at *q'* (a new production point). Line *qq'* becomes the Rybczynski line in this case, and directs definitely upwards. Harmonious trade will be established in such a way that country A exports its comparative advantage *Y* goods, and imports its comparative disadvantage *X* goods. Thus, FDI is complementary to commodity trade, where the former creates the latter.

On the other hand, FDI towards capital-intensive industries where the host country

is comparatively disadvantaged is trade-replacing or trade-destroying as such a type of investment is essentially import-substituted or perhaps oligopolistic competition resulting in trade reduction between the investing and host countries. **Figure 5.7** depicts the graphical explanation of such mechanism.

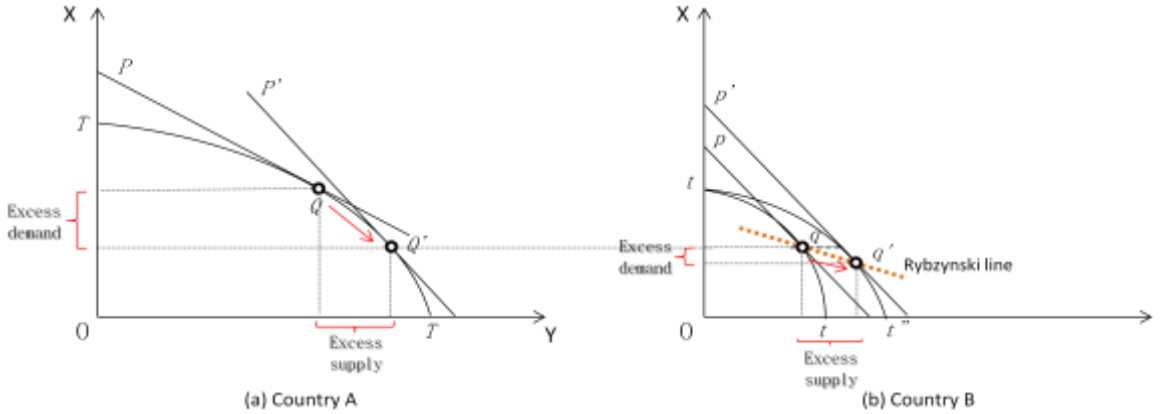


Figure 5.7. Kojima's hypothesis of FDI substitute to trade

Country B's production possibility curve expands, as previously assumed, l.5 times as large horizontally from *tt* to *tt"*. Under the given international commodity price ratio, shown by *p'* line, production point is at *q'* and consumption point at *q* creating an excess demand for X-goods (importable) and an excess supply of *Y* goods (exportable) in country B. Country A's situation is the same as mentioned previously in **Figure 5.6**, and it has an excess demand for X-goods (importable) and an excess supply of *Y* goods (exportable) equivalent to the horizontal and vertical distances, respectively, between *Q'* and *Q* points. The two countries are competing both in importing and exporting capacity. The foreign direct investment in this case will not open any commodity trade between the two countries, and may even destroy commodity trade which was opened by variation in the international commodity price ratio. Thus, the foreign direct investment of pro-comparative advantage

industry is trade-destroying or anti-trade-oriented.

Similar to Kojima's hypothesis of FDI complementary to trade, Markusen (1983) proposes that FDI may expand exports when exports are induced by non H-O-S factors such as differences in technologies. An important determinant of this relationship is whether FDI is undertaken in an export-oriented or import-competing industry in the host country. FDI undertaken in an import-competing industry tends to reduce exports since most products are intended to serve domestic market. Meanwhile, FDI conducted in search to utilize host country's comparative advantage in natural resource, low-labor cost export-oriented sector is likely to stimulate exports to home or third countries' market. This proximity-concentration trade-off could be the case for Indonesia, due to its mixed advantages of low-labor cost, natural resource abundance, and huge domestic market for foreign companies.

It is worth noting, however, that the Kojima hypothesis may fail to explain the complexity of relationship between FDI and trade. This is because international investments made by multinational corporations may be diversified in various industries including capital/technology-intensive and labor-intensive industries, depending on firms' competitive advantage in the host country's market. As a result, net impact of such FDI on foreign trade will be uncertain (Arndt, 1974; Lee, 1984, among others).[56] Despite of above limitation, Kojima proposition may have some validity to explain international investments flowed from industrialized countries to developing countries (Sun, 1999). Given the theoretical possibilities of the two contrasting links between FDI and exports, the question

[56] Many studies have been devoted to elucidate the complexity of relationship between FDI and trade shifting from less macro- towards more micro-perspectives. Product Life Cycle hypothesis (Vernon, 1966) and Eclectic theory of OLI paradigm (Dunning, 1979) are among the influential studies.

of which connection type actually exists is a matter of empirical issue.

5.3.2. Reviews of empirical literatures

Similar to the conflicting theoretical views on the role of FDI, the available empirical evidence in such an area is inconclusive. In more aggregate analysis, Horst (1972) analyzing the effect of US FDI on US manufacturing exports to Canada using 3 digit SITC cross-section data in 1963 found a negative impact of FDI on US exports to Canada and Canadian tariff positively affect US FDI (tariff-jumping motive). In an attempt of investigating the impact of FDI on Indian exports using annual data of 1970-1998, Sharma (2003) did not find any statistically significant evidence of FDI impact on exports. In contrast, other studies indicated that FDI actually had a positive effect on host countries export performance, as found by O'Sullivan (1993) in Ireland and Blake and Pain (1994) in U.K.

In addition to single country studies, some cross-countries literatures employing more disaggregated data indicate that the effect of FDI on host countries export performance may differ by countries, regions, or industries. Employing cross-countries data from 1971 to 1992, Pain and Wakelin (1998) found some supporting evidence of significant impact of FDI on exports of ten out of 11 OECD economies, where seven countries have positive impact of FDI and 3 countries of Japan, Italy and Denmark exhibit negative effect. Regarding the latter result, the authors argue such foreign investments have been aimed at the relatively closed domestic market rather than using the country as an export base. Investigating the impact of FDI on regional exports performance in China for the period 1984-1997, Sun (2001) showed evidence that FDI effect was higher in coastal-

than in inland regions. Taking into account the difference of factor proportion (comparative advantage) within manufacturing industries in China, Wang et al. (2007) using 1983-2002 data found the effect of FDI on manufacturing exports of labor-intensive industries was higher compared to that of capital-intensive industries. The summary of some empirical studies analyzing the effects of FDI and exchange rate on exports performance is presented in **Table 5.2.**

Table 5.2. Selected empirical studies analyzing FDI and exchange rate impacts on exports

Study	Objective	Data set and model	Result
Horst (1972)	To study the effect of US FDI on US manufacturing exports to Canada.	3-digit SITC data of 1963 Cross-section OLS	‣ US FDI negatively affect US exports to Canada. ‣ Canada tariff positively affect US FDI (tariff-jumping)
Goldberg and Klein (1997)	To analyze FDI and RER impact on 7 developing countries' exports to US & Japan.	9 countries data of 1978-1993 Panel OLS	‣ FDI & RER positively affect exports. ‣ RER affects exports via price- and FDI-channel ‣
Leichenko and Erickson (1997)	To elucidate FDI effect on US's manufacturing exports (provincial level)	US's 1980-1991 data from 48 states Panel OLS	‣ FDI inflow has positive effect on state mfg. exports growth. ‣ Positive effect of RER.
Ramsetter (1999)	To review FDI effect on trade propensity in Indonesia manufacturing industries specifically in different share of foreign ownership.	3-digit industry category in 1990, 1992 & 1994 (15,949 samples) LDV (Tobit model)	‣ Positive effect of FDI. ‣ High foreign ownership has high trade propensity.
Zhang and Song (2000)	To elucidate determinants of China's manufacturing exports (incl. FDI, dom. inv., & growth)	China's 1986-1997 data from 24 prov. OLS, RE and FE panel	‣ FDI inflow has positive impact on provincial exports. ‣ (-) impact of RER on exports.
Sun (2001)	To elucidate FDI effect on China's exports (provincial level classified by region)	China's 1979-1995 data from 29 prov. (3 regions) GLS panel (Random Effects)	‣ FDI eff. differs across regions. ‣ Stronger in costal than inland. ‣ Not significant in west part. ‣ Positive effect of RER.
Dijk (2002)	To assess export determinants (incl. foreign ownership) of manufacturing sectors.	Indonesia's 1995 industrial census (20,161 samples). LDV model (Tobit and PW)	‣ MNEs mostly exhibit sig. positive effect on sectors' exports except in beverages, footwear and instruments. ‣ Neg. eff. on printing & publis.
Sharma (2003)	To analyze some determinants of India's exports (incl. FDI)	India's data of 1970-1998 2SLS (time-series)	‣ FDI has no significant effect on India's exports. ‣ Appreciation of Rupee negatively affects exports.
Sugema (2005)	To assess RER depreciation and supply-side shocks on non-oil trade.	Indonesian data of 1984:1 to 1997:2	‣ Depreciation of RER positively affects exports.

		FMOLS (time-series)	‣ RER-import elasticity is higher than that of exports
Kutan and Vuksic (2007)	To analyze FDI effects (supply capacity- & specific-effect) on 12 CEEs' exports.	12 CEEs data from 1996 to 2004 GLS panel (Random Effects)	‣ FDI has increased domestic supply-capacity. ‣ FDI-specific effect only exists in new member of EU.
Jongwanich (2010)	To analyze impact of REER and FDI on exports' growths of 8 economies in East and Southeast Asia.	Quarterly data of such countries' total merchandise, SITC 5-8, & SITC 7 (1993- 2008) GSM/ARDL (time series)	‣ FDI has positive export-effect. ‣ Its impact is higher in SITC 7 (Indonesia) ‣ Indonesia exports are more sensitive to RER than others'

Recent advances in the literature of the linkage between international trade and investment have emphasized the trade impact of dynamic changes in comparative advantage resulting from FDI (Sun, 2001). As FDI plays an important role in facilitating an international division of labor and increases the mobility of production factors –not only capital, but also and more importantly, technology, management skills, and other know-how, it may globally reallocate economic resources and productive capacities according to the relative cost of production in different countries. This is expected to bring about a dynamic change in comparative advantage leading to shifts in the structure and pattern of international trade. Sun (2001) suggests for examining the sector-based difference in FDI-export effect as a plausible channel to study the industrial distribution of FDI and the industrial structure of exports.

Nevertheless, empirical studies examining the sector-based contribution of the linkage between FDI and manufacturing export in the special case of Indonesia have been limited. Studies of Ramstetter (1999) and van Dijk (2002), which consider the effect of multinational enterprise (MNE) activities on export propensity using manufacturing firm-level data of Indonesia, are some notable exceptions. Using rigorous survey data at firm-level, both studies found positive contribution of foreign investment on export expansion,

in general. More specifically, Ramstetter (1999), investigating the impact of foreign ownership level on export propensity of 15,949 firms in 1990, 1992 and 1994, found evidence of highly export proportion per output in the highly foreign proprietary of a firm. Van Dijk (2002), using data of 1995 industrial census, showed evidence that MNEs mostly exhibited significant positive effect on sector-based exports, except in beverages, footwear and instruments. Recent study by Jongwanich (2010) on the determinants of exports performance of 8 Asian economies (including Indonesia) indicates that FDI becomes one of important factors of exports performance. Employing quarterly data for 1993-2008, the author classifies exports into three exports categories, namely total merchandise, exports (SITC 5-8), and machinery and transports equipment (SITC 7). The latter category is proposed to capture the increasing importance of international product fragmentation and trade in parts and components. The author concludes that FDI impact tends to be higher in a case of manufacturing exports, especially for exports of SITC 7. Nevertheless, none did those studies explicitly account for the sector-based difference of FDI effect on manufacturing exports classified by factor intensity in their model, which also enables one to investigate FDI-exports impact based on industry's comparative advantage. Our study attempts to propose empirical contribution in this field.

To sum up, there seems to be proper theoretical justification on the positive impact of FDI on exports. Given the ambiguous link between FDI and host country's exports, it is not clear whether FDI has an effect on exports performance of industries with different comparative advantage. The sector-based analysis is perhaps more appropriate for elucidating the true scale and performance of FDI-exports links in manufacturing

industries. These issues are explored empirically using Indonesia manufacturing data.

5.4. Methodology and data description

5.4.1. Empirical model

The preceding discussions of the general theories and some empirical literatures in the role of FDI on export performance suggest that FDI may contribute substantially on manufacturing exports expansion. In addition to FDI-trade theory, other factors may explain exports performance of the host countries. Based on reduced-form of export equation (Goldstein and Khan, 1978; Rose, 1990; Athukorala, 2004; Jongwanich, 2010), real manufacturing export is determined by some factors namely real exchange rate, real world income, and country's production capacity represented by growth of GDP. While real world income is treated as demand shifter, production capacity is supply shifter. Nevertheless, small country assumption implies that the world market would absorb as much export as a country could offer. Thus, export should be supply-driven in this sense (Athukorala and Riedel, 1996, among others). In other word, the coefficient attached to real world income should be insignificant. Such an assumption allows us to estimate some determinants of exports (including FDI) in the presence of data unavailability of sector-based exports price indices.

Since FDI is expected to affect exports from supply-side channel through direct and indirect effect i.e. exports spillover (Markusen and Venables, 1989), we thus specify FDI and other export determinants, namely domestic capital investment, growth of GDP, and exchange rate including economic shocks, by modifying a export model used in Goldberg and Klein (1997), Zhang and Song (2000) and Sun (2001), as follows:

$$X_{it} = \alpha_i + \beta_1 FDIF_{it-1} + \beta_2 DCIF_{it-1} + \beta_3 GDPG_t + \beta_4 REER_t + \beta_5 Dcrisis_t + \varepsilon_{it} \quad (5.1)$$

where subscript *i* and *t* denote cross-sectional unit and time respectively. ε is disturbance term. β_1 through β_4 are parameters to be empirically estimated. X_{it} is level of manufacturing export value of industry *i* in year *t*. $FDIF_{it-1}$ and $DCIF_{it-1}$ account for levels of FDI and domestic capital investment flows to industry *i* in year *t*, respectively. $GDPG_t$ is growth rate (in percentage) of gross domestic product (GDP) in year *t*. $REER_t$ is level of index of real effective exchange rate (export-weighted) in US$ in year *t*. The binary/dummy variable of $Dcrisis_t$ is also included to capture the effect of Asian 1997 economic crisis and other supply disruptions on manufacturing exports (the value of unity for 1997 to 2003, zero otherwise). All variables, except growth of GDP and dummy variable, are in natural logarithms.

The beta coefficients of β_1 through β_4 are the elasticity of exports with respect to FDI, domestic capital investment, GDP growth and the export-weighted foreign exchange rate, respectively. The value of coefficient on $FDIF_{it}$ (β_1) is of particular interest for this study since this coefficient depicts changes in percentage of manufacturing exports as response to a percentage change in FDI. The use of lag structure on explanatory variables of FDI and domestic capital investment is justified based on several rationales, namely (a) following Leichenko and Erickson (1997), the effects of investments on exports performance are not likely to take place immediately since any effect of investments (i.e. modernization of production facilities, adjustments in production structure, dissemination of new technology and so forth) requires a certain time to take effect on exports production; (b) such a procedure will alleviate potential problem of endogeneity between

exports and FDI (Zhang and Song, 2000; Sun, 2001). The lag specification represents appropriate sequence for investment proceeding ahead of production and production proceeding ahead of exports; (c) although the simple first-order lag structure may not be appropriate to fully capture potential feedback between investments and exports, the relatively short-time period for the study (19 years) requires the use of simple lag approach.

In addition to FDI, we also specify other following variables, which may play important roles as determinants of manufacturing exports performance. Firstly, the inclusion of domestic investment in exports analysis is intended to hold the effect of other investments constant in general. We expect that coefficient of β_2 is in positive sign since increases in domestic capital formation will augment productive capacity enabling producers to expand their output. Some previous studies (Leichenko and Erickson, 1997; Zhang and Song, 2000; Sun, 2001) indicate the importance of domestic investment on export performance. Secondly, growth rate of GDP ($GDPG_t$), which indicates overall economic performance of the host country economy in year t, is included to capture the export-enhancing effect in supply capacity due to increased economic performance. Thus, we expect the coefficient β_3 to be positive. We deliberately employ growth of GDP rather than its level in order to alleviate plausible direct simultaneity between GDP and investment. In addition, it may also alleviate endogeneity problem between GDP and exports.[57] Ideally, we should use growth of gross sector-based product to capture the impact of sector-based economic performance on manufacturing exports. Nevertheless, the unavailability of sector-based GDP matched appropriately with existing data of sector-

[57] The issue of endogeneity is examined and tested using Hausman (1978) test. The result of the Hausman computed F-value of 0.463 (p. 0.497) is less than critical F-value (1, 175) of 3.895 at the 5% significance level, which suggests that the present model renders no endogeneity problem (see **Appendix**).

based FDI limits our study. Thirdly, the exchange rate variable is another typical trade-relating variable that may influent exports since it represents the competitive factor (price-effect) of export commodities. Sugema (2005) found evidence of positive effect of exchange rate depreciation on Indonesian non-oil exports. In our model, $REER_t$ represents the CPI based index of real effective exchange rate (2000=100) weighted by Indonesia's 15 export partners' currencies in US$. It is constructed in a way that an increase in REER index denotes the real depreciation of the currency. As conventional export demand theory predicts, the depreciation of a country's currency may give impetus for more export expansion. The depreciation (appreciation) of the currency makes a country's exports commodities more (less) competitive leading to more (less) demand thrust in world market. Thus, we expect the coefficient β_4 to be positive. Finally, we include dummy variable of economic crises, $Dcrises_t$, to capture the impact of Asian 1997 economic crisis and other export supply disruptions, which lasted until 2003.[58] We use similar dummy structure with that of study of Adiningsih et al., 2005. The effect of such crises might be ambiguous. On one side, Asian 1997 economic crisis may increase exports via significant exchange rate depreciation. On the other hand, such depreciation may hamper imports of intermediate goods required in exports sector. Later, more expensive imported inputs will be transmitted into increased domestic price level (exchange rate pass-through) that may hamper investment needed to increase production of tradable.

Panel data involves different models that can be used for estimation. These are Pooled Least Squares (PLS) method, Fixed Effects Model (FEM), and Random Effects

[58] Detailed explanation of the impacts of Asian 1997 economic crisis and other economic disruptions following such a crisis on exports and investment are thoroughly provided in many literatures i.e. Pangestu (2002) and Thee (2003), among others.

Model (REM). The main problem of the PLS model is that it does not allow for sector-based heterogeneity and assumes that all sectors are homogeneous. FEM, on the other hand, is able to capture the sector-based effect of FDI on manufacturing exports since it models each effect explicitly. Like FEM, REM can also acknowledge heterogeneity in the cross-section. Nevertheless, rather than explicitly model the predetermined heterogeneous effect using sector-based dummy, REM assume that the effects are random, independent and identically distributed over the error term, so that $u_{it}=v_i+\varepsilon_{it}$, v_{it} denotes the ith sector's year-invariant unobserved heterogeneity. REM can be estimated using generalized least squares (GLS) model. Hsiao (1986) argues that even though it might be inconsistent when number of observation is small and if the initial values are correlated with the effects, the asymptotic bias of GLS estimator is smaller than that of the OLS. In order to obtain the most appropriate inferences based on the FEM or REM model, the Hausman statistics then is used to test the null hypothesis that the regressors and individual effects are not correlated. Failure to reject the null hypothesis implies that REM is preferred rather than FEM. On contrast, if the null hypothesis is rejected, FEM then will be appropriate.

We first estimate Equation (5.1) on full sample of manufacturing industries (11 industries) to investigate whether growth of Indonesia's manufacturing exports in general is attributable to FDI. To analyze the scale and performance of such a FDI export-enhancing effect in sector-based level, Equation (5.1) is later employed on two sub-samples of manufacturing sectors classified by factor intensity, namely (i) NRI and ULI sector consisting of five industries, which represents the comparative advantage in natural resources- and labor-abundance industry, and (ii) PCI, HCI and TI sectors comprising of

seven industries, which account for capital- (physical and human) and technology-intensive sector. In so doing, it enables one to analyze whether FDI may crowd-in (out) host country's exports from different industry represented by its comparative advantage (disadvantage) as Kojima (1975) predicts.

Later, to further elucidating the FDI individual effect on each industry, our analytical model is expanded by relaxing the restriction of equal effect on each observed sectors. In this sense, it may have imperative implications for designing development strategy and providing guidance for FDI to specific industry. Thus, we now assume such an effect varies across 11 sectors.

$$X_{it} = \alpha_1 + \alpha_2 D_{2i} + ... + \alpha_{11} D_{11i} + \beta_1 FDIF_{it} + \gamma_1 (D_{2i} FDIF_{it}) + ... + \gamma_{11} (D_{11i} FDIF_{it}) + \beta_2 DCIF_{it\,t} + \beta_3 GDPG_t + \beta_4 REER_t + \beta_5 Dcrisis_t + u_{it} \quad (5.2)$$

More succinctly, above equation can be expressed as follows:

$$X_{it} = \alpha_1 + \sum_{n=2}^{11} \alpha_i D_{ni} + \beta_1 FDIF_{it} + \sum_{n=2}^{11} \gamma_i (D_{ni} FDIF_{it}) + \beta_2 DCIF_{it} + \beta_3 GDPG_t + \beta_4 REER_t + \beta_5 Dcrisis_t + u_{it} \quad (5.3)$$

where, D is sector dummy, n is dummy number, *i* is sector (say, D_{2i} is 1 for TEX –the textiles and garments sector, zero otherwise, and so forth), and γ_is are differential slope coefficients, just as α_is are differential intercepts which capture sector's specific effect. If one or more of the γ_i coefficients are statistically significant, it will tell us that one or more slope coefficients are different from the base group i.e. if β_1 and γ_2 are statistically significant, then ($\beta_1 + \gamma_2$) will give the value of FDI coefficient for sector 2 (Gujarati, 2004). Equation (5.2) is estimated on full sample using the FEM. We provide further details on

the data description as well as list of sectors in two main categories in following sub section of data description.

5.4.2. Data description

The sector-based datasets used for this study are obtained from Capital Investment Coordination Board of Indonesia (BKPM). Datasets are published but not publicly available. Access to the datasets and permission to use them were granted to the authors by BKPM. Initially, we categorized industry based on factor intensity into five main category-classes namely natural resource-intensive (NRI), unskillful labor-intensive (ULI), physical capital-intensive (PCI), human capital-intensive (HCI) and eventually, technology-intensive (TI) following Aswicahyono and Pangestu (2000). We follow such a categorization in order to maintain consistency with national statistics level (BPS). However, to synchronize with the existing data of realized FDI and domestic fixed capital investment by industry from BKPM, we then regroup the datasets into two main categories namely NRI and ULI sector, and PCI, HCI and TI sector. The former represents the comparative advantage (natural resource-intensive, low-labor cost, and low technology) industry, while the latter implies the comparative disadvantage (capital- and technology-intensive or technology-complex) industry. The NRI and ULI sector consists of four industries, while the PCI, HCI and TI sector comprises of seven industries providing us with 11 manufacturing sectors in total.

We match such realized FDI and domestic fixed capital investment data by industry with exports value (in US$) of each commodity by SITC rev. 2 obtained from *UN*

COMTRADE database.[59] The panel datasets cover 11 cross-sections of manufacturing sectors with series from 1990 to 2008 providing us with 182 observations for full sample (unbalanced), 87, and 95 observations for sub-sample of NRI and ULI, and PCI, HCI and TI sectors, respectively. For the sake of consistency, we initially employ identical categorization with that of Aswicahyono and Pangestu (2000) is as described and utilized in previous chapter. Nevertheless, sector-based data of FDI and domestic capital investment available at BKPM does not match with such classification. In order to suit with BKPM data, manufactured exports data by factor intensity has to be regrouped accordingly. Details of industry classification based on factor intensity and export commodity based on SITC under two main category classes are provided in **Table 5.3**. Data of growth of real GDP in US$ (2000=100) is obtained from *World Development Indicators*, while data of Indonesian and its trading partners' currencies in US$ as well as their consumer price index are obtained from IMF-*International Financial Statistics*. Finally, exports values (US$) to Indonesia's 15 main trading partners used to construct effective exchange rate are obtained from UN-COMTRADE.

Table 5.3. Commodity classification based on factor Intensity

No	Manufacturing industry (BKPM)	Abbreviation	SITC (rev. 2)
A	**NRI and ULI sector**		
1	Wood and cork manufactures	W	63
2	Non-metallic mineral	NMM	66
3	Textiles and garments	TEX	65, 84

[59] Exports price indices for disaggregated sector are not available. We thus employ Indonesia's GDP deflator (US$ index) as proxy for export price. This is justified since merchandise exports have the biggest share in total exports (Kee and Hoon, 2004). The use of GDP deflator for international tradable price index can be found in literatures (Heien, 1968; Goldstein and Khan, 1976). Our experimentation of using CPI and PPI for export price deflator did not perform best, while IFS export price index is only available up to 2005. In addition, we use gross capital formation (GCF) price index calculated by dividing current value of GCF of Indonesia in US$ value over its constant value, as proxy for investment deflator. Both values are obtained from *World Development Indicator*.

4	Leather and footwear	LF	61
5	Other manufacturing commodity	OI	89
B	**PCI, HCI and TI sector**		
1	Chemicals and pharmaceuticals	CP	51, 52, 54, 59
2	Rubber and plastics	RP	62, 57, 58, 893
3	Pulp and paper/paperboard	P	64
4	Metal goods, machineries and electronics	MME	67, 68, 69, 72 to 74, 751, 752, 759, 76, 77
5	Road vehicle and other transports	RV	78, 79
6	Medicals, instruments and optics	MO	87, 88

Note: Initial categorization following Aswicahyono & Pangestu (2000, pp. 468) is reclassified to match with sector-based data of FDI & domestic investment available from BKPM.

5.5 Empirical results and implications

5.5.1 FDI and other export determinants

To investigate the impact of FDI and other variables on Indonesian manufacturing exports performance, a set of regression analyses using panel estimation models discussed in previous section have been undertaken on full- and sub-sample under two main categories of manufacturing exports classified by factor intensity. We provide results using PLS, REM, FEM and heterogeneous FEM in **Table 5.4** and **5.5**, respectively. As previously discussed, the PLS model may pose problems raised from its homogeneity assumption. Yet, we keep presenting results of pooled least squares to see whether signs of estimation are consistent for different estimation models and stable in all observations. Later, all inferences will be conducted based on the most appropriate model as suggested either by Hausman- or Likelihood Ratio (LR) test. The results for full- and sub sample using Equation (5.1) with their estimation properties are provided in **Table 5.4**, whereas the results and their estimation properties of Equation (5.2) using heterogeneous FEM on full-sample are presented in **Table 5.5**.

Table 5.4. Panel estimates of exports determinants (dependent variable: exports)

Variable	All Sectors		NRI and ULI		PCI, HCI and TI	
	PLS	REM	PLS	FEM	PLS	REM
Constant	6.528***	10.735 ***	8.002***	14.807***	3.454	8.655**
		(1.826)		(0.881)		(3.630)
GDP growth	3.591	2.894 *	2.772**	1.765***	3.664	3.181*
		(1.639)		(0.514)		(1.827)
FDI	0.176***	0.092 ***	0.247**	0.045	0.255***	0.102**
		(0.037)		(0.055)		(0.052)
Domestic investment	0.145***	0.046 *	0.156***	0.072***	0.125*	–0.013
		(0.027)		(0.024)		(0.04)
Exchange rate	2.030***	1.793 ***	1.422***	0.984***	2.460***	2.446***
		(0.344)		(0.155)		(0.558)
Economic crisis	– 0.518***	– 0.330 **	–0.403***	–0.098*	–0.674**	– 0.521*
		(0.159)		(0.057)		(0.278)
Estimation Properties						
Adjusted R^2	0.419		0.928		0.562	
Hausman test (χ2)	4.626 (0.46)		n.a.		1.506 (0.91)	
LR test (χ2)	303.88 (0.00)		207.183 (0.00)		125.20 (0.00)	
Estimation model	Random Effects		Fixed Effects		Random Effects	
Observation	182		87		95	

Notes: ***, **, and * represent significant at the 1%, 5%, and 10% level of significance, respectively.
Numbers in parentheses are robust standard errors (heteroskedasticity corrected)
PLS, REM, and FEM denote pooled least squares, Random Effects model and Fixed Effects model respectively.

The coefficient estimates presented herein are the elasticity coefficients of exports in response to a one percent change in the explanatory variables. In general, all signs of coefficient estimates are as expected. They are robust under four different estimation models and stable in full- and sub-sample estimations. For the full-sample, the Hausman test indicates that Random Effects ($\chi^2 = 4.63$, $p < 0.46$) is the most appropriate estimation model as shown in lower side, first column of **Table 5.4**. On the other hand, the FEM is preferred to only PLS model for sub-sample estimation of NRI and ULI sector based on LR statistics ($\chi^2 = 207.2$, $p < 0.00$). This is because the number of cross-section under such

sub-sample is less than number of regressors so that REM cannot be performed. The results are provided in second column. Estimation results for sub-sample PCI, HCI and TI are generated using REM as indicated by result of Hausman test ($\chi^2 = 1.51$, $p < 0.91$) in lower part, third column of **Table 5.4**, while results in **Table 5.5** are in favor of heterogeneous FEM compared to PLS as shown by χ^2 statistics of LR test therein ($\chi^2 = 16.6$, $p < 0.08$)**.** In addition, one common problem encountered in panel data estimation is heteroskedasticity, whose presence renders OLS estimators inefficient. In the present results, standard errors are heteroskedasticity corrected either using *seemingly unrelated regression* (SUR) method or White cross-section standard errors and covariance.

As shown in above table, our study finds significant evidence on the importance of FDI in manufacturing export expansion. The positive effect of FDI on exports are significantly found in two out of three observations. In full-sample, we find significant FDI export-enhancing effect at one percent level of significance, whose value of 0.092 implies that a one percentage increase in the level of FDI inflows in previous year is associated with 0.092 percentage increase in manufacturing exports in the next year, *vice versa*. For sub-sample, we support evidence of the positive effect of FDI on sector-based exports of PCI, HCI and TI at five percent significance level. The magnitude scale of 0.102 indicates that one percentage increase (decrease) in FDI inflows in previous year is associated with 0.102 percentage expansion (reduction) in manufacturing exports of PCI, HCI and TI commodities in the next year. Nevertheless, we do not find any significant evidence of FDI effect on manufacturing exports of comparative advantage industry under NRI and ULI sector, eventhough it still bears positive sign.

There are some plausible explanations regarding these evidences. Firstly, the traditional comparative advantage in labor-intensive, low-technology sector has started to be exhausted, while FDI inflows towards technologically sector may intensively utilize Indonesia as export-platform to third countries' markets. Study of Rahmaddi and Ichihashi (2012) using Constant Market Share (CMS) analysis and revealed comparative advantage (RCA) indicator indicates while there heve been the recurrent deteriorating competitiveness effect and continuous decline of comparative advantage indicator in NRI and ULI export commodties from 1990 to 2008, manufacturing exports growth mostly enjoyed from persistent positive contribution of competitiveness effect of PCI, HCI and TI commodities. Thee (2006) argues that certain industries of NRI and ULI sector in Indonesia, i.e. textiles and garments, have already moved up the technological ladder since 1992. Meanwhile, there has still been a weak and narrow domestic capabilities to absorb and improve upon complex technologies. As a result, expansions of technology compelx manufactures are likely to be relied upon imported capitals and technology. Secondly, lower tariffs in products under PCI, HCI and TI category (see **Figure 5.3b**) might have induced more FDIs toward such sectors, which eventually generate higher export-effect. Ito (2010) and Ekholm et al. (2007) argue that reduced trade costs, as represented by declining tariff, induce firms to conduct export-platform FDI. Thirdly, low tariff might also have facilitated more imported capital goods inflows towards these sectors. Okamoto and Sjöholm (2001) argue extensive use of imported capital and intermediate goods may partly explain high labor productivity, which leads to more export expansion. Data from *OECD-Structural Analysis I-O database* as indicated in **Table 2.5** indicates that medium to high

and highly technology manufacturing exports of Indonesia require more imported inputs than the low-technology ones, on average. During mid-1990s to mid-2000s, highly technology manufactured exports utilized 36.5% imported inputs compared to 21.7% of those for NRI and ULI sector.

Table 5.5. Results of heterogeneous FEM model (dependent variable: exports)

Variables	Coefficient	*t*-statistics	Estimation Properties
Constant	10.983 ***	(5.285)	
GDP growth	2.994 ***	(2.656)	
Domestic cap. Investment	0.029	(0.947)	
REER	1.740 ***	(5.473)	
Economic crisis	–0.329 **	(-2.270)	
FDI Wood manufactures	–0.116	(-0.897)	
Non-metallic mineral	0.072	(1.480)	Adjusted R^2: 0.851
Textile and garment	0.011	(0.313)	LR Test (χ2): 16.59*
Leather and footwear	0.198 ***	(3.435)	FEM
Other manufacturing industry	0.117 *	(1.809)	182 observations
Rubber and plastics	0.105	(0.713)	
Road vehicle & other transports	0.192 **	(2.341)	
Paper/paperboard	0.050	(0.943)	
Chemical and pharmaceutical	0.188	(1.092)	
Medical, instruments, and optical	0.188 **	(1.991)	
Metal, machineries, and electronics	0.247 **	(2.022)	

Note: *, **, and *** indicate 10%, 5% and 1% level of significance, respectively.
Numbers in parentheses are robust *t*-statistics

In similar vein with findings in previous table, results of Equation (5.2) shown in **Table 5.5** provide some supporting evidence. We find significant evidence for FDI export-enhancing effect at least in 10% significance level on five out of 11 industries, namely two industries (LF and OI) under labor intensive, low-technology sector and three industries (RV, MO, and MME) of technology complex, higher value-added sector. While, the highest FDI export-enhancing effect of 0.247 is found in MME commodities, the lowest

value of 0.117 is notified in exports of other manufacturing industry. Such a value of 0.247 suggests that exports of MME industries benefit most from the FDI received, where one percentage of FDI increase towards such sector will induce 0.247 percantage expansion on MME exports. This implies the importance of foreign invesment on industrial development in such sector through multinational enterprises' global production network activities particularly in electronics industry. On average, the positive effect of FDI inflows on manufacturing exports is relatively higher for technology complex, higher value-added commodities of PCI, HCI and TI sector, compared to those of LF and OI industries under NRI and ULI sector. This implies that FDI facilitate exports performance in both labor intensive, low-technology and technology complex, higher value-added industries without any significant evidence of crowding-out effect on manufacturing exports of any sector.

Our empirical evidences are also consistent with previous findings of Ramstetter (1999), van Dijk (2002) and Jongwanich (2010). In full-sample, our finding supports the widely-held belief of the positive contribution of foreign investment on host country exports. In sub-sample evidence, our finding of higher FDI export-enhancing effect of PCI, HCI and TI sector compared to that of NRI and ULI sector is in accordance with study of Jongwanich (2010) who found higher FDI-export effect in exports of machineris and transports compared to those of exports of total merchandise and manufacturing commodities (SITC 5-8). At industry-level, our finding is generally in accord with finding of van Dijk (2002), who found significant evidence of FDI effect in most Indonesian manufacturing sectors, yet partly in contrast with his findings in footwear and instruments industries. We also share similar argument on the importance of road vehicle and other

transport (RV) and metal goods, machineries and electronics (MME) commodities with that of Pangestu (2002). Summary of comparison with some previous studies on the importance of FDI on exports of Indonesia is provided in **Table 5.6**.

Our above findings also suggest that FDI inflows play higher significant roles in promoting export development of highly technology, higher value-added sectors than those of low technology, unskilled labor-intensive sectors.[60] This may be an important reason for impressive growth of real exports of manufacturing commodities under PCI, HCI and ULI sectors during 1990-2008. Lall (2000) points out that rapid and sustained manufactured export growth requires structural shifts moving from easy to complex products and processes within activities, and from easy to complex technology across industries' activities. In such a way, foreign investment may serve as tutor and catalyst to promote technological upgrading activities via technology transfer and diffusion. In overall, our empirical findings support the widely held belief that increased levels of FDI positively affect (crowd-in) manufacturing export performance. The FDI export-enhancing effect is especially higher for highly technology, higher value-added sectors of PCI, HCI and TI without any significant evidence of crowd-out effect in natural resource- and unskilled labor-intensive sector, sector of which the comparative advantage lies.

Domestic investment bears a positive sign on exports performance. It plays an important role in determining performance of overall manufactured exports at 10% level of significance. The magnitude of 0.046 implies that one percentage increase of domestic

[60] This part, however, should be interpreted with caution since export figures do not perfectly measure industry's technological development. For instance, industrial classification based on level of technological intensity may be misleading when low-technology products can use relatively technology process or high technology exports may also include assembled products with low-value added (Okamoto and Sjoholm, 2001). Nevertheless, such figure can still be a rough indicator of technological competence (Thee, 2006).

investment will expand exports by 0.046 percent, *vice versa*. Nevertheless, we only find statistically significant evidence at one percentage significance level of positive influence of domestic investment on exports expansion in NRI and ULI sub sample. The scale magnitude of 0.072% suggests that one percentage increase of domestic investment will promote exports expansion of NRI and ULI sector by 0.072%, *vice versa*. This indicates the relative importance of domestice investment on manufacturing exports of the comparative advantage sectors. This evidence seems reasonable since Indonesia's comparative advantage traditionally lies on natural resource and unskilled labor intensive sectors as previously argued. This implies that the expansion of such low-technology exports of manufactures, in contrast with that PCI, HCI and ULI, may in fact be facilitated by any increase in domestic capital formation.

Growth of GDP carries positive sign as expected and significant in all observations, at least at 10% level of significance. Its high level of magnitude implies the importance of country's economic performance on production of exportable. High economic growth represents advancements in country's productive capacity through supply-side channels such as infrastructure, logistics and production capabilities, all of which can be utilized in enhancing exports production. The magnitude of 2.894 indicates that one percent increase in GDP growth will facilitate overall manufacturing export growth by 2.894 percent. Any improvement in GDP growth will generate higher manufactured exports growth of PCI, HCI and TI than that of NRI and ULI commodities. GDP growth coefficients are as 1.764% and 3.18% for NRI and ULI, and PCI, HCI and ULI exports commodities, respectively. This is as evidence that higher technology, higher value-added exports

commodities are more responsive to any improvement in production capacity compared to those of low technology, unskilled labor-intensive manufactures.

Following economic rationale, manufacturing export performance is positively influenced by an exchange rate (REER) depreciation at one percent level of significance in all observations. Its value of 1.793 indicates that one percentage in currency depreciation will facilitate 1.793% growth of overall manufacturing exports implying that any depreciation (appreciation) will induce increases (decrease) in manufacturing exports more than proportionate. The REER impact on exports also exhibits sector-based difference across two sectors. Its magnitudes of 0.984 and 2.445 suggest that one percent of depreciation (appreciation) will induce 0.984%, and 2.445% increases (decrease) in manufacturing exports of NRI & ULI commodities, and PCI, HCI & TI products, respectively. In contrast to customary economic rationale, our findings suggest that more highly technology products tend to be more susceptible to exchange rate changes. This seems reasonable for the case of Indonesia since the industrial development in capital- and technology-intensive sector is still at the bottom of the technology ladder compared to natural resource- and labor-intensive industries, sector in which Indonesia's traditional comparative advantage lies. Thee (2006) argues that technological capabilities of high tech industries in Indonesia are still weak. BPS (2011) indicates that average value-added of NRI and ULI sector from 1998 to 2001 was higher than that of PCI, HCI and TI sectors. In addition, export products under such sectors, as previously discussed, are more import-content intensive than in those under NRI and ULI. All these factors make such manufactured exports more responsive to any exchange rate swing. Our overall findings

are comparable with those of Jongwanich (2010) and Sugema (2005). We provide comparison with some previous findings on exchange rate elasticity along with that of FDI as summarized in **Table 5.6**. In addition to other export determinants previously discussed, we also indicate significant evidence of negative effect of economic crisis in all observations, except NRI and ULI sub-sample. Export commodities of PCI, HCI and TI sector are more vulnerable to any economic shocks. This is partly explained by the more responsive inclination on exchange rate movement and highly imported inputs required in the production of technology complex, higher value-added commodities.

Table 5.6. Comparison of estimated FDI and exchange rate elasticities for Indonesia exports

Exports determinants	**This study**			**Jongwanich (2010)**			**Sugema (2005)**	**van Dijk (2002)**
	Mfg. 3 digit	NRI&ULI	PCI, HCI & TI	Total exports	Mfg. SITC 5-8	SITC 7		
• FDI	0.09	n.s	0.10	0.03	0.02	0.06	-	(+)
• Exchange rate	1.79	0.98	2.45	4.52	2.15	0.97	1.33	-
Data span	1990-2008			1994:1-2007:4			1984:1-1997:2	1995
Observations	182	87	95	56			54	20,161
Model	Random & Fixed Effects panel			GSM model			FMOLS	Tobit model
Export type	Manufacturing			Total, manufacturing & SITC 7			Non-oil	Non-oil

Note: n.s. denotes not significant result; GSM is general to specific model; FMOLS denotes fully modified ordinary least squares.

5.5.2 Policy implications

Aforementioned empirical findings address some implications. First, apart from FDI, the importance of other export determinants on exports, namely domestic investment, growth of economic performance and exchange rate, suggests government of Indonesia to maintain a sound domestic supply condition and competitive exchange rate management in order to sustain impressive manufacturing exports performance in general. Particularly, increases in domestic capital formation are considerably essential to promote exports of

NRI and ULI commodities. Second, since FDI exhibits not only positive effect on exports performance, but since its effect also varies across industries, focused FDI promotion measures deserve some attention. Third, higher FDI effect on technology complex and higher value-added commodities suggests that it may play a significant role contributing to changes in exports structure from natural-resource, low-technology commodity toward more-value added, technology complex product. This structural shift is deemed essential to maintain a rapid and sustained manufactured export growth. The study thus proposes impetus for GOI to more facilitate FDI flows to and further development of such sectors. Such measures should also be accompanied by supplementing efforts such as provision of excellent R&D infrastructures, eliminating unnecessary trade-cost, delivering efficient logistic system, and so forth. Fourth, promoting further development of technology complex and higher value-added industries is also to expand and to deepen manufactured exports diversivication to maintain sustained & rapid export growth since the industrial development in certain Indonesia's traditional comparative advantage industries i.e. textiles and garments already used up. Fifth, GOI can also deliver an incentive system for firms to upgrade their technology capabilities and the higher quality of education, training, and R&D infrastructures especially in human capital-based technology (sectors with highly FDI's export effect) to optimize technology transfer and spillovers from MNEs to indigenous firms export-oriented sectors. Such technology transfers and spillovers will eventually result in increased productivity and innovation in domestic economy leading to higher growth not only of exports but also in overall economic performance. Further researches analyzing the sector-based variation of FDI linkages on productivity and

spillover as well as whether FDI induces more export diversification and innovation in targeted sectors are thus worth pursuing.

5.6 Concluding remarks

In this chapter, we review the importance of FDI on sector-based manufacturing exports performance using panel estimation. The findings support the widely held belief that increased levels of FDI positively affect manufacturing export performance and it is an important factor determining the rapid growth of manufacturing exports. The study also reveals that FDI export-enhancing effect varies across Indonesian manufacturing sectors according to their factor intensity and technological capabilities, both of which represent industrial comparative advantage and disadvantage. Such an export-enhancing effect is even higher in PCI, HCI and TI sectors without any significant evidence of deteriorating effect in NRI and ULI, sectors of which the comparative advantage lies. The empirical results imply that foreign investment plays a significant role in shifting export structure from natural resource, low-technology commodities towards technology complex and higher value-added commodities. In addition, the study indicates the importance of other determinants of export performance, namely domestic investment, GDP growth and exchange rate depreciation. While domestic investment is more effective in generating exports performance of NRI and ULI sector, the findings indicate that any exchange rate depreciation facilitate export growth of technology complex, higher value-added commodities more than proportionate. We also find that export commodities of such sectors suffer most from any economic shock. Thus, the findings suggest the importance of some macro- and microeconomic measures to sustain manufacturing exports growth as

well as to promote further industrialization towards technology complex, higher value-added manufacturing industries. Finally, we anticipate future research that explicitly analyzes the sector-based impact of foreign investment on industrial productivity-spillover and whether such FDI may promote export diversification and innovation in selected sectors.

A.5 Appendix

A.5.1 Endogeneity test

The issue of endogeneity of GDP in the present model of Equation (5.1) is examined and tested using Hausman (1978) test. With the presence of endogeneity, the estimated parameters from ordinary fixed effect model are biased and inconsistent. Since GDP is being suspected to be endogenous by rational economic expectation (Keynessian identity), it is important to confirm that GDP variable in the present estimation model is deemed exogenous prior to draw any inference from the estimation result. We conducted following procedures of Hausman test as explained in Woolridge (2009).

(i) Estimate a reduced form for GDP growth panel equation by regressing it on all exogenous variables, including those in the structural panel equation (5.1) and the additional instrumental variables for GDP growth (growth of labor, $GLAB_t$, and lagged of GDP growth, $GGDP_{t-1}$). The reduced form of GDP growth equation is as follows:

$$GDPG_t = \delta_i + \lambda_1 FDIF_{it-1} + \lambda_2 DCIF_{it-1} + \lambda_3 GLAB_t + \lambda_4 REER_t + \lambda_5 Dcrisis_t + \lambda_6 GDPG_{t-1} + \nu_{it} \quad (5.4)$$

where subscript i and t denote cross-sectional unit and time respectively. υ is disturbance (residual) term. λ_1 until λ_6 are parameters to be empirically estimated. $GLAB_t$ and $GDPG_t$ are growth of labor in year t and growth of GDP in previous year t-1. Definition for other variables remains similar with those of Equation (5.1). All variables, except growths of GDP and labor, and dummy variable, are in natural logarithms. In this reduced form, $GDPG_t$, $GLAB_t$, $REER_t$ and $GDPG_{t-1}$ are common variables in panel context. The result of OLS regression is as indicated below.

Dependent Variable: GDPG
Method: Pooled Least Squares
Date: 06/11/12 Time: 16:25
Sample (adjusted): 1991 2008
Included observations: 18 after adjustments
Cross-sections included: 11
Total pool (unbalanced) observations: 182

Variable	Coefficient	Std. Error	*t*-Statistic	Prob.
C	0.8302	0.0828	10.0325	0.0000
FDIF?(-1)	0.0044	0.0015	2.9377	0.0038
DIF?(-1)	-0.0052	0.0013	-3.8907	0.0001
GLAB	-0.7226	0.4609	-1.5679	0.1187
REER	-0.1743	0.0163	-10.6866	0.0000
D_CRISIS	0.0103	0.0066	1.5700	0.1182
GDPG(-1)	-0.3081	0.1202	-2.5640	0.0112

R-squared	0.6709	Mean dependent var	0.0474
Adjusted R-squared	0.6596	S.D. dependent var	0.0472
S.E. of regression	0.0276	Akaike info criterion	-4.3075
Sum squared resid	0.1329	Schwarz criterion	-4.1843
Log likelihood	398.9855	Hannan-Quinn criter.	-4.2576
F-statistic	59.4662	Durbin-Watson stat	1.1799
Prob(F-statistic)	0.0000		

(ii) Then, obtain the residuals, *RESID* (υ_t), for equation (5.4).

(iii) Add *RESID* to the structural equation (5.1), which includes *GGDP* and test for significance of *RESID* using OLS regression. If the coefficient of *RESID* is statistically different from zero, we conclude that $GDPG_t$ renders an endogeneity. Otherwise, it is indeed exogenous. The result is as follows:

Dependent Variable: X?
Method: Pooled Least Squares
Date: 06/11/12 Time: 16:25
Sample (adjusted): 1991 2008
Included observations: 18 after adjustments
Cross-sections included: 11
Total pool (unbalanced) observations: 182

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.6981	7.8106	0.2174	0.8281
FDIF?(-1)	0.1408	0.0750	1.8779	0.0621
DIF?(-1)	0.1917	0.0811	2.3635	0.0192
GDPG	10.6637	11.1322	0.9579	0.3394
REER	3.0655	1.6731	1.8323	0.0686
D_CRISIS	-0.6068	0.2652	-2.2879	0.0233
RESID?	-7.4631	11.4355	-0.6526	0.5149

R-squared	0.275724	Mean dependent var	20.9613
Adjusted R-squared	0.250891	S.D. dependent var	1.1019
S.E. of regression	0.953713	Akaike info criterion	2.7808
Sum squared resid	159.1744	Schwarz criterion	2.9040
Log likelihood	-246.0522	Hannan-Quinn criter.	2.8308
F-statistic	11.10341	Durbin-Watson stat	0.1892
Prob(F-statistic)	0.0000		

The result shows evidence that the residual, *RESID*, is not significantly different from zero (*p*. 0.515), and the Hausman's computed *F*-value is 0.463 (*p*. 0.497), which is less than critical *F*-value (1, 175) at the 5% significance level of 3.895. Thus, we can safely conclude that there is no endogeneity problem in the present Equation (5.1).

CHAPTER 6

CONCLUSION

Exports play a vital role in Indonesia economic development as indicated by its importance to GDP proportion. Even though most of time growth of GDP is attributed to growth of domestic-demand especially consumption expenditure component, yet exports contribution has its growing significance, in line with growing industry's development. In some certain periods especially during economic crisis, exports in fact play a significant role as an economic bolster to Indonesian economy. Since petroleum exports cannot be counted on over to promote sustained rapid growth into the 1990s onward, Indonesia requires new engine for sustained growth into the 1990s onward which is in favor of export expansion especially of manufactures. Nevertheless, rapid manufacturing export expansion requires highly proportion of capital and intermediate imports especially that of high technology, more-value added sectors. It is thus very important to reinvestigate the validity of ELG hypothesis in the presence of highly propensity of imports of capital & intermediate goods prior to scrutinize the underlying factors determining exports performance, namely income and price factor, non-price factors comprising of exports structure and competitiveness, FDI and exchange rate.

Assessing all these essential factors of exports performance is expected to provide rationales for astute trade-based industrialization strategy.

6.1 Summary and major findings

The general contribution of the dissertation is the review export-led development and the determinants of exports performance in Indonesia with the perspectives of developing countries. The unique characteristics of Indonesian economy reveal several interesting issues which may have important implication for exports policy management in the future.

The study commences by reviewing the importance of exports in Indonesia economic development and touches the issue whether exports promote growth, or in other word, whether exports promotion or outward-oriented strategy appropriate for Indonesia, a populous, previously oil-dependent economy. To grasp best practices from high performing exporting countries, we provide a descriptive comparative analysis of some selected comparators which share similar characteristics with Indonesia. One best practice revealed from most high performing exporting countries is that they maintain the growing importance of manufacturing exports especially that of highly technology-content export commodities. This propels rigorous analyses on the importance of export promotion strategy and the determinants of exports performance.

The validity of outward-oriented or ELG hypothesis, by controlling important variable of imports of capital and intermediate goods, is reinvestigated in **Chapter 2**. The identification of such causal structure is dissected within long- and short-run perspective by employing multivariate VAR Granger causality. The result indicates that exports and economic growth exhibit bi-directional causality which is ELG in long-run and GLE in short run. The evidence of GLE suggests that the performance of exports can in fact be

stimulated by increasing the productivity of internal demand to generate more quality export supply as neoclassical trade theory proposes. ELG in long-run, on the other hand, indicates that the performance of exporting behavior will induce more economic growth through accumulative learning process and innovation driven by competition dynamics in world market. In addition, imports of capital and intermediate goods are detrimental to economic growth both in long- and short-run. Even though it hampers economic growth, import of capital and intermediate goods is required for production of exportable.

Contribution to the literature from this chapter is the application of vector error correction model to estimate the causal structure of exports and economic growth in Indonesia by controlling imports of capital and intermediate goods. Moreover, this study distinguishes such causal structure between exports and economic growth in long- and short-run perspective.

Chapter 3 estimates the importance of foreign- and domestic demand on export performance within supply and demand framework. Since previous ELG study exhibits a bi-directional causal structure of exports and economic growth, the inclusion of domestic-demand variable in export model becomes imperative. Both typical export variables of income and price factor are used as appropriate proxies for foreign- and domestic-demand variables. Income variable is dissected into its secular (trend) and cyclical (deviation) movement which also enable one to test domestic-demand pressure hypothesis on export performance in Indonesia. The analysis also captures trade liberalization policy and some shocks suspected to influence export performance. The results indicate both price and income factors are significant in determining exports performance. In addition, both price

and income variable are demand-elastic in long-run implying the importance of manufacturing exports in total export structure.

The separation of income variable into its secular and cyclical movement reveals important finding of the validity of domestic-demand pressure hypothesis on export performance implying the existence of resource competition between export-oriented and domestic sector. The result also indicates the importance of government trade liberalization policy in reducing exports price. This signifies the role of government in managing export competitiveness.

Contribution to the literature from this chapter is the application of 2SLS model to deal with the endogeneity problem between price and quantity of exports in demand and supply framework. The estimates of foreign and domestic demand on exports performance are dissected into long- and short-run parameters. Moreover, this study exhibits evidence on the validity of domestic-demand pressure hypothesis which has never been explicitly modeled for the case of Indonesia.

Chapter 4 decomposes growth of exports and assessing the evolution of exports structure and competitiveness in manufacturing exports. The evidence of highly elastic price elasticity of demand and supply for exports indicates the importance of manufactured commodities in exports structure. In more rigorous view, exports structures, not only can be as form of product composition, but also distribution structure to export market destination. Sustaining high export growth involves an on-going process of expanding shares in world market by increasing the price and quality competitiveness of exports commodities and by specializing in more productive exportable activities that are growing

rapidly on world markets. In addition to price and income factors of export determinants previously assessed, this chapter analyzes non-price factors of export performance in terms of product composition, market distribution and competitiveness by employing CMS analysis, and assesses the evolution pattern of exports structure in manufacturing industries using RCA indicators.

The results suggest that while mostly enjoying benefits from world export growth, Indonesia exports performance were deteriorated by the negative contribution of commodity composition and market distribution, and the role of competitiveness in manufacturing export performance, which was improved significantly right after trade liberalization policy unleashed in 1986 has continuously diminished until recent years. In addition, most of Indonesian manufacturing exports were still concentrated in natural resource- and unskilled labor-intensive manufacturing commodities. The contribution to the literature is that this study dissects manufacturing export commodities up to 3-digit SITC, which are classified based on factor intensity. Such a classification enables us to analyze the changing pattern of export structure and the contribution of competitiveness on export performance of designated export-oriented sector.

Chapter 5 further scrutinizes the roles of FDI, domestic investment and exchange rate in determining the performance of sector-based manufacturing exports. Previous findings indicate problems in upgrading exports structure and deteriorating contribution of competitiveness. These are as rationales for calling for action to expedite export upgrading process and improve in competitiveness. The former can partly be facilitated by FDI and the latter calls for competitive exchange rate management to certain extent. Employing

Random Effects, Fixed-effects and heterogeneous Fixed-effects panel estimations, this study aims to analyze the relative contribution of FDI and exchange rate in determining the performance of sector-based manufacturing exports. The results suggest that FDI significantly crowds-in manufacturing exports in most panel observations and has a stronger effect in physical capital-, human capital-, and technology-intensive sector, without any evidence of a crowd-out effect in natural resource-intensive and unskilled labor-intensive industries—sector in which Indonesia has a comparative advantage. Exchange-rate influences manufacturing exports performance of all sectors, yet with sector-based differences across the two sector groupings. The findings suggest that more highly technological products tend to be more susceptible to exchange-rate changes, *vice versa*. This seems reasonable for the case of Indonesia since the industrial development in capital- and technology-intensive sector is still at the bottom of the technology ladder compared to natural resource- and labor-intensive industries, sector in which Indonesia's traditional comparative advantage lies.

This chapter contributes to the literature by investigating the sector-based impact of inward FDI on a host country's exports, using disaggregated data of manufacturing sectors categorized by factor intensity. This study provides evidence on the contrasting importance of FDI and domestic investment in different type of factor intensity manufacturing sector. While the former plays much role in determining export performance of physical capital-, human capital-, and technology-intensive sector, the latter contributes more on the performance of natural resource-intensive and unskilled labor-intensive exports.

6.2 Implications and policy recommendations

Result of bi-directional causality between exports and economic growth suggests a balance emphasis in maintaining the roles of exports and domestic-demand for successful and sustained economic development in Indonesia. The evidence of GLE in short-run indicates the importance on productivity enhancing measures to promote export performance i.e. provision of excellent infrastructure, alleviate market distortion, prudent inflation management so forth. On the other hand, ELG result suggests the importance of astute export management so that any exporting activity can be managed in such a way to enhance continuous productivity and innovation (laddering up) through accumulative learning process in domestic economy to promote a sustained and rapid economic performance.

Despite of its benefit to export production, imports of capital and intermediate goods should be well managed. This is because highly dependence on imported inputs could be detrimental to long-run economic growth, especially if such imports intensively consume foreign reserves leading to chronic balance of payment. Thus, government should be able to induce more export revenue by promoting competitive export sectors as well as encouraging exporters to enhance export market penetration and diversification. In addition, it is an imperative to call for concrete actions for developing the efficient and viable export-supporting industries.

Since demand is price-elastic, it is suggested for government to maintain export competitiveness. Conversely, if price competitiveness is weakened, Indonesia will suffer from a large decline in the volume of exports. Thus, exchange rate management becomes

one of critical measures in maintaining export competitiveness. Competitive exchange rate management can be conducted through effective & prudent macroeconomic policy.

In addition, the highly elastic price elasticity of demand also implies that GOI should facilitate further industrialization process particularly in manufacturing export-oriented sectors and remain less dependent on natural resource based products. Indonesia needs to devise a long-term strategy aimed to improve the quality of exportable. In so doing, GOI may encourage the adaptation of better technology and persistently deliver continuous supports to business climate, all of which can facilitate the productivity improvement in exports sector.

Apart from price, world income growth will also lead to large increase in demand for Indonesia exports. In the event of a slowdown in world income growth, Indonesia can still maintain high growth of exports by improving its competitiveness.

The significances of demand and supply price elasticity as well as secular and cyclical movements imply that foreign and domestic demands play roles in determining performance of Indonesia exports. The higher magnitude of secular income than that of cyclical income implies the export performance is more attributed to productive capacity. The higher magnitude of price elasticity of supply than that of demand suggests that Indonesia exports are more supply-determined. This supports previous conjectures arguing that supply side rather than demand side is the more relevant determinants of Indonesia export performance. Based on all these evidences, GOI should facilitate improvements on productivity of factor inputs by removing economic bottlenecks, provide more attention on improvement of infrastructures condition, and facilitate investment in export sector, all of

which are in order to boost export performance.

Government should put emphasis to enhance exports of PCI, HCI and ULI to take advantage of highly world demand growth under those commodities. The enhancement process can be as wider product differentiation and diversification as well as product technology deepening.

All these efforts do not necessarily mean that such development is conducted by neglecting exports of NRI and ULI, commodities in which Indonesia's traditional comparative advantage lies, but in fact, more export promotion towards PCI, HCI and TI products is worth pursuing to support ULI and NRI exports whose comparative advantage has already been used up.

In addition, upgrading the productivity and advancement of technological capability in NRI and ULI sector may rejuvenate the depletion of comparative advantage in those sectors. Governments should facilitate higher domestic capital formation, more research and development activities and new technologies adoption in NRI and ULI sectors.

Development of such highly technology, higher value-added export commodities requires improvement in industrial capabilities; government thus can promote technological upgrading process towards higher value-added activities by facilitating export-oriented FDI toward PCI, HCI and TI sectors. This effort has to be supported by persistent, sound macro- and microeconomic measures to enhance competitiveness such as competitive exchange rate management, provision of excellent industrial infrastructure the elimination of unnecessary trade costs, the deliverance of an efficient logistic system, and so forth.

Exporters should enhance market diversification toward more growing export destination countries such as China and Australia. Active export-promotion efforts facilitated by government to those markets are worth conducting.

GOI can also deliver an incentive system for firms to upgrade their technological capabilities and to promote higher-quality education, training, and R&D infrastructures—especially in human capital-based technology (i.e., sectors with a high FDI–export effect), to optimize technology transfer and diffusion from MNEs to indigenous firms' export-oriented sectors. Such technology transfers and spillovers eventually result in increased productivity and innovation in the domestic economy, leading to higher growth not only among exports but also in terms of overall economic performance.

6.3 Suggestions for further studies

This study is as an attempt to review export policy and its underlying factors determining export performance in Indonesia. It provides overall understanding of export policy concept and certain export determinants using standard theory and approach, but it cannot explain other underlying factors of exports that work in reality. For instance, the study did reveal that Indonesia's export competitiveness and manufacturing comparative advantage have been diminished in recent years, yet it did not explain clearly what factors cause them depleted. The use of particular variables may not serve as perfect proxy in capturing the true linkages of export-growth nexus and the underlying factors of exports. In addition, as previously indicated in the scope and limitation part, many other important trade factors are still beyond the analyses of the present dissertation as well.

Thus, as the data become more available both in quality and quantity manner, any

future study may refine present analyses and can be further devoted to estimate the efficacy of export policy, the impact of export diversification and trade of intermediate goods on economic growth, and the impact of other underlying trade factors on determining export performance and comparative advantage directly using timely data. To chase the extent to which export diversification plays an essential role in determining export performance, export growth can be decomposed further based on intensive- and extensive margin of growth. The extent to which any exporting behaviour may influence productivity and innovation is also worth exploring further. With regard to FDI, the effect of sector-based variation in FDI linkages on productivity and spillover, as well as whether FDI induces further export diversification and innovation still remain some open questions.

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