EXPORT LED GROWTH HYPOTHESIS:

AN ANALYSIS OF INDONESIA'S TRADE POLICY PRE AND POST 1997 FINANCIAL CRISIS

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International Institute of Islamic Economics
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DECLARATION

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied from any source. It is further declared that I have carried out this research by myself and completed this thesis on the basis of my personal efforts under the guidance and help of my supervisors. If any part of this thesis is proven to be copied out or earlier submitted, I shall stand by the consequences. No portion of work presented in this thesis has been submitted in support of any application for any other degree or qualification in International Islamic University or any other university or institute of learning.

Hendri Samsul Bahri Tanjung

APPROVAL SHEET

EXPORT LED GROWTH HYPOTHESIS: AN ANALYSIS OF INDONESIA'S TRADE POLICY PRE AND POST 1997 FINANCIAL CRISIS

by

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Dedicated to:

The Memory of my father (late)
who supported me to come to Islamabad
for higher education

ABSTRACT

The Asian economic crisis in 1997 also brought Indonesia among others into a declining phase of economic performance. Prior to that, Indonesia had reached a miraclous level of economic growth. After the crisis, conflicts in trade policy took place in Indonesia. The ministries of finance and trade were in favor of export promotion, while the ministry of agriculture and the ministry of industry were in favor of import substitution. This study attempts to analyze the conflict in policies objectively.

This empirical research investigates the relationship of exports with economic growth by analyzing the hypothesis of Export Led Growth (ELG) using annual time series data for the Indonesian economy from 1967 to 2007. The variable used are Real GDP, real exports, gross fixed capital formation, terms of trade, and a dummy variable for 1997 financial crisis. The study applies various sophisticated econometric techniques: the unit root test, the cointegration test, vector auto regression (VAR), the error correction model (ECM), impulse response function (IRF), and the Granger causality test. The data is collected from International Financial Statistics (2007), World Development Indicator (2007), The Beareau Statistics of Indonesia (2010), and Ministry of Trade of Indonesia (2010).

The results of this study show that the ELG and GLE hypothesis are valid for Indonesia over the period 1967-2007 (pre and post crisis). In particular from the year 1983 when President Soeharto took export promotion intensively to a decade after crisis, both the ELG and GLE are valid in Indonesia. The crisis significantly affected all variables in the short run as well as long run like: GDP growth, export growth, investment growth, and terms of trade. The reality is that export led growth is the vehicle of economic growth and economic growth also leads to export growth. Hence, maintaining the export promotion strategy any further after 1997 financial crisis is advisable with caution. This study implies that export promotion at all cost is not desirable post crisis. Furthermore, export promotion and import substitution have to be undertaken according to condition of Indonesian economy.

Key Words : Exports, Economic Growth, Trade Policy, Indonesia

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All praises to Allah, on His last Prophet Muhammad who taught humanity to be human beings. If I remember six years back, when I planned to continue my study in Pakistan, my father supported me fully by saying "Please go and travel to the other part of the world to seek knowledge. Insha Allah it will be beneficial for your career, although probably I can not see you again". He cried when I left him. I cried for almost two hours after that. When I visited my father in summer 2005, he was very happy and healthy, as well as when I visited him in summer 2006. But, his speech became the truth when I visited his grave in September 2007. May Allah give him peace and blessing there.

When I came to Pakistan to study for the PhD degree, I knew that I was the first Indonesian to enroll for the PhD in economics at the International Institute of Islamic Economics (IIIE), International Islamic University Islamabad (IIUI) Pakistan. I prayed at that time that Allah would give me health to complete the degree.

I cannot ignore a series of incidents making it possible for me to get this education. These incidents are:

- Suggestion of my teacher Prof Dr. KH. Didin Hafidhuddin to go to IIUI for the doctoral degree in Islamic Economics.
- Support of my father Samsul Bahri Tanjung to go to Pakistan for my study.
- Choice of Statistics at the Bachelor level, Management and Fiqh Muamalah at the Master level.
- Invitation from IIIE for admission in M.Phil leading to PhD Program.
- Award of a scholarship for doctoral studies from 'Muhsineen'
- Award of a scholarship for doctoral studies from the government of Indonesia.

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Hendri Samsul Bahri Tanjung

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CHAPTER 1

INTRODUCTION

1.1. Background

The Asian economic crisis in 1997 brought Indonesia into a decline of economic performance. Prior to that, Indonesia had reached a miraculous level of economic growth from 1980s to 1990s. From 1986 to 1996, the value of total non-oil exports in dollar increased by 20.3 percent. Export of manufactured goods grew by around 20 percent leading to more than 50 percent of total exports (Basri and Patunru, 2007). It seems that export promotion[1] policy adopted in the 1980s was successful. However, this astonishing export performance ended when the crisis broke out in mid-1997 and total export growth declined to five percents.

Indonesian President Soeharto invited the International Monetary Fund (IMF) Team in 1998 to reform the economy. IMF packages under the name of Structural Adjustment Program (SAP) included reducing import tariffs and

[1] Export promotion is defined by Todaro and Smith (Economic Development, 8th edition) as looking outwards and seeing trade barriers. Strong points of Export Promotion are creating more jobs and bring in more foreign exchange. Difficulties in export promotion will appear when market relatively stable and developed countries are experts in protecting their labor intensive industries.

reforming regulations to open up trade. SAP encouraged a gradual reduction in import tariffs. Instead of getting better result, the export performance from 2001 to 2005 became worse. Inspite of a noteworthy improvement in the world economic environment after 2001, Indonesia was unsuccessful to bring back its pre-crisis export performance. If during the pre-crisis period (1968-1997) the export growth was 13.92 percent then after the crisis (2000-2005) the export growth slid down to 4.73 percent. The economic growth also plunged from 6.93 percent before the crisis to 3.25 percent after the crisis[2]. The interesting question in this regard is whether Indonesia should continue to maintain its trade policy (Export Promotion) after 1997 crisis?

There are two opinions regarding this issue. According to the first opinion, Indonesia should continue the export promotion strategy, as Liwan and Lau (2007) found that the hypothesis of export led growth (ELG) was valid. This opinion tends to be supported by the Indonesian Ministry of Finance and the Ministry of Trade. According to the second opinion, such a strategy could not be continued as evaluated by Pramadhani et.al.(2007). This opinion tends to be supported by the Ministry of Agriculture and the Ministry of Industry. As a result there is conflict of opinion over trade policy within the Government of Indonesia. This invites the question of how to resolve the conflict and to choose a proper trade policy for development of Indonesian economy. Hence, the study of export led growth hypothesis for Indonesia has attracted the attention of researchers.

[2]Statistics Bureau of Indonesia, Trend of the Selected Socio Economics indicators of Indonesia, March 2008

The Export Led Growth (ELG) Hypothesis is an important issue which has been debated for almost half a century. ELG attempts to answer the following questions; does export growth lead to economic growth or does economic growth lead to export growth? Is there a bidirectional relationship between the two? These questions are no doubt very important especially for Developing Countries. The focal point of the ELG dispute is whether a country is better served by adjusting trade policies to export promotion or to import substitution[3]. Hundreds of articles appearing in different journals and working papers from different institutions have tried to answer these questions.

At least there are three reasons have been pointed within trade theory under Neoclassical Economics which support the ELG suggestion. Firstly, the growth of exports may be a representative of high demand for output of the country. Hence, the country boosts its output. Secondly, exports expansion may endorse specialization in the making of exportable goods, which in turn may enhance the productivity level. The productivity change may lead to output growth. Thirdly, an increase in exports may relax a foreign exchange constraint. This eases importing input and in turn allows output expansion (Giles and William, 2000).

On the other hand, it is possible to accept the Growth Led Export (GLE) hypothesis. Economic growth leads to improvement in technology and skills. This will increase the comparative advantage for the nation and in turn boost up

[3]Import substitution is defined by Todaro and Smith (Economic Development, 8th edition) as looking inwards but still paying outward. Some strong points of Import substitutions are large domestic market, low risk, and protecting local industry are easier than to lift trade barriers in other countries. Difficulties in import substitution will appear when bad management and technology produce low quality and high cost.

exports. This is verified by Lancaster (1980) and Krugman (1984). The intervention of the government subsequently in the case of market failure also result in GLE.

A bidirectional (BD) link between exports and output is also likely. This is proved by Helpman and Krugman (1985). They assume that exports may go up from the achievement of economies of scale because of productivity improvements. The growth in exports may facilitate cost reductions. This may result productivity growth. Bhagwati (1988) assumes that enhanced trade would create more income. This in turn leads to more trade.

Finally, there is likely to be no causal link between the expansion of exports and economic growth. It happens when the two variables are governed by other exogenous factor in the system , e.g., real exchange rate (Yang, 2008).

Although many efforts have been made to deal with the issue of the ELG hypothesis, different people have come up with different outcomes. Liwan and Lau (2007) ascertained the evidence for the ELG hypothesis in Indonesia. Using time series annual data for the period 1976-2005, they find that the ELG hypothesis is valid. At the same time, Pramadhani et.al., (2007) investigated the ELG hypothesis for Indonesia by using quarterly data from 1990 to 2004. They found the inverse support in favor of growth-led export (GLE). This means a rejection of the ELG hypothesis.

It is evident from the above that the results of the relationship between export and output are not unique. Different people arrive at different conclusions even when working on the same country. These conflicting results on ELG are

confusing to the policy makers of Indonesia such as the ministry of finance, the ministry of trade, the ministry of agriculture, and the ministry of industry. The ministry of finance and the ministry of trade were in favor of export promotion, while the ministry of agriculture and the ministry of industry were in favor of import substitution.

Should policy makers promote exports? If they follow the results of the work of Liwan and Lau, then Indonesia should promote exports as a policy to achieve growth. If they follow the results of the work of Pramadhani et.al, then Indonesia should not promote exports as a policy to attain growth. What should they do? There is no reliable answer, because different studies show contrasting results.

This study is designed to analyze the issue and it is expected to contribute in three ways. First is to re-evaluate the available ELG literatures and vindicate that the results may not be unique. It will focus on researchs on the export-economic growth relationship rather than those explaining growth per se. It will take Indonesia as a case study.

The second contribution is to look at the history of export and growth in Indonesia and find the real world issues in a qualitative way to assess what happened first and what happened next. This qualitative and historical study is needed to isolate the exogenous events, which form the basis for isolation of causal factors.

The third contribution is to use a chain based bivariate model instead of a single model to formulate economic policy. In the bivariate model, even when the

causality is established, it may not be enough to formulate appropriate economic policy that the researcher wants to arrive at. The bivariate chain-based model can be described as follows:

Policy instrument versus exports;

Exports versus intermediate variables;

Intermediate variables versus growth.

And Policy instrument versus growth;

Growth versus intermediate variables;

Intermediate variables versus Exports.

In the earlier published works, the researchers directly linked the exports and growth using a bivariate or multivariate model and then recommended policies based on the results of causality. In fact, even when the causality is established, it may not be sufficient information to formulate appropriate economic policy. This is the deficiency in the existing literature which the present study wants to resolve.

This kind of deficiency raises questions about the sequence or chains of mechanisms by which exports may cause growth or growth may cause exports. Therefore, we should see the links between exports and economic growth, and test the relationship of the two variables via the intermediate variable. This needs a chain of bivariate models instead of a single bivariate model. By using the interlinking chain, the results might be different from the statement of those of

Liwan and Lau (2007), Pramadhani et.al (2007) or Giles and William (2000) regarding noncausality.

If the intermediate variable is investment in a country and the causality runs from exports to investment and from investment to growth because the export will relaxe a BOP constraint in demand and then all other forms of demand (consumption, investment and goverment expenditure) arise, in turn increase GDP, then we can conclude that the causality runs from export to growth. This would mean, the ELG hypothesis is valid. There is causal relationship.

Furthermore, comparison of results arrived at by other authors could also be analyzed. This can be approached by encompassing the model to test both the hypothesis (pro and cons ELG) that have been tested by previous authors. The idea of encompassing is that we are able to explain econometric results obtained by other authors, both right ones and wrong ones. The flowchart of this study can be seen in Figure 1 and Figure 2.

1.2. Motivation

The motivation of this study is to explore the reasons for ambiguity in the inference from ELG Hypothesis. This study is motivated by the fact that if different people suggest different policies based on the ELG Hypothesis then there will be confusion about the best course of action.

The prime motivation is to contribute to the Indonesian economy by resolving the conflict of policy occurring in trade since the 1997 crisis and to pinpoint the appropriate policy for Indonesia, especially a decade after crisis.

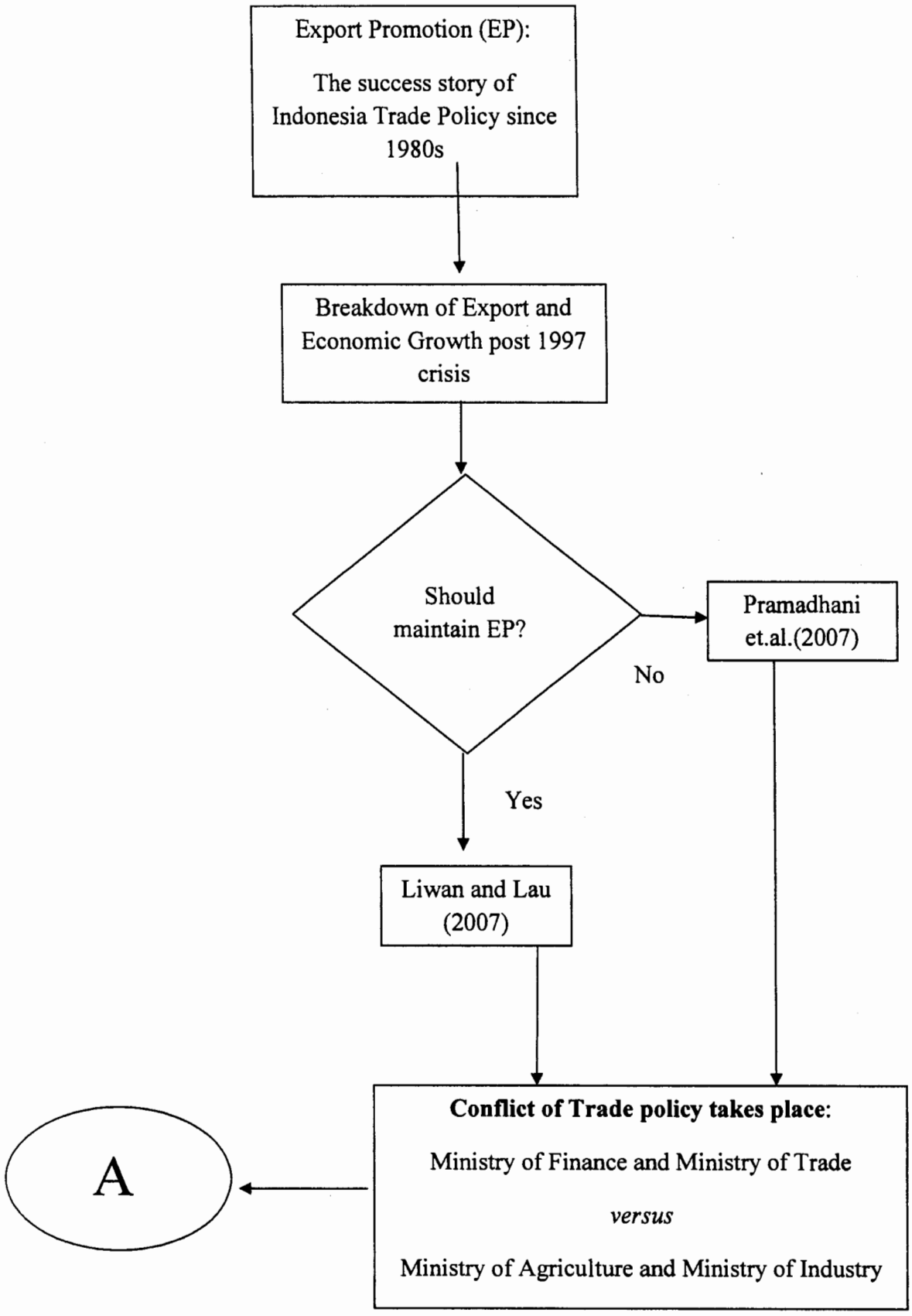

FIGURE 1. Research Framework

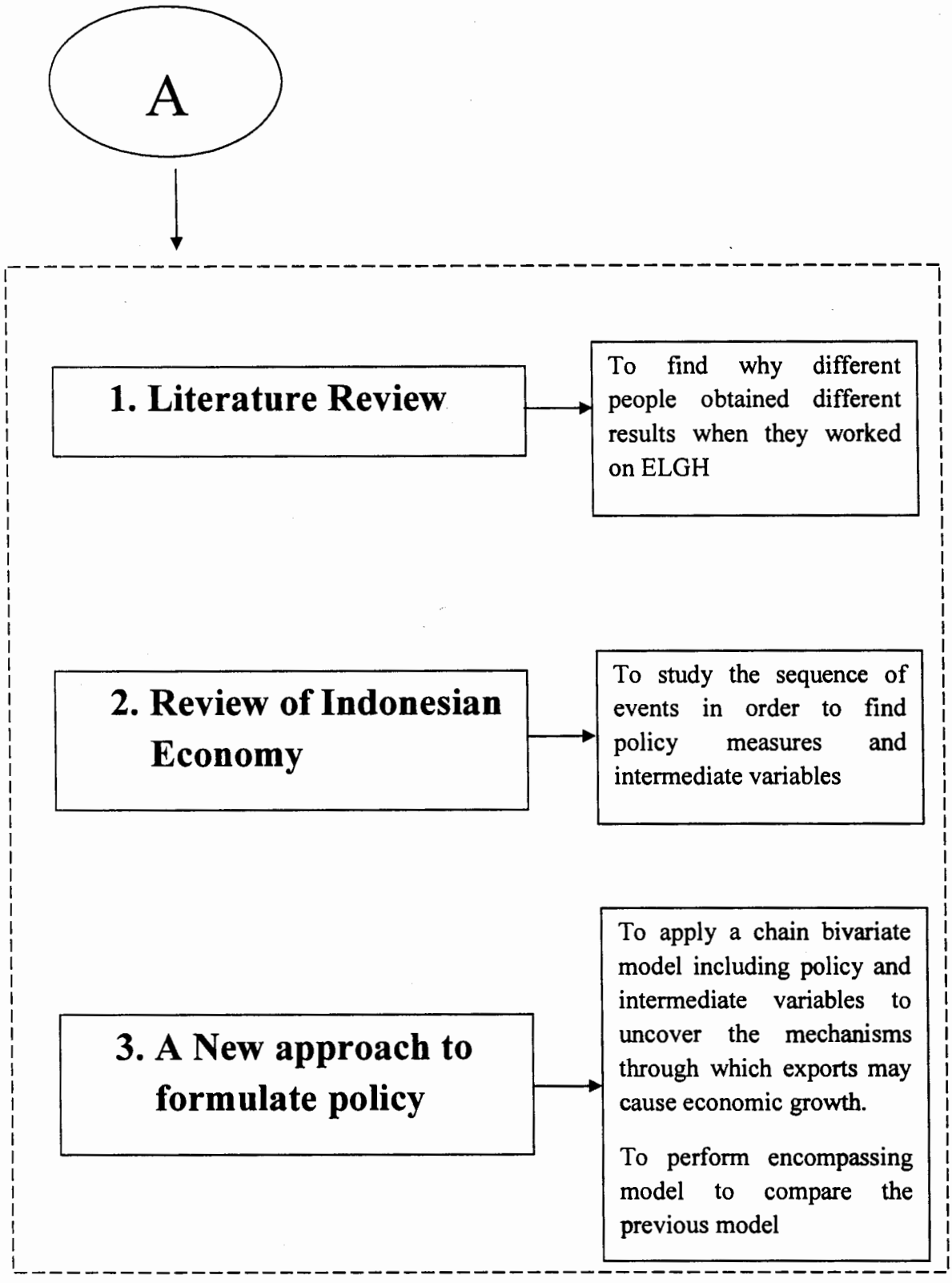

FIGURE 2. Research Framework (continued)

1.3. Significance of this Study

The study:

1. Explains why different people arrived at different results while assessing the ELG Hypothesis.
2. Describes important history of export and growth in Indonesia.
3. Benefits policy makers for dealing with the export led growth issue.
4. Builds a new approach to formulate economics policy for Indonesia.
5. Uses encompassing model to explain previous ELG models for Indonesia.
6. Recommends the appropriate trade policy for Indonesia.

1.4. Objectives

Main objectives of this study are following. Firstly to understand why the ELGH produced contradictory results for Indonesia in the past and secondly to find a solution for the ELGH problem from crisis onward. In turn, this will help the government of Indonesia to adopt an appropriate trade policy post 1997 financial crisis.

1.5. Research Hypothesis

The testable hypothesis of this study is that exports leads to economic growth in Indonesia.

1.6. Limitations

Following limitations apply to this study:

1. Only selected papers will be investigated in this study, in particular, analysis is implemented on the papers which relate export and growth rather than explaining growth per se.
2. Only Indonesian economy will be studied comprehensively, using quantitative and qualitative methods. Therefore, the result may not be generalized for other developing countries.

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CHAPTER 2

ECONOMIC HISTORY OF INDONESIA

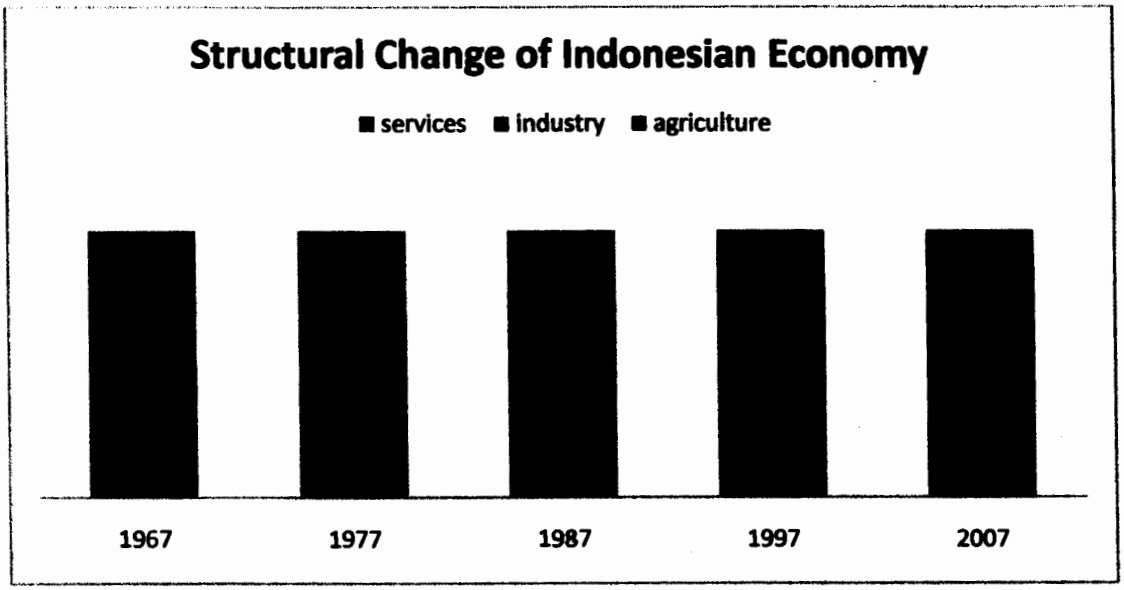
2.1. Indonesia Growth's Miracle

After the independence, Soekarno became the first president of Indonesia. His main focus was on the political development of the country. He was famous for his slogan 'Guided Democracy and Guided Economy'. He nationalized the remains of the extensive Dutch economic interests in 1958. He also threw away an inordinate amount of government resources in a clash with Malaysia. The cost of the decision made by the President was very expensive. In the mid 1960s, inflation rose up to 600 percent, the highest ever since the year of independence.

In 1968, Soeharto was sworn in as president. He built up the Indonesian economy succesfully. With the concept of industrialization, a swift change occured in the structure of the economy (Figure 3).

The share of agriculture fell from 51.41 percent in 1967 to 29.58 percent by 1977 and further declined to 23.33 percent by 1987, 16.09 percent by 1997 and 13.70 percent by 2007. This means the share of agriculture declined by almost 37 percent in 40 years. During the same period, the share of industry went up from 12.73 percent in 1967 to 34.25 percent by 1977 and further rose up to 36.26 percent by 1987, 44.33 percent by 1997 and 46.80 percent by 2007. In contrast to the reduction in the share of the agriculture sector, the industry share increased by over 30 percent. This means

Indonesia was becoming an industrialist country. In fact, this transformation was part of the national plan as stated in 'Garis-Garis Besar Haluan Negara' (Broad Guidelines on Government Policies), issued by the MPR (Highest Constitutional Body) in 1978.

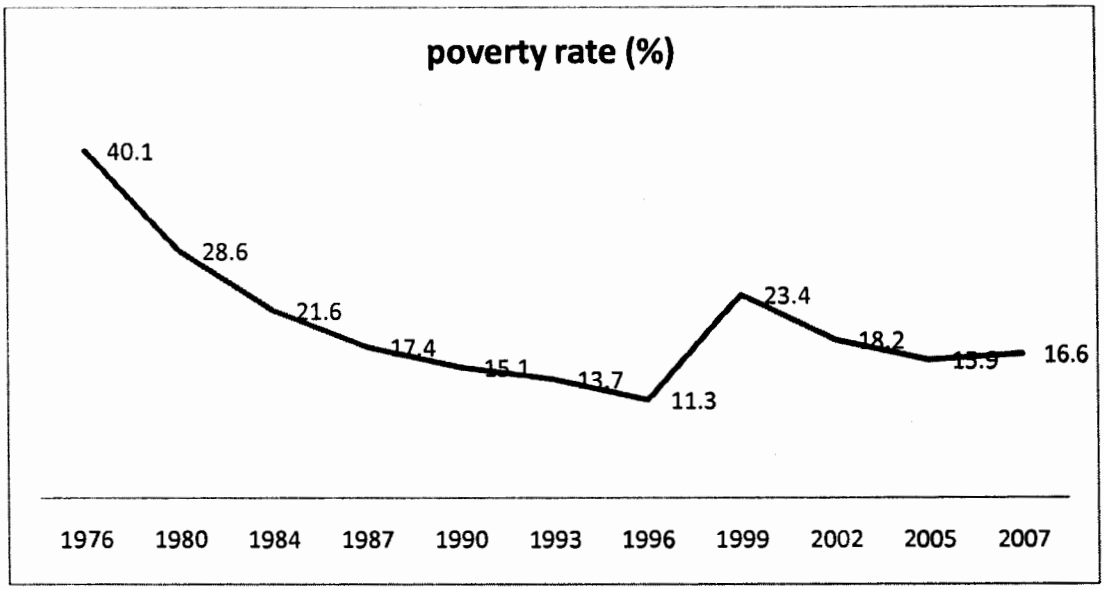


Source : World Development Indicator 2007, and BPS 2011

Figure 3. The Structural Change of Indonesian Economy from 1967 to 2007

The population below the poverty line decreased from 40.1 percent in 1976 to 16.6 percent in 2007. This means poverty alleviation was successful in Indonesia. The ration of poor people gradually decreased to 28.6 percent by 1980, subsequently to 21.6 percent by 1984, 17.4 percent by 1987, 15.1 percent by 1990, 13.7 percent by 1993, and 11.3 percent by 1996. Crisis in 1997 rose the poverty rate to 23.4 percent by 1999. After that, it gradually decreased to 18.2 percent by 2002, 15.9 percent by 2005 and 16.6 percent by 2007. The reduction of poverty can be seen from Figure 4. When celebrating the fiftieth anniversary of Indonesian independence in 1995, President Soeharto proudly said that Indonesia had achieved a tremendous success in

combating poverty. In just 20 years (1976-1995), Indonesia had reduced the poverty rate by more than 70 percent.



Source : BPS Indonesia

Figure 4. Indonesia Poverty Rate 1976-2007

Indonesia's social development was extraordinary (Table 1). The windfall of booming oil revenues in the 1970s led to increase the government expenditures on health and education. By increasing the education budget, adult literacy increased from 57 percent in 1970 to 87 percent by 2000 and up to 92.1 percent by 2007. With a soaring health budget, life expectancy rose from 47.9 years in 1970 to 66 years by 2000 and 67.7 years by 2007. The success of family planning brought a significant decrease in population growth from 2.1 percent in 1970 to 1.4 percent by 2000 and 1.2 percent by 2007. Because of this successful program, Pakistan invited the Indonesian officials in 2006 to explain the success story of family planning program.

Under President Soeharto, Indonesia produced a remarkable three decades of rapid growth. Indonesia GDP experienced an average of 7 percent growth per year

(1967-1997) the same figures as achieved by Malaysia during 1970-1998. Over about 30 years, Indonesia could succesfully reduce the poverty rate by almost 50 percent from over 60 percent population below property line in 1965 to 11 percent by 1996[1]. This means Indonesia succeeded in lessening poverty rate by around 80 percent in 30 years. With this performance, in 1993 IMF and the World Bank labelled Indonesia as one of the South East Asian Tigers.

Table 1. Indonesia Social Indicator 1970-2007

No	Social Indicator	Year				
		1970	1980	1990	1997	2007
1	Adult Literacy	57	70	80	87	92.1
2	Primary School enrollment[2]	80	107	112	113	116
3	Secondary School enrollment	16.1	29.1	44	72.7	71.5
4	Life Expectancy	47.9	54.8	61.7	66	67.7
5	Infant Mortality (per 000 births)	118	90	60	41	40.3
6	Population growth rate	2.1	2.0	1.8	1.4	1.2

Source : World Development Indicator (2007) and World Bank (2010) and BPS

2.2. Indonesian GDP

The real GDP Growth of Indonesia can be seen from Figure 5. The annual growth of Indonesian GDP fluctuated around 7 percent in the 30 years (from 1967 to

[1]Bureau of Statistics Indonesia methodology, not World Bank Methodology. According to Bureau of Statistics Indonesia, poverty line is 210,000,- rupiahs per month per person. But World Bank says the poverty line is US $ 2,- per day which is equal to US $ 60 (equivalent to 540,000,- rupiahs) per month per person.

[2]Based on **Gross Enrollment Rate (GER). GER** is defined as the ratio of total enrollment to total population of the age group.

1996). When crisis occurred, the GDP growth plunged from 4.71 percent by 1996-97 to -13.14 percent in 1997-98. Next year, it came to 0.80 percent and by 1999-00 the GDP growth reached 4.92 percent.

There are five periods in which the Indonesian economy experienced significant events. First is the stabilization and reconstruction era, second, the oil boom years which made oil-export drive growth, third, structural and financial sector reforms, fourth, rising vulnerability, fifth, the Asian financial crisis and finally, the post 1997 Asian financial crisis.

2.2.1. Economic stabilization plan

An economic stabilization plan was launched in October 1966. Some stated policies were minimizing fiscal deficit, devaluation, duality of the exchange rate, credit limits, import licensing system partially dismantled, 'export bonus' scheme liberalized and rescheduling of the Paris Club Debt. The Paris Club Debt settlement in 1966 gave temporary relief of $ 3.1 billion external debt fully convertible into local currency held at fixed exchange rate. Paris Club agreement rescheduled the $ 3 billion Soekarno era debt to 30 years in June 1970. We can say that President Soeharto used external debt policy in stabilizing the Indonesian economy.

Ten percent devaluation of rupiah was taken and pegged to the US $ in August 1970. This kind of devaluation took place many times in the next 20 years, such as devaluation of the Rupiah by 50 percent against the US $ in November 1978, by 38.5 percent in March 1983, and by 45 percent in September 1986.

President Soeharto invited the international community to help the Indonesian economy. In September 1966, there was a first major meeting with non-communist creditors in Tokyo. Three month later, a meeting was held with creditors in Paris. In

February 1967, the first official meeting of the IGGI was held in The Hague and in September 17, a multilateral conference was held in Tokyo on Indonesia's debt.

Indonesia started to liberalize foreign exchange in July 1967 as the implementation of foreign investment law legalized in January 1967. In the same year, banking law reform was passed. In June 1968, domestic investment laws were launched. In November 1968, an investment credit program was initiated, and five years later, the Investment Coordinating Board was established.

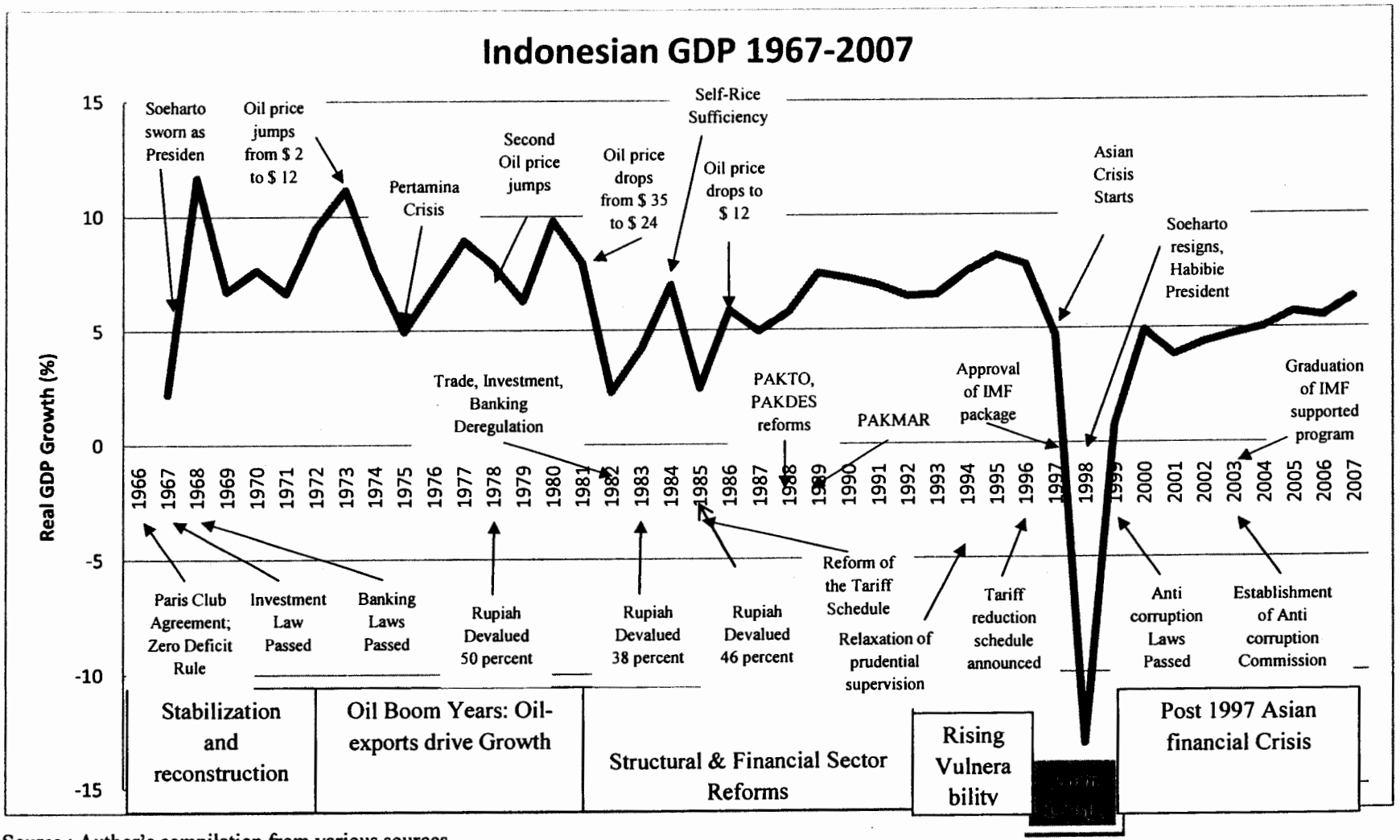
Regarding export and import, President Soeharto introduced a major trade policy package in April 1970. The package comprised devaluation, elimination of most multiple exchange rates (exchange rate unified), simplification of export and import procedures, elimination of international capital control, and introduction of import bans on the automotive industry. In April 1971, an import ban on automobiles was imposed for Java and Sumatra. In December, import duties on 459 items were reduced.

2.2.2. Oil Boom Years

In August 1973, international petroleum prices began to rise steeply. The price jumped from $ 2 to $ 12 per barrel in the next six months. As a result, Indonesia's net oil revenues jumped from US $ 0.4 billion in 1973 to $ 2.6 billion in 1975 (World Bank, 1979).

The windfall in oil revenues caused a surplus of current account and increased budgetary revenues. In four years (1973-1977) the government consumption raised at rates of 9.8 percents and private consumption grew at rates of 7 percents. The Consumer Price Index (CPI) inflation averaged 24 percents.

Figure 5. Indonesia GDP 1967-2007



Source : Author's compilation from various sources

In February 1975, the Pertamina[3] crisis started. Pertamina was unable to repay or refinance its short term debt. This crisis occurred because Pertamina made a $10 billion foreign debt to build some projetcs between 1973 and 1975. Bank Indonesia was compelled to pay the Pertamina's debts in March 1975.

The oil prices experienced for a second jumping due to the chaos in Iran in 1978 and resulted huge increase in net oil revenues that reached to $ 4.4 billion. The revenues from oil increased 11 folds in only 5 years. This money was spent in improving the education and health sectors (Prawiro, 1998).

2.2.3. Structural and Financial Sector Reforms

In the 1980's Indonesia attempted to solve problem caused by rapid decline in oil revenues. The policy of macroeconomic balance was reinstated. The policy was a combination of fiscal and external policies. This combination comprised cut backs on public expenditures for large projects, introduction of a major tax reform to increase non-oil tax revenues, a national income tax and reform in property tax collection.

The role of exchange rate was important in the adjustment process. The Government instigated a large depreciation in March 1983 and in September 1985. The 38.5 percent depreciation in March 1983 generated limited inflationary impact. This was because of the fiscal retrenchment measures realized at the same time. The 45 percent depreciation in September 1985 also gave limited impact because of the "Sumarlin Shock[4]".

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[3] Pertamina is the abbreviation of 'Perusahaan Tambang dan Minyak Bumi' (Oil and Mining Company) which is one of some state owned companies.

[4] *Sumarlin Shock* is a policy adopted for a sharp monetary tightening by shifting deposits of the state owned enterprises to the central bank, and at the same time requiring banks to buy back their money market notes (so-called SPBUs) from the central bank.

In June 1983, the first banking deregulation package was released. This comprised a new credit ceiling for all banks, the abolition of deposit interest rate controls on state banks, and the gradual termination of Bank Indonesia's liquidity credit. As a result, interest rates on deposits and loans increased, and banks had more sovereignty to mobilize deposits in support of new lending (Bank Indonesia, 2002).

The PAKTO (October Package) reforms were launched in October 1988. This was the second major package of bank deregulations. The goal of these reforms was to improve financial sector efficiency by supporting competition and increase the accessibility of long-term finance by endorsing the growth of a capital market. The PAKTO entailed:

a) An easing of restrictions on the opening of new private banks, bank offices, and Non-Bank Financial Institutions (NBFIs).
b) Enabled state-owned enterprises to place up to 50 percent of their total deposits with private banks and NBFIs.
c) A reduction in the required reserve ratios from rates that averaged 11 percent to a uniform level of 2 percent of all third-party liabilities (Cole and Betty, 1996).

PAKTO was followed by PAKDES (December Package) and PAKMAR (March Package 1988). The three packages aimed for more rapid capital market development. As a consequence, domestic credit rose from 3.9 trillion rupiah in 1988 to 9.3 trillion in 1990. M2 increased from a rate of 13 percent in 1988 to 26 percent in 1990. The number of banks doubled from 111 in 1988 to 240 in 1994.

2.2.4. Rising Vulnerability

Obviously, when the new system came, it required new regulatory supervision. Unfortunately, this did not occur when the banking liberalization measures were launched. Three scandals in the early 1990's illustrated this point (World Bank, 2004):

a) In August 1990, because of foreign exchange speculation, bank Duta beared extensive losses.

b) In 1991, after it had quadrupled its lending post the PAKTO reforms, mainly in real estate, Bank Summa ran into trouble.

c) Finally, in 1993, bank Bapindo had extended a loan of $ 420 million to the Golden Key Company, for building chemical manufacturing plants. The loan far exceeded the loan concentration limits set by the central bank, but supervisors had not noticed.

An interesting case was at Bank Central Asia (BCA). The bank was owned by the Salim group. The bank was financing a cement plant owned by the group with a loan that exceeded insider lending limits. When the director of supervision objected, he was fired.

2.2.5. The 1997 Crisis

Later on financial crisis occurred. At least three factors caused this crisis: (1) external debt and capital mobility, (2) poor macroeconomic management and (3) corruption. This crisis was triggered by the devaluation of the Thai Baht on July 2, 1997. At that time, the Baht was over valued to the US dollar. Hence, Thailand

exports were stagnant and the number of tourists visiting Thailand declined. Because of this, Thailand devaluated the Baht. As a result of the devaluation, goods and services in Thailand became cheaper compared to its neighboring countries. Tourists preferred to go to Thailand instead of the other countries. This caused decline of foreign exchange in other countries including Indonesia because their exports lost in competition to Thailand's export. This devaluation was then followed by the devaluation in neighboring countries, such as the Philippines in July, 11, 1997. Any country which was late to respond to the Bath devaluation experienced so called 'capital flight'. Indonesia was hit by capital flight because of its floating foreign exchange system. This system took time to proceed. As a result, Indonesia was lacking of foreign exchange but at the same time, the need of foreign exchange was so much extreme because many private companies had many foreign currency based loans due for repayment in 1997. The value of the Rupiah was drastically worse off. Unfortunately, the foreign exchange from exports did not return back to Indonesia but were parked at Singapore, Hongkong, etc. As a result, there was scarcity of foreign exchange. This was the chain of events causing the monetary crisis in Indonesia.

The monetary authority intervened in the market many times. It released foreign exchange reserves to push the value of US dollar down. But every decline in the value of the US dollar was attacked by speculators. In this crisis, the value of Rupiah fell drastically because Indonesia's foreign exchange continued to go abroad.

Prior to the 1997 financial crisis, the country had handled some crisis well. Three significant well resolved crises are: The economic crisis of the mid 1960's, the 1975 Pertamina[5] crisis, and the economic crises in the early 1980's.

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[5] Pertamina was unable to repay or refinance its short term debt. Total debt was over US $ 10 billion.

In the early 1990's some changes happened. The economy became more open and complex. The nature of the Soeharto regime was increasingly more corrupt. The World Bank (2004) reported that the 1980's reforms had led firms borrowing large scale from abroad making the currency vulnarable to be attacked by speculators. The reforms shifted the economy from a public sector–led economy to a private sector–led economy. Through openness (privatization) the crisis became much harder to be managed by the government.

In September 1997, a policy statement about fiscal restraint, stabilization measures, deregulation, and the closure of insolvent banks was released. President announced the postponement of 81 mega projects. At the same time, in Hongkong, IMF and World Bank thrashed out feasible preventive programs. One month later, IMF team came to Jakarta and a First letter of intent (LOI) was signed. One week later, 16 banks were closed due to approval of the IMF package.

In January 1998, President Soeharto signed a second IMF supported program. The program announced bank restructuring measures and established the Indonesia Bank Restructuring Agency (IBRA). Three months later IBRA closed 6 banks and took over 7 banks. On April 6, a third Letter Of Intent (LOI) was signed and one component of the LOI was the gradual elimination of fuel subsidies. The President decided to increase fuel prices by 70 percent on May 6, and as a consequence, the next day a bus fare increase of 67 percent was put into practice. The very significant change in fuel prices triggered extensive protest. Four students were killed in a demonstration at Trisakti University. This triggered aggressive uprising in Jakarta, during which hundreds died. In an unprecedented move, parliament chairman Harmoko demanded the resignation of President Soeharto. And on May 21 Soeharto

stepped down, leading to Habibie becoming president. What had begun as a financial crisis had turned into an economic, social and political crises.

2.6. Post Crisis

After the crisis, Indonesia realized that important institutions had been lacking for many years. It started to rebuild these institutions in 1998. One action for improvement was the implementation of a radical decentralization program. The second action was establishing an independent central bank and judiciary as well as creating an Anticorruption commission called the 'Komisi Pemberantasan Korupsi (KPK)'. Through such actions, there is hope that Indonesia will be better in future.

In late 2005 Indonesia faced a 'mini-crisis' due to international oil prices rises and imports. The currency reached Rp 12,000/USD1 before stabilizing. The government was forced to cut its massive fuel subsidies, which were planned to cost $14 billion for 2005, in October. This led to a more than doubling in the price of consumer fuels, resulting in double-digit inflation. The situation had stabilized, but the economy continued to struggle with inflation at 17% in 2005.

For 2006, Indonesia's economic outlook was more positive. Economic growth accelerated to 5.1% in 2004 and reached 5.6% in 2005. Real per capita income has reached fiscal year 1996/1997 levels. Growth was driven primarily by domestic consumption, which accounts for roughly three-fourths of Indonesia's gross domestic product. The Jakarta Stock Exchange was the best performing market in Asia in 2004 up by 42%. Problems that continue to put a drag on growth include low foreign investment levels, bureaucratic red tape, and very widespread corruption which causes

51.43 trillion Rupiah or 5.6573 billion US Dollar or approximately 1.4% of GDP to be lost on a yearly basis. However, there is very strong optimism with the conclusion of peaceful elections during the year 2004 and the election of the reformist president Susilo Bambang Yudhoyono.

According to Indonesian Statistics Bureau 2008, the unemployment rate in February 2007 was 9.75%. Despite a slowing global economy, Indonesia's economic growth accelerated to a ten-year high of 6.3% in 2007. This growth rate was sufficient to reduce poverty from 17.8% to 16.6% based on the Government's poverty line and reversed the recent trend towards jobless growth, with unemployment falling to 8.46% in February 2008 (BPS, Statistics Indonesia, 2009). Unlike many of its more export-dependent neighbors, it has managed to skirt the recession, helped by strong domestic demand (which makes up about two-thirds of the economy) and a government fiscal stimulus package of about 1.4% of GDP, announced earlier 2009. After India and China, Indonesia is currently the third fastest growing economy in the Group of Twenty (G20) industrialized and developing economies (IMF, 2009).

2.3. Indonesia's Trade Policies

Trade policy in Indonesia has always alternated between protectionism and openess, depending on the condition of natural resources and the global environment. For 20 years after independence, Indonesia applied an import substitution policy. This policy was loaded with state intervention. The country had very rigid restrictions. Errors also occured in managing the economy. The combination of restrictions on trade and mistakes in economic management had devastating consequences on

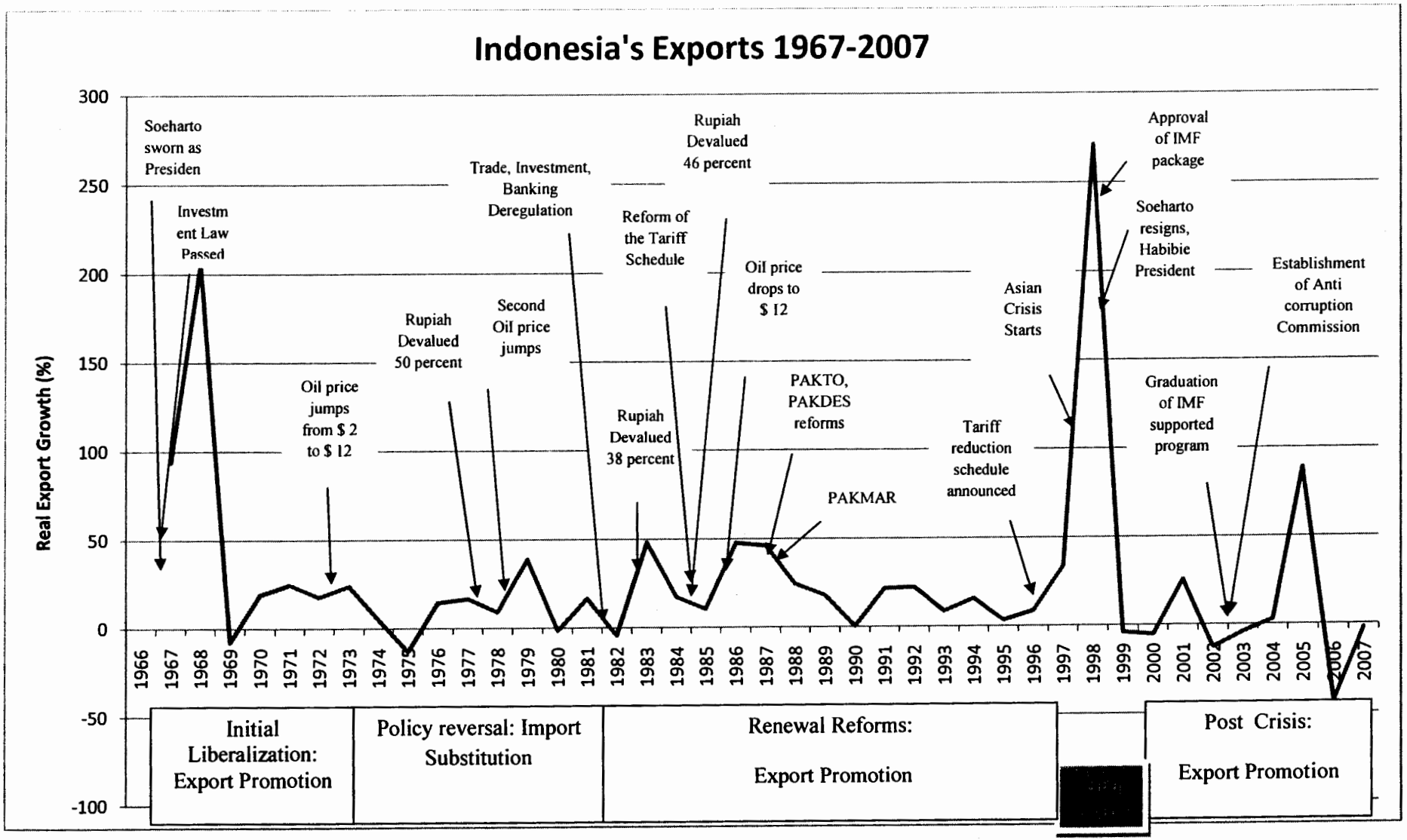
economic growth and prosperity. Estimated income per capita dropped by 15 percent between 1958 and 1965, and inflation reached 1000 percent, an enormous figure, in 1965 (World Bank, 1993).

2.3.1. Initial Liberization to Export Promotion

The communist rebellion spurred during 1965 brought major changes in Indonesia's political economic order. In 1966 the leadership of the country moved from President Soekarno to President Soeharto. Under President Soeharto, the government tried to stabilize the economy by devaluing rupiahs and making fundamental changes in the investment sector. Regulations on the movement of capital between countries were relaxed and global trade was facilitated, although the official tariffs were still relatively high (Kokko, 2002).

President Soeharto entrusted the management of economic development to 'the Berkley Mafia', a group of economists that had been educated in America and then returned to Indonesia. Macroeconomic policies which they set could show fairly good results. This was characterized by economic growth of about 50 percent between 1967 and 1972. Exports also grew rapidly, in the range of 25 percent during this period.

There were at least two things that encouraged change in the domestic economy, i.e. foreign financial backing and political support. All of these are important especially after the communist insurgency had been succesfully overpowered. Those supports included foreign direct investment which focused on oil and gas and later on diversified into several different manufacturing sectors. In 1971 import duties on 459 items were reduced.



Source : Author's compilation from various sources

Figure 6. Indonesia's Export 1967-2007

The rise in oil prices and other primary commodity prices in the 70's became a stimulus for economic growth in Indonesia. This increased state revenues from oil exports. Consequently, the government played an active role economically. Several major projects were established. At the end of the 70s, a lot of progress was made in reducing the number of poor people and improving health, education, and the social conditions of society (Hill, 1996).

Money earned from oil was used to finance important investments in infrastructure and heavy industry. This led to economic growth averaging 7.5 percent between 1973 and 1981. On the other hand, the increase of oil revenues was problematic due to the inefficiency of investment. Another problem was investment restrictions placed upon certain business groups by the government. The appreciation of the rupiah also occured due to huge oil exports which lowered the competitiveness of non-oil exports (Kokko, 2002).

2.3.2. Policy Reversal to Import Substitution

The oil boom began in 1973. Parallel to that, the import substitution policy was applied. Indonesia started giving permission for foreigners to invest freely in the country in 1970. This followed after the legislation of foreign investment law in 1967. Hence, many foreign investments came into the country through the field of synthetic fiber industry. At the same time, Indonesia imposed a high import tariff policy and banned import of goods for certain sectors.

Then, the government began gradually reducing foreign investment and foreign trade in general because of some party's insistence. They demanded the government to protect the domestic industry. The government began to be

selective in accepting foreign investment. Therefore, some sectors were set to be protected from infiltration by foreign investment.

Indonesia then became very rich due to the oil boom. The government began to protect the economy through tariff and non tariff barriers and finally tighten the entry of foreign investment. This policy was in contrast to the previous one, where Indonesia relied heavily on foreign assistance to obtain funds for economic development.

A year later, in 1974, the government became even more restrictive in accepting foreign investment. This was triggered by an anti-foreign rebellion called "Malari". New rules were applied, i.e. intensifying barriers on foreign capital and increasing the government share to 51 percent or more within 10 years of foreign companies operating in Indonesia.

In attempting to move toward an industrialist country, the state owned companies set up new plants or increased the installed capacity of current plants, particularly in the areas of oil mining, fertilizers, cement, iron, steel and aluminium. The costs were taken from revenues generated by oil exports. The decline in crude oil price which peaked in 1982 forced the government to rethink the policy of import substitution (Ishida, 2003).

2.3.3. Renewal Reform to Export Promotion

In 1983, the devaluation of the rupiah occured. As a result, many industrial projects were delayed. However, some projects still continued. Examples of such projects were the Cilacap oil refinery, the steel mill of PT Krakatau Steel, and the aluminium mill at Asahan. Unfortunately, these strategic projects were submitted

to the group of Chinese entrepreneurs including Soedono Salim, William Soeryadjaya, The Ning King, and Prayogo Pangestu .

The implementation of export promotion began in 1983. Since that year, trade liberalization was released. This was characterized by lowering barriers to trade and investment, and devalueing the rupiah. The effect was fantastic. Non-oil and gas exports rose nearly six-fold to 35 billion US $ in 1995 from 5.9 billion US $ in 1985. The proportion of manufacturing exports to non oil exports rose to 60 percent from 10 percent. The avarege of economic growth was 8 percent .

Although Indonesia'a economy was relatively better in this period, but some problems rose before the Asian crisis occured. The problems comprised of a very large dependence on the government in industrialization and special facilities granted to certain people in the circles of power which resulted into difficulties in liberalization and deregulation.

Growth in exports due to the market mechanism is inhibited by government intervention in some strategic industries. The building of such high technology businesses such as aircraft factories, steel mills, shipyards, weapon manufactures and electricity plants must be fully supported by the government for the prosperity of the people. According to The Ministry of Research and Technology, all of these absolutely need state participation. The projects were costly and financed by capital investment every year. The projects also had non-transparent financial statements. The projects were full of subsidies and protection. On the other hand, private companies were encouraged to borrow a lot to compete with these strategic industries. Indonesia'a emense foreign debt which reached 57 percent of

GDP and 200 percent of annual export revenue in 1997, was direct consequence of these capital projects (Kokko, 2002).

2.3.4. Remained Export Promotion Policy After 1997 Crisis

As Indonesia became ever more deeply engulfed in the economic crisis of 1997-98, the government signed a series of Letters Of Intents (LOI) with the International Monetary Fund. While most of the conditions of in these LOI's pertained to macroeconomic and financial policy, there were a number of trade related provisions. Several of the trade provisions involved the removal of special previleges granted in highly controversial circumtances to members of Soeharto Family.

Although the government formally exited the IMF program in late 2004, it also announced its intention to proceed with continuing trade liberalization, including the tariffication of most remaining Non Tariff Barriers (NTB's), and an in-principle commitment to unify tariffs and reduce them to around 5% by 2010. Thus in 2005 the government began what it called a'tariff harmonization' program with objective of adopting a uniform tariff rate.

The new tariff harmonization program specifies a tariff reduction schedule from 2005 to 2020. By 2010, 94% of all tariff lines would have rates at or below 10%. The remaining 6% of tariff lines (the so called 'sensitive factors') would have their rates reduced to 10% by 2020.

The trade regime remained broadly open after crisis needs some explanations. One of them was that, in immediate post-crisis period, The IMF LOI played a role in at least checking protectionist pressures. A second factor

was the very large depreciation of the Rupiah in 1997-1998, which provided some exchange rate protection for tradables. Related to this, economic recovery in the immediate post crisis period was crucially dependent on the growth of the export sector. A third explanation is that finance ministries are typically central to the resolution of a crisis and these now more powerful agencies are generally more likely to favour lower protection. Thus the resistance to protectionist pressure has been as much to do with personalities as institutions. Fourth, this liberalization was still a recent memory at the time of the crisis, it had built up a constituency of support and thus any unwinding of successful reforms was likely to be resisted. Fifth, notwithstanding the faltering WTO negotiations, the global trend towards liberalization at this time had strong intellectual appeal, particularly with the example of the increasingly open Asian giants, China and India. Finally, at the margin, Indonesia was a signatory to various regional trade agreement –AFTA in particular- which provided a mild barrier to increased protectionism (Bird, Hill and Cuthbertson, 2008).

2.3.5. The Growth of Indonesian Foreign Trade 1983-2007

The growth of Indonesia's exports and imports in the period of 1983-2007 is presented in Table 2. The table depicts a steady increase of Indonesian exports during 1986 to 1997 increase from US $ 14,805 million (1986) to US $ 53,443.6 million (1997). As Indonesia faced financial crisis in 1997, two years later, Indonesian exports declined by 8.6 percent and 0.4 percent respectively. Then, in 2000 Indonesia's exports showed sharp increase to US $ 62,124.0 million.

Table 2. The Growth of Indonesian Foreign Trade 1983-2007 (US million $)

Year	Non Oil and Gas		Oil and Gas		Total	
	Exports	Imports	Exports	Imports	Exports	Imports
1983	5 005.2	12 207.0	16 140.7	4 144.8	21 145.9	16 351.8
1984	5 869.7	11 185.3	16 018.1	2 696.8	21 887.8	13 882.1
1985	5 868.9	8 983.5	12 717.8	1 275.6	18 586.7	10 259.1
1986	6 528.4	9 632.0	8 276.6	1 086.4	14 805.0	10 718.4
1987	8 579.6	11 302.4	8 556.0	1 067.9	17 135.6	12 370.3
1988	11 536.9	12 339.5	7 681.6	909.0	19 218.5	13 248.5
1989	13 480.1	15 164.4	8 678.8	1 195.2	22 158.9	16 359.6
1990	14 604.2	19 916.6	11 071.1	1 920.4	25 675.3	21 837.0
1991	18 247.5	23 558.5	10 894.9	2 310.3	29 142.4	25 868.8
1992	23 296.1	25 164.6	10 670.9	2 115.0	33 967.0	27 279.6
1993	27 077.2	26 157.2	9 745.8	2 170.6	36 823.0	28 327.8
1994	30 359.8	29 616.1	9 693.6	2 367.4	40 053.4	31 983.5
1995	34 953.6	37 717.9	10 464.4	2 910.8	45 418.0	40 628.7
1996	38 093.0	39 333.0	11 721.8	3 595.5	49 814.8	42 928.5
1997	41 821.1	37 755.7	11 622.5	3 924.1	53 443.6	41 679.8
1998	40 975.5	24 683.2	7 872.1	2 653.7	48 847.6	27 336.9
1999	38 873.2	20 322.2	9 792.2	3 681.1	48 665.4	24 003.3
2000	47 757.4	27 495.3	14 366.6	6 019.5	62 124.0	33 514.8
2001	43 684.6	25 490.3	12 636.3	5 471.8	56 320.9	30 962.1
2002	45 046.1	24 763.1	12 112.7	6 525.8	57 158.8	31 288.9
2003	47 406.8	24 939.8	13 651.4	7 610.9	61 058.2	32 550.7
2004	55 939.3	34 792.5	15 645.3	11 732.0	71 584.6	46 524.5
2005	66 428.4	40 243.2	19 231.6	17 457.7	85 660.0	57 700.9
2006	79 589.1	42 102.6	21 209.5	18 962.9	100 798.6	61 065.5
2007	92 012.3	52 540.6	22 088.6	21 932.8	114 100.9	74 473.4

Source: BPS, 2009

There was a declined by 9.3 percent to US $ 56,320.9 million for total exports in 2001. In contrast, in 2007 Indonesia's exports increased significantly by 20.09 percent to US $ 114,100.9 million. The trend of Indonesia's Exports from 1983 to 2007 is presented in Figure 7.

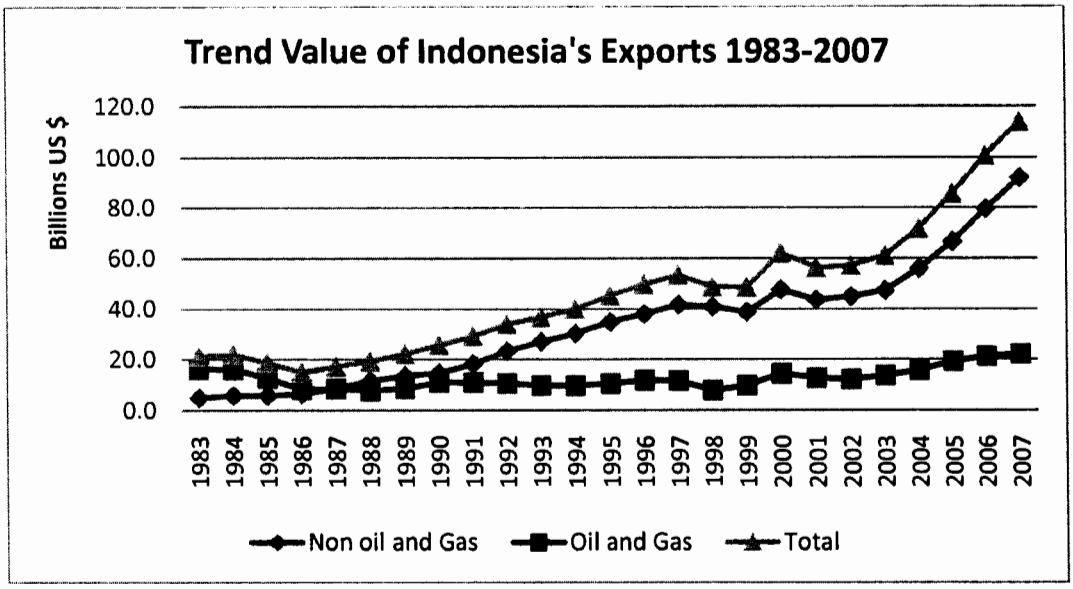


Figure 7. Trend Value of Indonesia's Exports 1983-2007 (billion US $)

Figure 7 shows that during 1983-2007, the share of non-oil and gas exports tended to creep up compared with that of oil and gas exports. The contribution of non-oil and gas exports grew up from 73.53 percent (1993) to 80.64 percent (2007). In contrast, the share of oil and gas exports went down from year to year, where its share dropped from 26.47 percent (1983) to 19.40 percent in 2007. This indicated that the composition of Indonesia's exports was shifted to non-oil and gas commodities.

Similar to exports, Indonesia's imports also increased from US $ 10,259.1 millon (1985) to US $ 41,679.8 million (1997). As Indonesia faced financial

crisis in 1997, two years later, Indonesian imports declined by 34.4 percent and 12.19 percent respectively. Then, in 2000 Indonesia's imports showed sharp increase to US $ 33,514.8 million. There was a decline by 7.6 percent to US $ 30,962.1 million for total imports in 2001. In contrast, in 2007 Indonesia's imports increased significantly to US $ 74,473.4 million. The trend of Indonesia's Imports from 1983 to 2007 is presented in Figure 8.

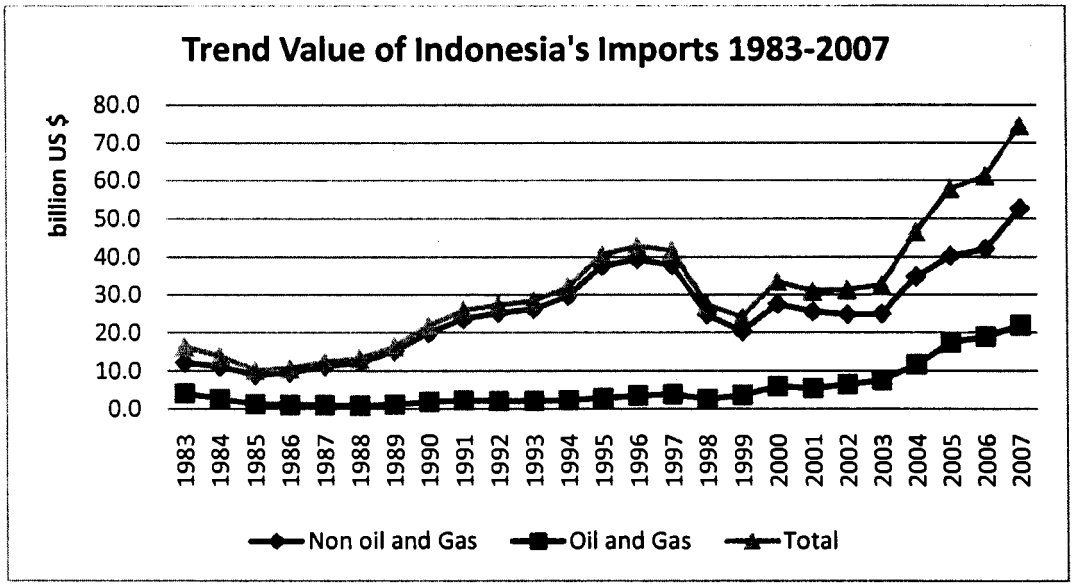


Figure 8. Trend Value of Indonesia's Imports 1983-2007 (billion US $)

Figure 8 shows that during 1983-2007, the share of non-oil and gas imports tended to decline compared with that of oil and gas imports. The contribution of non-oil and gas imports went down from 92.33 percent (1993) to 70.55 percent (2007). In contrast, the share of oil and gas imports increased from year to year. Where its share boosted from 7.66 percent (1993) to 29.45 percent in 2007. In 2008, net export of oil and gas commodities was -1,426.6 million US

$. This means that Indonesia became net importir oil and gas in 2008. Prior to that, Indonesia became net importir of oil since 2004.

The succes of international trade of Indonesia can be measured by the net exports which always positive. Figure 9 shows the net exports from 1983 to 2007.

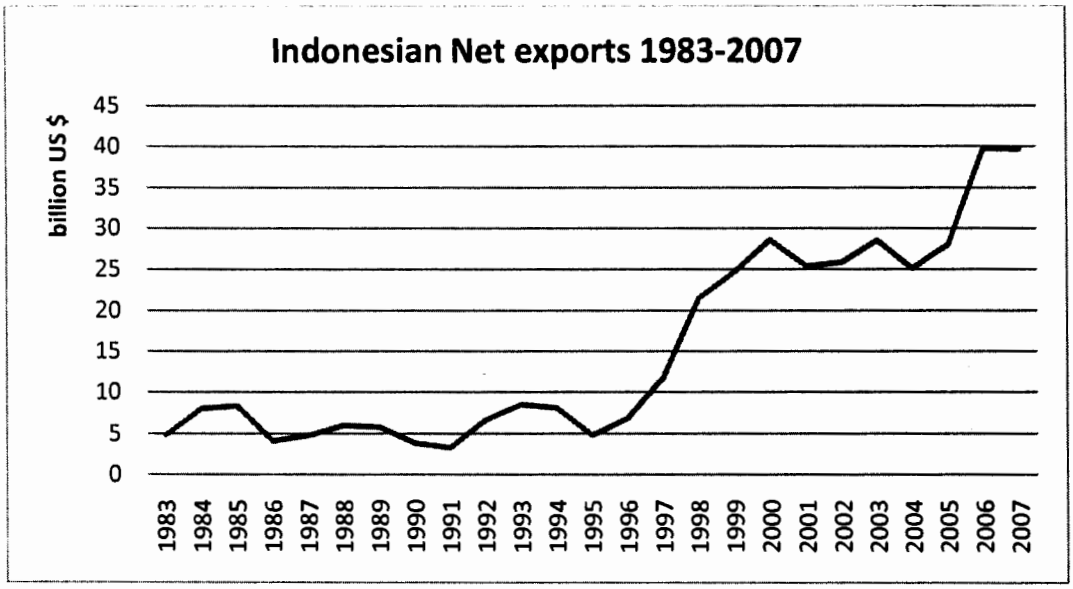


Figure 9. Indonesia's Net Exports 1983-2007 (billion US $)

2.3.6. The Main Export Partners of Indonesia

The success of International Trade of Indonesia may also be measured by the trade surplus between Indonesia and its partners. Table 3 shows the biggest trade surplus of Indonesia with four countries, 2007-2008.

Table 3 shows that in 2008, surplus trend of Indonesian exports to Japan amounted to US $ 12,615.8 million; United States amounted to US $ 5,156.8 million; India amounted to US $ 4,261.5 million, and Netherlands amounted to

US $ 3,323.7 million. As compared to 2007 figures, these figures increased significantly with the magnitude occured to Netherlands (48.02 percent), followed by India (27.81 percent). Meanwhile, the decrease occured to Japan (26.25 percent) and USA (24.47 percent).

Table 3. The Biggest Trade Surplus of Indonesia with Four Countries 2007-2008

Country	Surplus (million US $)*		Change (%)
	2007	2008	
Japan	17 106.1	12 615.8	-26.25
United States	6 827.1	5 156.8	-24.47
India	3 334.3	4 261.5	27.81
Netherlands	2 245.5	3 323.7	48.02
TOTAL	29 513.0	25 357.8	-14.08

*deducted import to bounded zone
Source: BPS, 2008

Japan was recorded as the prominent country partner in 2008, with its share was 20.25 percent that followed by USA (9.51 percent) and Singapore (9.39 percent). The contribution of Japan was decreased by 0.46 percent than that of 2007, and the share of exports to USA decreased by 0.67 percent. In contrast with Japan, Singapore's share increased from 9.20 percent to 9.39 percent (see Table 4).

Table 4. Share of Indonesian Exports by country group of Destination 2007-2008

No.	Country Group/Country	2007 (%)	2008 (%)
1	ASEAN	19.54	19.83
	• Singapore	9.20	9.39
	• Malaysia	4.47	4.69
	• Thailand	2.68	2.67
2	NAFTA	10.98	10.30
	• USA	10.18	9.51
3	United Europe	11.70	11.28
	• Germany	2.03	1.80
	• Netherland	1.27	1.13
	• United Kingdom	2.41	2.87
4	Middle East	4.01	4.19
5	Others	53.78	54.40
	TOTAL	100.00	100.00

Source: BPS (2008)

While, The balance of trades deficit between Indonesia with Singapore, Saudi Arabia, China and Thailand were shown in Table 5. If in 2007 these figures were US $ 2,428.5 million with Saudi Arabia, and US $ 1,232.8 million with Thailand, then in 2008 they became US $ 3,6130.0 million and US $ 2,673.0 million respectively.

If in 2007 Indonesia's trade with China and Singapore experienced in surplus, then in 2008 changed to deficit. The percentage changes were tremendeous, i.e. -423.06 percent and -1,448.92 percent respectively.

This situation caused the trade deficit with those four countries increases to US $ 16 924.4 million (900.29 percent increase). Indeed this decreased the national exchange reserves in the period 2007-2008. Hence, the exports should be increased gradually in the future.

Table 5. The Biggest Trade Deficit of Indonesia with four countries 2007-2008

Country	Deficit (million US $)*		Change (%)
	2007	2008	
Singapore	661.8	-8 927.4	- 1 448.92
China	1 117.6	-3.610.7	-423.06
Thailand	-1 232.8	-2 673.0	116.83
Saudi Arabia	-2 428.5	-3 613.0	48.77
TOTAL	-1 881.7	-18 824.1	900.29

*deducted import to bounded zone
Source: BPS, 2008

CHAPTER 3

THEORY FORMULATION

3.1. Growth as economy phenomena

Economic phenomenon in the economy is basically a business cycle or fluctuations. How can the fluctuations be explained? Fluctuations can be explained by the Business Cycle Theory. There are two versions of the New Classical theory, i.e., Mark I (Monetary Business Cycle) and Mark II (Real Business Cycle).

Mark I is basically the earliest version of New Classical model for the business cycle that was developed by Lucas in the form of *Misperception Theory* or the monetary surprised model. Expectations are rational, the Phillips curve is the same as the curve developed by Friedman and Phelps, and people have expectations. These three things together explain how a short run Philips curve comes into existence if the monetary expansion or inflation is unanticipated. The explanation of *'Misperception Theory'* is as follows:

Suppose inflation increases through an increase in Price. If the overall price (P) increases, the misperception theory explains that the people individually are more knowledgeable about the prices at which they sell their prices (wages) compared to the prices at which they buy their commodity. If general price level goes up, the producer of the commodity thinks that their prices (Pi) have gone up. The producer doesn't understand that general price level (P) also has gone up. This is asymmetry information. In this case, the producer thinks that it is profitable to produce more commodities. Therefore, he hire more labor and produce more output (Y). This is one of the fields of the business cycle (we are going in the boom period). If we inverse these whole arguments, we are going in a recessionary situation. Suppose inflation decreases through the decrease in general price level. The producer thinks that Pi/P also decreases. The producer retires some labor and output will be less. We will come into a recession period.

This is the theory of Lucas which is called the Misperception theory[1] to explain the economic fluctuations or business cycle. Basically two theories are prominent in the New Classical economics.

1. Overall money supply is not cooperated by economic agents
2. The change of labor (L) and output (Y) which is generated by the misperception theory are really of the magnitude which is observed in the business cycle. How much would be the change of L and Y if there are misperceptions?

These theories are criticized by:

[1] Snowdon and Vane (2002), An Encyclopedia of Macroeconomics, Edward Elgar Publishing, p. 85.

1. Okun and Tobin, 1980: The magnitude of fluctuations is not adequate enough to call it a business cycle.
2. Barro, 1993: He brought the empirical evidence to the general public that the proposition of anticipated money is neutral is not true. Neutrality in anticipated money which is correct in Lucas Theory is not robust across countries, across situations, and across periods.

Based on these two criticisms, Mc.Colm's statement about the monetary surprised model has come to be widely regarded as inevitable to industrial countries. The monetary surprised model is not applicable to explain economic fluctuations in the European world (industry countries). If that is the case, then there was a natural tendency among the New Classicists that they should find another theory of the business cycle. Since 1980, The New Classical writers have been attempting to find a substitute theory. There are six people who are counted in this group, namely: Glen, Prescott, Long, Plosser, Nelson and King.

There are two properties (logics behind) of MARK II (the Real Business Cycle):

- The reason for economic fluctuations is real rather than monetary. That's why the theory is called *Real business cycle* theory. Monetary theory which was in the Mark I was replaced by the real business cycle theory in the real sector. The logic behind the real business cycle is human behavior.
- The conventional theory (Monetarist or Keynesian) is *vis-a-vis* disequilibrium theory. Both school of thoughts (Monetarist and Keynesian) are disequilibrium theories in the sense that there was a possibility to remove disequilibrium by government intervention through

any kind of policy (Policy rule in Friedman case or Monetary and Fiscal Policy by Keynes). The reason for business fluctuation was disequilibrium in the economy rather than equilibrium. Equilibrium means that the market is clear (prices are clear in the market). There are four conditions for equilibrium: Prices are flexible, Markets are always clear, Agents make intelligent forward looking plans, and Expectations are rational.

3.1.1.Impulse Factor

Regarding growth as economy phenomenon, whenever there is a theory of business cycle, at least there is one impulse factor, i.e. monetary theory of business cycle, Aggregate Demand theory of Business Cycle, etc. The impulse in the Real Business Cycle theory is technological change or technological shock. Shock in the sense it can be either positive or negative.

If we combined the three arguments: shock, disequilibrium, and inter-temporal substitution between work and leisure, we will have the following curve:

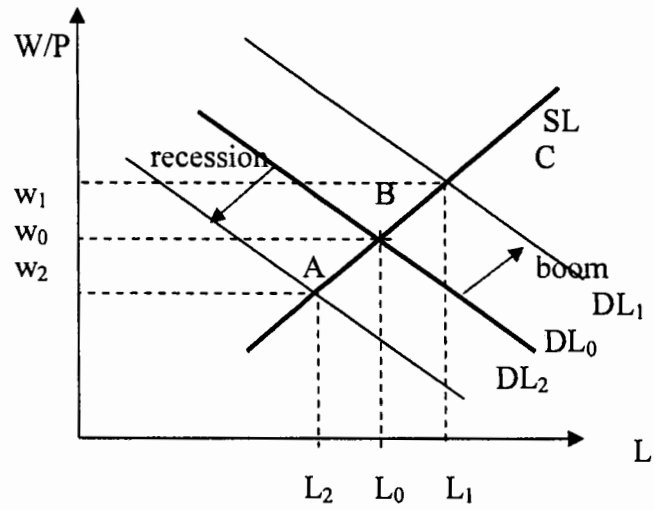


Figure. 10. Wage and employment fluctuations due to a technological shock

Demand Side (look at figure 10)

Boom = shock in a positive sense (innovation technology) leads the productivity of labor to increase which will shift the labor demand curve to the right: $DL_0 \rightarrow DL_1$, demand for labor increases and then output increases. *The demand curve shifts due to an exogenous factor (technology).*

Recession = shock in a negative sense leads the productivity of labor to decrease which will shift the demand curve to the left: $DL_0 \rightarrow DL_2$, then labor demand decreases and output also decreases.

Supply side (look at figure 10)

Boom = shock in a positive sense (an innovation in technology) increases the productivity of labor which will shift the demand curve to the right: $DL_0 \rightarrow DL_1$, the real wage rate will increase and the reaction of suppliers of labor will substitute work for leisure. It means that they will increase work. *Wage rate is a reflection of substitution between work and leisure (that's why there is no shifting in the supply curve).* Supply matches demand at point C because of the substitution between work and leisure. In the business cycle theory, you are never off from the supply curve. Point C is the point of equilibrium. The business cycle is the movement of supply curve and shift phenomena of demand curve. *It is the movement along the supply curve because there is no exogenous factor in the supply of labor.*

Recession = shocks in a negative sense lead the productivity of labor to decrease which causes the labor demand curve to shift leftward: $DL_0 \rightarrow DL_2$, then labor decreases and output also decreases. The unemployment which occurs due to reduction of employment is called voluntary unemployment. This is the first time the word VOLUNTARY unemployment is used. In all of the classical models we found involuntary unemployment. Why is it Voluntary? It is because the

real wage rate was determined by demand and supply. Who wants to work at the wage rate of 'w_2' will get job. There is no case of involuntary unemployment. 50% of the new macroeconomics are related to the issue of the business cycle theory and associated issues.

In those cases, we have a business cycle depending on the kind of shock. How does the theory work?

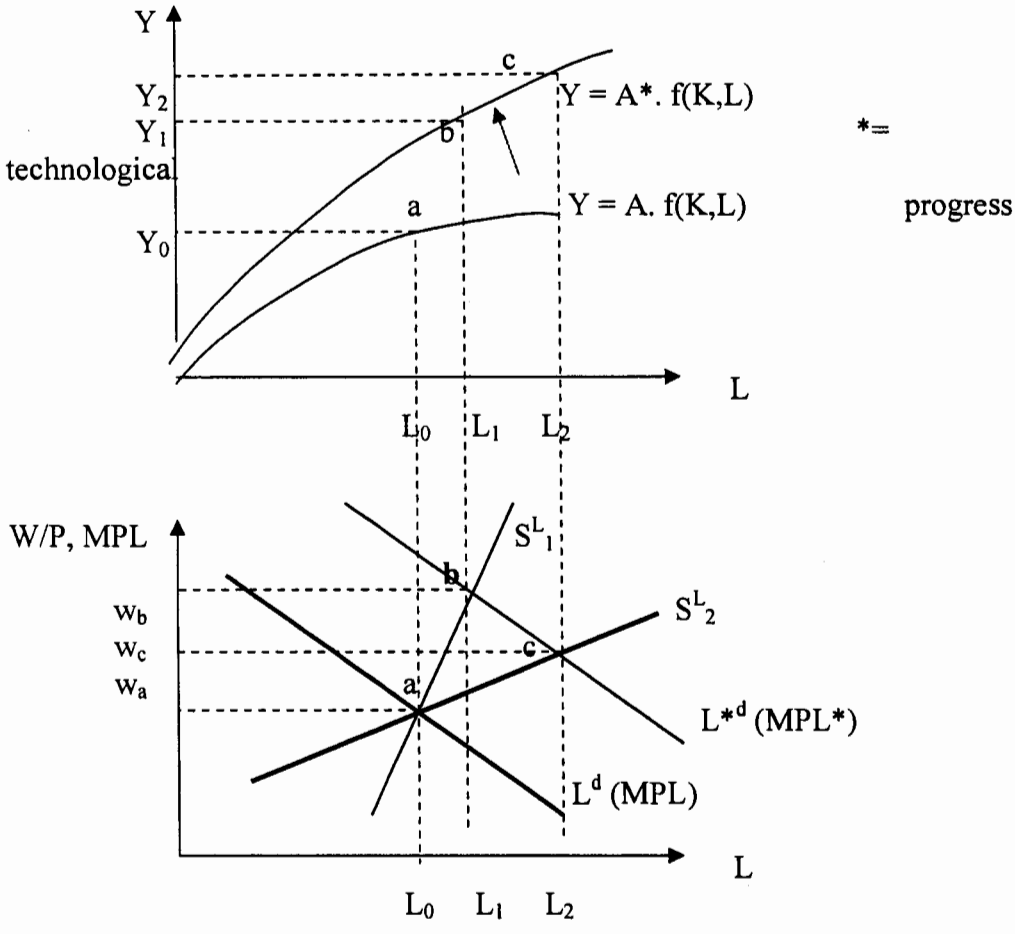


Figure 11. Output and employment fluctuations due to a technological shock

Source: Snowdon page 246

Let's draw two supply curves (one flatter than the other in figure 11). Initial equilibrium is at point 'a' L_0 and Y_0. Technological progress occurs. It shifts the demand for labor curve right from L^d to L^{*d} and a new equilibrium occurs at point 'b' at L_1 and Y_1 for $S^L{}_1$ and point 'c' at L_{12} and Y_2 for $S^L{}_2$. A big shock occurs at 'c' (flatter S^L curve) whereas a small shock occurs at 'b' (Steeper S^L curve). The business cycle needs a big shock. S^L should be flatter because the *Elasticity of L with respect to W/P must be significant* is a requirement of the Business Cycle Theory.

Because SL indicates the inter-temporal substitution of leisure, in other words, the requirement of the business cycle theory is *significant inter-temporal substitution of leisure.*

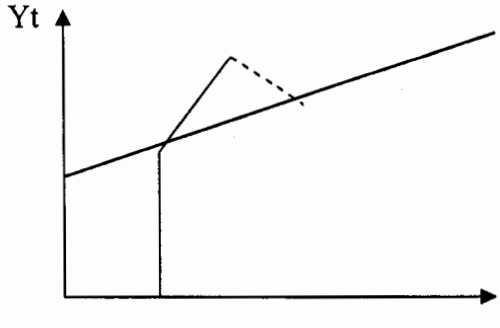
Another support to the Real Business Cycle Theory is a very elegant work by Nelson and Plosser in 1982. The finding of their work on GNP Data series in the US is a ***random walk*** variable. This is purely an econometric finding and a further extension to the real business cycle theory.

3.1.2. Conventional Analysis

Before 1982, the theory was that real GNP is a deterministic trend. It is called a conventional analysis found by Professor Solow who first developed the growth theory.

According to Solow, changes caused by shocks are temporary. There is a possibility to deviate from the trend, but the nature of the path is to return to the

trend. It is called 'deterministic' where deviation is reversible to the trend itself (reversible cyclical fluctuations). When b<1, this trend is stationary. Any fluctuations are temporary. It is in the Classical Theory.



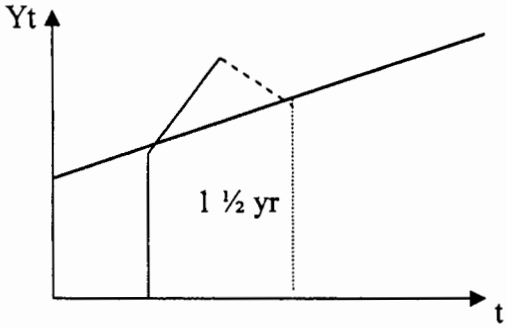
The deterministic trend

$Y_t = g_t + bY_{t-1} + z_t$

b<1, the requirement to reverse to the trend.

Figure 12. The deterministic trend of GDP

In Solow's case, let's say it took one and a half year for the deviation to go back (see Figure 13).



Econometric term for this is:

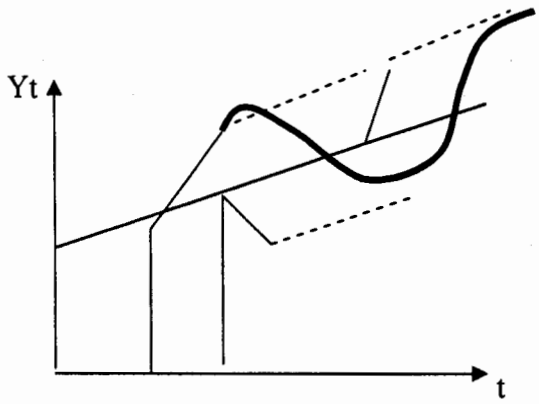
Y revolves around a deterministic trend

Figure 13. Solow Case of GDP

This means that one and a half year would be a part of the business cycle. In this case, we can distinguish the deviation (one and a half year which is short run) from trend (long run).

3.1.3. Recent Analysis

According to Nelson &Plosser (1982), the trend of GDP is stochastic trend.



The Stochastic trend, b=1

$Y_t = g_t + bY_{t-1} + z_t$

Y would revolve around a statistical process → build term: *Random Walk.*

Figure 14. The Stochastic of GDP

The deviation is not temporary (the trend). It is a part of the system. Basically, it is permanent business cycle. For the business cycle to hold, there are constraints imposed to this theory:

1. Technical changes are frequent. It is Friedman's shock (after 10, 15 years).
2. It should be random. It should not only above the trends. Some time it comes down, some time it goes up.

In the process of correction, there were number of things appeared, number of new articles and number of new proposals. We say them some development, not paradigm nor revolution.

There are two problems that we have to know on which side the correction might be going on:

1. In the past, nobody took expectation seriously. Although the word "Expectation" was there in the economics even before NCR. Therefore, people took expectation seriously.
2. What kind of link between macro relation and micro relation. Seventy percent theory is of macroeconomics but developed had no micro foundations, except Keynes Psychological Consumption Function, and Marginal Efficiency of Capital schedule of Keynes. Classical said wages are flexible, but no foundation behind it. Keynes said, I don't agree with the classical, wage is fixed. In General Theory, there is no single foundations. He says that experience tells us that wages are inflexible. Experience tells us that people go for nominal wages instead of real wages. But, all of them had no micro foundation. The link between macro relation and micro relation is very weak. We became very impudent in the NCR.

Later the new development took place. Now, Focus of research in the post NCR are:

The finding of the US GNP series as a random walk have brought revolution within the NCR to this extent that technical changes are frequent and random is true. This is real business cycle. But what is hidden about this is we cannot distinguish between deviation (short run) and trend (long run).

The real business cycle theory is deviated from the earlier theory through three things:

1) Random changes (technology will not ensure the business cycle). Technology may ensure deviation from the path.
2) Role information. There is no place of monetary misperception theory in this case.
3) Breaking down the short run and long run economy in the macro analysis is not possible. We have integrated the growth theory and business fluctuation theory. This is the new finding which is the base of NEW MACROECONOMICS.

3.1.4. New Macro Economics

Since 1972, there is no revolution, but there are many of development. Everybody thought that it is better for them to reconstruct their own economics, trying to answer the issues which have been highlighted by the New Classical Revolution (NCR). Therefore, Keynesian started corrected themselves, Monetarism started corrected themselves wherever they thought they are wrong, and Neo Classical People tried corrected them too.

1. Modeling expectation is more satisfactory. This revolution is called rational expectation of revolution (rules versus discretion; permanent income-consumption hypothesis).
2. This NCR is New Classical, explaining macro phenomena using new classical model which, while assuming Rational Expectation (RE), maintain the assumption that prices continuously adjust to equilibrate supply and demand (real business cycle theory, sector shift theory of business cycle). Now, everybody tries to copy the model of new classicals, they should adopt this technique/instrument and explain economic phenomena.
3. What happen to Keynesian, the only opponent group? They made reconstructing macro economics using New Keynesian models. They tried to reconstruct the whole model, i.e. text book model that combine IS-LM with a modern Philips Curve but are based on failure of wages and prices to adjust instantly to equilibrate supply and demand (Fixed Price and general disequilibrium; labor contracts and sticky wages; monopolistic competition and sticky prices with menu cost, or efficiency of wages model)

Since 1980s, many Islamic economists tried to build a model of Islamic Macroeconomics. They used micro foundation of it. They showed that in Keynesian Framework, by replacing the institution of interest by musharakah finance, the system is operative on variable return on capital instead of fixed pre-determined return.

3.2. International Trade Concept

International trade is trade between countries. It has become a God provision that humans need each other in meeting their needs. Likewise, a country, no matter how strong it's economy, still needs goods and services produced by other countries. There is no exception in the Islamic state and the Islamic economy. From the beginning until now, the Muslim community has always been deeply involved and active in free trade with other nations in the world, in order to meet the different intent and needs from time to time. Therefore, if we trace back through history, it is evident that since the prophet (Muhammad) preached Islam until the end of the glory days of Islam, it has always been found that international trade has colored the international activities of Muslims. Even long before the advent of Islam, international trade had become a common practice by the Quraish[2]. It was recorded in the Qur'an surah Quraish, verses 1-4.

The involvement of Muslims in international trade began from the earliest period of Islamic history. The tradition has in fact continued to experience growth and improvement during Ummayyah caliph, Abbasid and subsequent caliphs. The vast field of trade undertaken by Muslim traders had almost covered the entire continent of Europe, Russia and China. This is evidenced by the discovery of coins of Islam in European countries, Russia and China which proves that the currency of Islam had been widely used internationally as a medium of exchange.

[2] A tribe in Arab, the tribe of Prophet Muhammad (Peace Be Upon Him)

In the first chapter of his book *The Wealth of Nations*, Fifth Volume (2005), Adam Smith compared people from an underdeveloped economy with a level of economic society forward. The example of backward society characterized by subsistence hunters is the Native American community in North America, while the community chosen to exemplify advanced economies is the Arabic community, which he recognized Mohammed and his immediate successors as the community leaders. In his opinion, in the year 774 AD, King Offa who ruled in England printed gold coin which is a direct copy of the Islamic dinar with it's Arab writings. All the writing on the coin is in Arabic script, except on one side is written "OFFA REX". Interestingly, the gold coins of King Offa also included the phrase "Laa ilaa ha Illa Allah, Muhammad Rasul Allah" and also two small crosses on the bottom to symbolize King Offa's Christian religion.

The facts demonstrate that the Islamic Dinar was the strongest currency in the world at that time. In addition the Islamic economy was much more advanced than the European economy, it also shows that international trade was conducted by merchants of Islam and had reached out far into northern Europe.

3.3. International Trade Policy

In fiqh muamalah[3], we found there are at least two general principles that underlie the activity of free trade carried out by Muslims with other individuals and societies in the world. These rules uphold the ethos of work and commerce

[3] Islamic Law discussing relationships/contracts/transactions among human beings

and it has been demonstrated throughout the course of history. The first principle is the meaning contained in the hadith[4], the Prophet underlines that humans are free to make choices in order to meet their needs. This rule negates the existence of all sorts of obstacles that can be encountered by individuals and communities while attempting to meet their basic needs in the market. Barriers and distortions are obstacles to any economic agent obtaining the best choice. These constraints can be found in areas of consumption, such as the misleading information from advertising and from product promotion. These can also be found in an uncompetitive market structure such as monopolies, monopolistic competition, oligopoly, cartel, and various other forms of collusive markets.

Definitely, the impact of various barriers harms consumers because they have to spend a higher amount to realize their choice. Actually, they would be able to meet their requirements with a lower cost.

The second rule is that humans are free to perform the engagement agreement, make contracts, partnerships, joint ventures, cooperate with trade and form alliances in business. This principle ensures the widest possible freedom for Muslims to establish cooperative ties in various fields of trade and business amongst themselves and with non-Muslims. Of course, the shape of the engagement must not violate the established rules of sharia[5]. Flexibility and discretion in the second rule gave a huge boost so that Muslims could be the pioneers of international trade. Thus traces of Muslim traders can be found

[4] Sayings, deeds and endorsement of Prophet Muhammad (Peace Be Upon Him) narrated by his Companions

[5] Sharia is the corpus of Islamic law based on Divine guidance and embodies all aspects of the Islamic faith, including beliefs and practices.

almost all over the world. They used the trade routes as a medium from which to preach Islam to all corners of the world especially to the islands of Indonesia.

Although the two principles above are very idealized in the teachings of Islam, in regards a benefit for Islam, those principles still require *dhowabith* (restrictions). Hence, when the principles are implemented in the field, they not only will improve the welfare of all economic agents but also not harm the state benefit or harm the strength of Islam in general. Some studies of scholars in *fiqh muamalah* have provided a significant scientific input in the field of international trade policy. These scholars have seen the above issue. It can be found in various writings and in their intellectual heritage which is summed up in the books of fiqh in various schools.

3.3.1. Abu Ubaid's Thought

Long before the Theory of International Trade was found in the west, Islam applied the concepts of International Trade. A great scholar named Abu Ubaid bin Salam ibn Zayd ibn Miskin al-Azdi highlighted the practice of international trade, particularly imports and exports in his book, *Al Amwaal*. He was born in 774 AD and died in 838 AD. Abu Ubaid was the first scholar to document the economic activities in the time of the Prophet Muhammad (PBUH), the first four caliphs, and the companions up to the successors. Abu Ubaid's thinking about international trade can be seen in his book, *Al Amwaal* written about 1000 years before Adam Smith (1723-1790) spawned the theory of absolute advantage. Abu Ubaid's thinking about exports and imports can be divided into

three parts, namely: (1) The absence of a zero tariff in international trade, (2) Customs on staple foods being cheaper, and (3) There are certain limits to be imposed on excise.

3.3.1.1. The absence of zero tariffs in international trade

The collection of excise was customary in the days of *jahiliyah* (ignorance) and was done by the kings of both Arabs and non Arabs without exception. Therefore, they charged the import duty on goods imported into their country. From Abdurrahman bin Ma'qil, He said, "I once asked Ziyad bin Hudair, 'Who have you taken the excise from? He said, "We never put a duty for Muslims and Mu'ahid. 'I asked,' So, who is the person who has been charged excise by you? 'He said, "We put a duty on non muslim traders, as they have excised our imported goods when we went to their country" (Abu Ubaid, 2009).

It was made clear again by the Prophet's letters, which he sent to residents all over the country such as Tsaqif, Bahrain, Dawmatul Jandal and others who had embraced Islam. The contents of the letter was "Their livestock should not be taken and their imported merchandise cannot be imposed duty upon it".

Umar bin Abdul Aziz had sent a letter to the 'Adi bin Artha'ah which stated "Let the man pay *fidyah*[6]. Let the charge be fed to mankind. Please remove the excise duty paid on imported goods. Therefore, there is no excise duty of imported goods. However, it is one form of harm to others, as Allah says, 'You

[6] A kind of fine for pregnant moslem woman, sick men and travellers for not fasting during the fasting month (Ramadhan).

shall not harm humans against their rights and do not create evil in the world with mischief' (Quran surat Huud, verse 85).

From the description above, Abu Ubaid came to the conclusion that the customs duty was enacted in the days of ignorance. God then canceled the excise system by sending the Prophet and Islam. Then came the obligation to pay zakat[7] as much as a quarter of 'ushur (2.5%). Ziyad bin Hudair said, "I have been inducted into customs officer by Umar. Then he ordered me to take the duty of imported goods from the infidels as many as 'ushur (10%), goods import from the merchants of *ahli dhimma* as much as half of' ushur (5%), and imports of the Muslim traders' a quarter ushur (2.5%) ".

Interestingly, the idea that excise duty is a form of harm to others, is now echoed by the adherents of free trade, that there should be no tariff barrier into a country. The merchandise must be free to enter and exit a country. In other words, the import duty should be zero. However, nothing at all is free in Islam, all imported goods are charged according to the type of traders. The imported goods of Muslims are charged 2.5% counted as zakat. The imported goods of non-Muslims is subjected to excise duty of 5% for *ahli dhimma* (disbelievers who are making peace with Islam) and 10% for Jews and Christians. So, there is no practice since the beginning that the goods of a country should enter freely into another country.

[7] The amount payable by a muslim on his net worth as a part of his religious obligations, mainly for the benefit of the poor and the needy.

3.3.1.2. Excise cheaper on staple foods

For edible oil and wheat which are staple foods, the excise imposed is 5% instead of 10% in order to import the staple food as much as possible to come to Medina. Medina was the central governmentat that time. From Salim ibn Abdullah ibn Umar from his father, he said, "Umar had chosen among traders excise amounts from the outside, each of edible oil and wheat subject to excise duty paid as much as half of 'ushur (5%). He aims to assure import goods continuosly coming to Medina. And he has picked up the import duties of goods as much as 'ushur (10%)".

3.3.1.3. There are certain limits to be imposed on excise

Interestingly, not all the merchandise collected excise. There are certain limits which if less than this limit then the excise duty will not be charged. From Ruzaiq ibn Hayyan ad-Damisyqi (he was a customs officer at the border of Egypt at the time) that 'Umar ibn Abdul Aziz had written him a letter, whose contents are, "He who pass you from *ahli dhimma*, then excise their merchandise imports. That is, every twenty dinars must be subject to excise as much as one dinar. If the level is less than that amount, then calculate the levels of its shortcomings, so he reached ten dinars. If the merchandise is less than a third of dinars, you shall not charge anything from him. Then you make a letter to them explaining that the collection of excise duty will remain in place up to one year ".

Ten dinar is equal to the amount of one hundred dirham in the provision of payment of zakat. A cleric in Iraq, Sufyan had to abort the obligation to pay import duty of *ahli dhimma* if the goods did not reach one hundred dirham. According to Abu Ubaid, one hundred dirham is the lowest levels of property tax collection of import from the infidels and *ahli dhimma.*

3.3.2. Abu Yusuf's Thought

In his book *Al kharaj*, Imam Abu Yusuf wrote several pages about the problems associated with international trade, especially things that relate to the government's right in the form of customs and excise (custom duties). There are two chapters discussing it in the book of *Al kharaj*, namely in the chapter Ushur (import tax into the territory of Islam) and the chapter on strangers passing through the security point of Islamic territory. In both chapters, there are some hints that the duty goods from abroad would be taxed as goods from Muslim countries who enter into a foreign country.

Imam Abu Yusuf also provided a significant contribution in his book *Al-kharaj*. His contribution was mainly associated with the development of international trade at the time of the caliphate of Harun Ar-Rashid. He writes: "And the Imam (Muslim rulers) should not let someone from a foreign country into the Islamic country with security guarantees, or allowing them from exporting slaves, weapons or anything that could strengthen their power against Muslims. As for clothing, unusual merchandise and the like are not prohibited" (Abu Yusuf, 1987).

This statement does not mean that Abu Yusuf preferred the process of international trade to be limited and strict. He also does not intend economic independence (self sufficiency) in all areas of production so there would be no need to establish trade with other nations in the world (Autarchy). However, he wanted to caution thinking about the strategies of these international trade policies which would best benefit a country.

3.3.3. Neoclassical Economic Thought

Approximately 1200 years after Abu Yusuf, the Neoclassical school of economics believe a hypothesis that exports will lead to economic growth in the long run. This is called the "Export Led Growth Hypothesis". Adherents of the school spread this idea throughout the world by saying that trade between countries should be free without a hitch. Therefore, free trade would become a panacea for countries with low economic growth, particularly in Asia and Africa.

3.4. Three Models of Export Led Growth (ELG)

Before discussing in detail about studies on the export led growth hypothesis, we have to explain several models of ELG. There are at least three models which can be used to describe ELG: the neoclassical supply side model, the balance of payment-constrained growth model and the virtuos circle model (Thirlwall, 2003).

3.4.1. The Neo Classical Growth Model

The equation of this model is formulated by Feder (1983). The Neo Classical Growth Equation can be seen in equation (3.1).

$$G = a\,(I/Y) + b\,(dL/L) + [\,\delta/(1+\delta) + Fx]\,(X/Y)\,(dX/X) \qquad (3.1)$$

Where :

G = Gross Domestic Product (Output)

I/Y = Investment Ratio to Output

dL/L = Growth of the Labor Force

$\delta/(1+\delta)$ = the differential productivity effect

Fx = the externality effect

X/Y = share of exports in GDP

dX/X = growth of exports

Here, in the supply side model, export growth will affect externalities and then increase output growth. On the other hand, export growth will raise import growth. Esfahani (1991) conducted a study of 31 countries and found that exports are not significant to output growth. Also, when import growth was included in the model, externalities became insignificant. Then Esfahani concludes that export promotion policies can be quite valuable. He mentioned although exports do not emerge to have much direct externality effect on GDP, he still argued that export promotion policies in these countries can be quite important in providing foreign exchange. More supply of foreign exchange will releases import scarcity and permits output growth.

3.4.2. Balance Of Payments-constrained Growth Model

Neoclassical theory assumes that most factors of production in the growth and development process are exogenous. In facts they are endogenous to demand for the growth of output. Esfahani failed to explain these facts.

In most developing economies, the major constraint on the growth of demand is the current Balance of Payments (BOP) and the shortage of foreign exchange. The mechanism can be described as follows: export growth → relaxes a BOP constrained on demand → all other forms of demand (C, I, G) arise → increases GDP. It can be formulated into equation (3.2).

$$g = x/\pi \qquad (3.2)$$

Where: g = output

x = the growth of export volume (=growth of 'world' income and the income elasticity of demand for exports)

π = the income elasticity of demand for imports

As we know, exports are unique. The exports component is the only component of demand that supplies foreign exchange in the country in the absence of other form of flows. This foreign exchange is used to pay for the import requirements for growth.

3.4.3. The Virtuous Circle Model of Export led Growth

The Virtuous Circle Model of Export led Growth is also called 'induced productivity growth' and famous by the name of the Verdoorn Law. The circle is like this: Output growth = f (export growth); Export growth = f (foreign income growth, price competitiveness); Price competitiveness= f (productivity growth, wage growth); Productivity growth = f (output growth). If we make a figure of the circle, the figure will be like Figure 15:

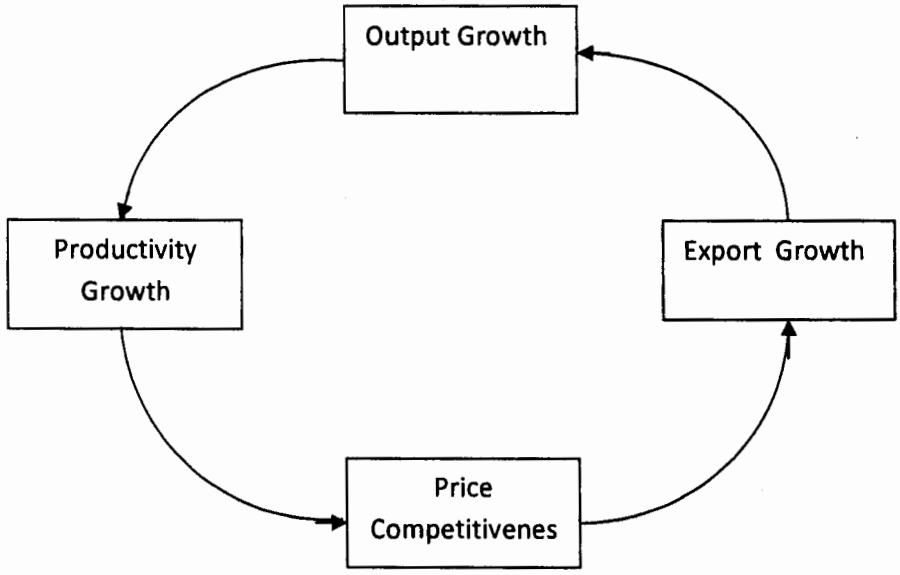


Figure 15. The Virtuous Circle Model of Export led Growth

CHAPTER 4

LITERATURE REVIEW

Numerous surveys had been conducted dealing with different aspects of the Export Led Growth Hypothesis. Two hundred and seventeen studies have been surveyed for this research. Giles (2000) surveyed one hundred and fifty eight studies from 1963 to 1999. Smith (2001) surveyed ten studies from 1968 to 1998. Ngoc et.al (2003) added two studies, Clarke and Rahan (2005) added one more study, and Zuniga (2005) added two studies more. All of these surveys were of 20th century studies. For the 21st century studies starting from the year 2000, the researcher himself surveyed forty four studies.

4.1. Cross Sectional Studies

Sixty six articles were surveyed from the period 1963-2004. Some authors looked at rank correlation coefficients between exports and output. The others looked at the simple OLS regressions. They used data which varied in number of countries from seven to more than 100. When a positive and statistically significant was found, they concluded that The ELG hypothesis was valid.

In fact this is not true. Correlation is assocation. Correlation is not causation. The correlation coefficient is also spurious due to exports themselves being a part of national product. To solve this problem, the authors used different approaches. One apporach was to modify the variables used. Some of them used output net of export instead of output itself. Some others used alternative export variables ; e.g., the real manufactured export earnings. The second approach was to find the other way of estimation model. They included Exports as explanatory variables in the production function.

These studies were not succesful. Correlation measures association, not causation. Association is different from causation. These are the potential difficulties with this cross sectional research. Some people are confused between association and causation. The acknowledgment of these described potential difficulties in attempting to check for ELG has led to the other group of studies that formally test for causality.

4.2. Time Series Studies

One hundred and fifty one time series studies published in the period 1972-2008 had been surveyed. From those studies, one hundred and fourteen studies (75 percent) use some of Granger's causality to test for ELG and only thirty seven studies (25 percent) use time series data to estimate regression models that do not incorporate dynamic effects. From all Granger causality studies, forty nine studies (43 percent) undertake bivariate analyses and sixty five studies (57percent) of the causality analyses employ a trivariate or higher-order system.

It is difficult to decide for or against ELG, as there are conflicting results. We will discuss these issues in the next section.

4.2.1.1. Canada Case

For Canada, 10 studies that have estimated Vector Auto Regression / Vector Error Correction Models (VAR/VECM) using Granger Non Causality (GNC) tests came up with different results. The ten studies are Awokuse (2003), Yamada (1998), Riezman et.al (1996), Pomponio (1996), Henriques and Sadorsky (1996), Bodman (1996), Jin and Yu (1995), Arnade and Vasavada (1995), Serletis (1992), and Afxentiou and Serletis (1991).

Two papers support GLE (Growth Led Export). They are Afxentiou and Serletis (1991), and Jin and Yu (1995). Both papers used Vector Autoregression in Difference (VARD). Afxentiou and Serletis (1991) used annual data from the period 1950-1985. The variables were logs of real GNP and real exports. They ran Philips and Perron test for testing stationarity. Cointegrating test was applied to decide between Vector Autoregression in Level (VARL) and Vector Autoregression in Difference (VARD). Since exports and GNP were not cointegrated, VARD was chosen. Jin and Yu (1995) examined quarterly seasonal adjusted data from the period 1960(1) – 1987(4). The variables were logs of real GDP and real exports. Julius Johansen test was used for testing stationarity. Although the types of data and the tests for nonstationarity were different, both conclude the same results supporting GLE.

Four papers support ELG (Export Led Growth). They are Henriques and Sadorsky (1996), Pomponio (1996), Yamada (1998), and Awokuse (2003). Henriques

and Sadorsky (1996) took three periods of data. The first data set was from the period 1877-1991. The second data set was from the period 1877-1945. The third data set was from the period 1946-1991. The variables were logs of real GDP, real export and terms of trade (export unit value/import unit value). VARL and Julius Johansen tests were used. The results supported ELG for the three periods. Pomponio (1996) examined annual data from the period 1965-1985. The variables were nominal manufactured output and exports. Investment was as an auxiliary variable. Yamada (1998) focused on quarterly seasonally adjusted data from the period 1960(1) – 1987(4). The variables were logs of real GDP output per employee, and real exports. TYDL augmented lags method with constants was used. Awokuse (2003) used quarterly time series data on Canada from 1961(1) – 2000(4). He performed Granger Causality using VECM and the augmented VAR methodology developed by Toda and Yamamoto (1995).

Three papers support Non Causality (NC). They are Riezman et.al (1996), Arnade and Vasavada (1995), and Serletis (1992). Serletis (1992) analyzed three periods of data. The first data set was from the period 1870-1985. The second data set was from the period 1870-1944. The third data set was from the period 1945-1985. The variables were logs of real exports, real GDP, and real imports. VARD was used since exports and GNP were non-cointegrated. The results supported ELG for the period 1870-1985 and 1870-1944 data. For the period 1945-1985, the result was non-causality. Here, different periods of data reveal different results. Arnade and Vasavada (1995) studied annual data from the period 1961-1987. The variables were real agriculture output, real agriculture exports, and unit export value. The Julius Johansen test was applied for testing stationarity. Since export and GDP were not cointegrated, VARD was chosen. The result was non-causality. Riezman et al.

(1996) considered annual data from the period 1950-1990. The variables were GDP and export growth in real international dollars, and real import growth as an auxiliary variable. VARD with no deterministic trend was applied and the result was non causality. Here, the assumption of no deterministic trend matters.

Only one paper supports bidirectional causality (BD), i.e., Bodman (1996). He investigated ELG using quarterly seasonally adjusted data from the period 1960(1) - 1995(4). The variables were logs of real exports of manufactured goods, real exports, real manufactured output per employee, and real total output per employee. Julius Johansen test was conducted for testing stationarity. He applied VECM. The result supported ELG for total export and output, but BD for manufactured exports and manufactured labor productivity. Here, different types of variables of data gave different results.

4.2.1.2. Portugal Case

For Portugal, six papers which assessed for ELG via Granger Causality Test came up with different results. The six studies are Riezman et.al (1996), Sharma and Dhakal (1994), Oxley (1993), Dodaro (1993), Hutchison and Singh (1992), and Jung and Marshal (1985).

Three papers support non causality (NC). They are Dodaro (1993), Hutchison and Singh (1992), and Jung and Marshal (1985). Jung and Marshal (1985) used annual data from the period 1953-1980. The variables were logs of real GNP and real exports. By applying VARD with a constant, the result supported non causality (NC). Hutchison and Singh (1992) analyzed annual data from the period 1956-1982. The variables were logs of real exports, real non-export GDP, and real GDP. The auxiliary

variable was real investment. They used VARD with no deterministic trend. The result was non causality. Dodaro (1993) studied annual data from the period 1967-1986. The variables were logs of real GDP and real exports. Since VARD with a constant was used, the result supported non causality.

Two papers support Growth Led Export (GLE). They are Oxley (1993) and Riezman et.al (1996). Oxley (1993) examined annual data from the period 1865-1991. The variables were logs of real exports and real GDP. The Julius Johansen test was applied for testing stationarity. By using VECM, the result supported GLE. Riezman et.al (1996) took annual data from the period 1950-1990. The variables were GDP and export growth in real international dollars. Real import growth was an auxiliary variable. They applied VARD with no deterministic trend. The results supported non causality (NC) for the bivariate model and GLE for the trivariate model. Here, different numbers of variables gave different results.

Only one paper supports bidirectional causality (BD), i.e., Sharma and Dhakal (1994). They investigated annual data from the period 1960-1987. The variables were logs of real exports and real GDP. They used VARD with a constant. The auxiliary variables were real gross fixed capital formation, real exchange rate, real world output, and population. The result supported Bidirectional causality (BD) between GDP and exports.

4.2.1.3. Pakistan Case

For Pakistan, seven papers that examined for ELG via the Granger Causality Test came up with different results. The seven studies are Shirazi and Abdul Manap

(2005), Akbar and Naqvi (2003), Kemal et.al, (2002), Islam (1998), Dutt and Gosh (1996), Arnade and Vasavada (1995), and Khan and Saqib (1993).

Four papers support the Export Led Growth (ELG) hypothesis. They are Khan and Saqib (1993), Arnade and vasavada (1995), Kemal et.al. (2002), Shirazi and Abdul Manap (2005). Khan and Saqib (1993) used annual data from the period 1972-1998. The variables were real primary exports, real manufactured exports, real exports, and real GDP growth. They applied OLS and 3 SLS (real GDP growth on real primary exports, real manufactured exports, and real exports). Other variables were ratio of domestic export prices to world export prices, employed labor force, capital stock series, and world GDP index. The result was positive export growth. This means that export leads to economic growth. Arnade and Vasavada (1995) analyzed annual data from the period 1961-1987. The variables were real agriculture output, real agriculture export and terms of trade. They performed the Julius Johansen test for testing stationarity, VARD for noncointegrated, and VECM for cointegrated series. The result supported Export Led Growth (ELG). Kemal et.al (2002) used annual data from the period 1960-1998 collected from WDI 2001. The variables were real GDP and real exports in local currency units. ADF and PP tests were performed to test stationarity, and the Johansen test for test cointegration. If cointegrated, they applied the Granger Causality Test based on the Vector Error Correction Model (VECM). The result supported ELG. Shirazi and Abdul Manap (2005) considered annual data from the period 1960-2003. The variables were real exports, real imports, and real output (GDP). They applied the Johansen Julius test for testing cointegration. A stationarity test was applied. The ADF and PP tests are used to determine the order of integration for each time series. For checking causality, they used the multivariate

Granger Causality test based on Toda and Yamamoto (1995). The result supported ELG.

Two papers support the Growth Led Export (GLE) Hypothesis. They are Dutt and Gosh (1996) and Akbar and Naqvi (2003). Dutt and Gosh (1996) studied annual data from the period 1953-1991. The variables were logs of real GDP/GNP and real exports. They used the Dickey Fuller and Philips Perron tests for testing stationarity. The Engel Granger-Augmented Dickey Fuller (EG-ADF) test was applied for testing cointegration and VECM for cointegrated series. The result supported GLE. Akbar and Naqvi (2003) took quarterly data from the period 1975-1998. The variables were export, income, investment, import and energy. They performed the ADF test for testing stationarity. The VAR model was estimated using the Seeming Unrelated Regression (SUR) technique. The results supported GLE for all cases (bivariate, trivarite, four variable, and five variable cases).

Only one paper supports bidirectional causality (BD), i.e., Islam (1998). He examined annual data from the period 1967-1991. The variables were real GDP, change in share of non export component in GDP, and proportion of export earnings in GDP. Other variables were total investment share of GDP, imports as a share of GDP, and share of non defense expenditures in GDP. He used the ADF test for testing stationarity and the Julius Johansen test for testing cointegration. VECM was applied for cointegrated series.

4.2.1.4. Indonesia Case

For Indonesia, twenty one papers have examined the ELGH. The 21 studies are: Bahmani-Claire (2009), Nushiwat (2008), Liwan and Lau (2007), Pramadhani et

al. (2007), Amir (2004), Lihan and Yogi (2003), Ekanayake (1999), Islam (1998), Ahmad et al. (1997), Xu (1996), Riezman et.al (1996), Pomponio (1996), Piazolo (1996), Arnade and vasavada (1995), Ahmad & Harnhirun (1995), Dodaro (1993), Hutchison and Singh (1992), Ahmad & Harnhirun (1992), Bahmani-Oskooee et al. (1991), Ram (1987), and Jung & Marshall (1985),

Eight papers support the ELG hypothesis. They are Jung & Marshall (1985), Ram (1987), Hutchison and Singh (1992), Piazolo (1996), Xu (1996), Islam (1998), Amir (2004), and Liwan and Lau (2007).

Jung and Marshal (1985) conducted a study of 37 developing countries (including Indonesia). The variables were Real export growth and GNP/GDP growth. They used annual data for the periods within 1950:1981 to assess the ELGH in those countries. Bivariate Granger causality (F), VARD and some VARD2 with a constant were performed. The lag was preset to 2 and increased to 3 if residuals correlated. They got that the ELG hypothesis was valid for Indonesia. Ram (1987) used annual data of 88 countries (including Indonesia), for various periods within 1960:1982. The methods were OLS and AUTO. The variables were real export growth (or % share of changes in exports in GDP) and GDP growth. Other variables were real investment as share of output, population growth, and a dummy variable for the 1973 oil crisis. As a result, ELGH was validated for Indonesia. It seems that oil crisis did not affect the export promotion strategy of Indonesia. Hutchison and Singh (1992) examined real exports, non-export GDP and GDP data for 34 countries (including Indonesia). Using annual data from the periods within 1950:85, they applied some methods (Bivariate and trivariate Granger (F); VARD with no deterministic trend). They ran the unit

root test but with no specified lag selection. The other variable was real investment. For Indonesia, the results varied:

- ELG was rejected (NC) for bivariate with economic growth as non-export GDP.
- ELG was valid for bivariate with economic growth as total GDP.
- ELG was rejected (GLE) for trivariate with economic growth as total GDP.

Piazolo (1996) conducted a study of real GDP and exports for Indonesia. He used annual data from the period 1965:1992. Some methods applied were 6-variable Granger (Wald), VECM with a constant, ADF, PP (with trend and constant), EG-ADF cointegration test (with constant and trend) and the Julius Johansen test. Lag selection was preset to 1. Other variables were real net foreign direct investment, rate of inflation, real gross fixed capital formation, population, and real government consumption. The results supported the ELG hypothesis.

Similar results are supported by Xu (1996), Islam (1998), Amir (2004), and Liwan and Lau (2007). Xu (1996) took the real exports and GDP data of 32 countries (including Indonesia) from the period within 1951:1990. Bivariate Granger (F) was performed to test causality. VECM was applied for cointegrated cases; VARD or VARD2 for noncointegrated, with a constant. ADF (preset to 3; combination of constant and trend tried) was used for unit root test. EG-ADF (preset to 3; no constant) was performed for cointegration test and non cointegration was found except in Hongkong, Indonesia, Korea, Malta and Peru. As a result, ELGH was valid for Indonesia. Islam (1998) focused on GDP and exports with annual data of 15 South East Asian countries from the period 1967:1991. The variables were real GDP,

change in share of non export component in GDP, and proportion of export earnings in GDP. He used bivariate and 5-variable Granger (F) to test causality. VECM was performed for cointegrated countries and VARD for non cointegrated countries (with constant). ADF was applied for testing unit root and the Julius Johansen for cointegration test. The other variables were total investment share of GDP, imports as a share of GDP, and share of non-defense expenditures in GDP. The results supported ELG in both the bivariate and multivariate cases.

Amir (2004) studied the effect of agriculture export and non agriculture export growth to economic growth. Ordinary Least Square (OLS) was performed on Indonesian time series data for the period 1981-2003. He found that there was significant effect from growth in both agriculture and non agriculture exports to economic growth. Liwan and Lau (2007) examine the relationship between economic growth, investment, inflation, and exports for three ASEAN countries namely Thailand, Malaysia, and Indonesia. By using annual data covering the period of 1976 - 2005, the result revealed that exports had a positive impact on growth for Indonesia and the other two countries.

Five papers support the GLE hypothesis. They are Ahmad & Harnhirun (1992), Pomponio (1996), Ahmad et al. (1997), Pramadhani et al. (2007), and Bahmani-Claire (2009).

Ahmad and Harnhirun (1992) studied real per capita exports and GDP for five ASEAN countries. They used annual data from the period 1967:1988 and performed several methods, i.e., bivariate granger (LR), VECM for cointegrated and VARD with a constant for non-cointegrated countries. Some test applied were ADF for testing unit root (with constant and trend), EG-ADF for testing cointegration. They found

cointegration for Thailand only. By using FPE as lag selection, the ELG hypothesis was rejected for Indonesia and instead the GLE was supported. Pomponio (1996) used annual data of 66 OECD and less developed countries (including Indonesia) in the periods within 1965:1985 and two variables (nominal manufactured output and exports) to assess the ELGH. Some methods applied were bivariate and trivariate Granger (F), VARL with no constant for cointegrated, and VARD with no constant for noncointegrated countries. The trivariate case was tested as (investment+export) causes output (IELG) and (investment+output) causes export (IGLE). The results for the bivariate case supported no causality (NC) and for the trivariate case supported IGLE.

Ahmad et al. (1997) examined real per capita GDP and exports annual data of five ASEAN countries (Thailand, Singapore, Philippines, Malaysia and Indonesia) from the period 1966:1993. Some methods used were bivariate granger (LR), VARD with no constant, ADF unit root test (with constant and trend), and EG-ADF cointegration test (no constant). The results did not support the ELG hypothesis and instead supported the GLE hypothesis. Pramadhani et.al (2007) looked carefully at the causal relationship between trade, growth, and inward direct investment in Indonesia for the period 1990-2004. Multivariate Granger causality was applied for this study. By using quarterly data, they found support for GLE and concluded that the ELG hypothesis should be rejected for Indonesia. Bahmani-Claire (2009) used annual data from 1960-1999 (40 sample size) to check the validity of the ELG hypothesis for 61 countries (including Indonesia). The data were real GDP, labor, capital, exports, and imports. All data were collected from WDI (2001) by the World Bank. Lag = 1 to optimum # lag (S to G), but most of the lag = 1. They performed

Johansen Cointegration to checking for cointegration between variables. When they found the variables were cointegrated they applied Weak Exogeneity test (Johansen). The result was evidence for a long run relationship based on weak exogeneity test from growth to export (GLE) for Indonesia.

Three papers support bidirectional Causality (BD). They are Ekanayake (1999), Dodaro (1993), and Bahmani-Oskooee et. al (1991).

Bahmani-Oskooee et al. (1991) analyzed real GDP and export growth for 20 less developed countries (LDCs) including Indonesia. By using annual data from the periods within 1951-1987, they performed several methods i.e., bivariate granger (Akaike FPE), VARL in growth variables, and some VARD models with constant. The result supported bidirectional causality which suggests both ELGH and GLEH are valid for Indonesia. Dodaro (1993) investigated real GDP growth, growth of real exports of goods and non factor services for 87 countries (including Indonesia). He performed a variety of methods: OLS simple regression between growth variables, bivariate granger (F), VARL in growth variables with a constant and lag selection preset to 2. Using annual data from 1967 to 1986, the result supported bidirectional causality. Ekanayake (1999) performed a cointegration and error correction model to analyze the causal relationship between economic growth and exports growth in eight Asian countries using annual data from 1960 - 1997. He found that bidirectional causality existed in Thailand, Srilanka, Philippines, Pakistan, Korea, Indonesia and India.

Six papers support non-causality (NC). They are Hutchison and Singh (1992), Ahmad & Harnhirun (1995), Arnade and Vasavada (1995), Riezman et.al (1996), Lihan and Yogi (2003), and Nushiwat (2008).

Hutchison and Singh (1992) found non causality between exports and growth by using a bivariate model with economic growth as non-export GDP. Ahmad and Harnhirun (1995) analyzed five ASEAN countries (Thailand, Singapore, Philippines, Malaysia and Indonesia) by using annual data from the period 1966-1990. The variables were real per capita GDP and exports. They use some methods: VECM with constant, bivariate Granger (LR), ADF with constant and trend, the Johansen cointegration test (preset to 2) and lag selection preset to 2. The result was no cointegration for Indonesia. Arnade and Vasavada (1995) focused on real agriculture output and agricultural exports data for 16 Latin American and 17 Asian & Pacific countries (including Indonesia). By using the Johansen cointegration test for annual data from the period 1961-1987, cointegration existed except for Canada, Nepal, Taiwan, Thailand, Equador, Guetamala, Nicaragua, and Uruguay. Some methods performed were trivariate granger (F), VECM for cointegrated and VARD for non cointegrated countries with no deterministic terms, and ADF unit root test (no deterministic terms). The result supported no causality for Indonesia. Riezman et.al (1996) considered GDP and export growth annual data of 126 countries (including Indonesia) from the periods within 1950:90. They performed bivariate and trivariate Granger (F). Other variable was real import growth. For Indonesia, the result supported non causality (NC) from the bivariate model. Lihan and Yogi (2003) investigated the relationship between export economic and exports growth. OLS was applied to Indonesian time series data over the period 1983-2001. They found there was no significant effect of export growth on economic growth. Nushiwat (2008) used annual data from 1981-2005 (sample size of 25) collected from International Financial Statistics (IFS). The data were the annual growth rate of real GDP (Y) and the annual growth rate of exports (X). Both variables were in real terms, deflated

using the GDP deflator for each country. He used Granger Causality to find whether exports lead to growth (ELG) or Growth leads to Exports (GLE). He used two lags for the model. The result supported no causality (NC) between Exports and Growth.

To sum up, we find that the time series studies lead to nowhere. Summary of those studies can be seen in Table 6. At least three studies support each category of results.

Table 6. Different Results from Time Series Causality Studies for Indonesia

Year of study publication	ELG	GLE	BD	NC
1985 -1990	Jung & Marshall (1985) Ram (1987)			
1991-95	Hutchison and Singh (1992)	Ahmad & Harnhirun (1992), Hutchison and Singh (1992)	Bahmani-Oskooee et al. (1991) Dodaro (1993)	Hutchison & Singh (1992), Ahmad and Harnhirun (1995), Arnade & Vasavada (1995)
1996-2000	Piazolo (1996), Xu (1996), Islam (1998)	Pomponio (1996), Ahmad et al. (1997)	Ekanayake (1999)	Riezman et al. (1996),
2001-05	Amir (2004)			Lihan & Yogi (2003).
2006-10	Liwan and Lau (2007)	Pramadhani et al. (2007). Bahmani-Claire (2009).		Nushiwat (2008)

Note: ELG = Export leads to Growth, GLE = Growth leads to export,

BD=Bidirectional (both ELG and GLE), NC=Non causality

4.3. Summary of Literature Review

4.3.1. Variables used for ELG studies

To find whether ELG is valid or not for Indonesia, some researchers used two variables (bivariate model) and the others used three or more variables (multivariate models). The common variables used in this study are real GDP growth and real export growth.

There are conflicting results found by using bivariate models. Support for the validity of ELG was found by Xu (1996), Jung & Marshall (1985) when they used annual data of real GDP growth and real export growth, and Islam (1998) when he used some modification of the variables (change in share of non export component in GDP and proportion of export earnings in GDP).

Evidence for rejecting the ELG (accepting GLE) was found by Ahmad & Harnhirun (1992) using annual data of real per capita exports and GDP, as further confirmed by Ahmad et.al (1997) using the same variables.

Support for non-causality between exports and growth was found by Hutchison & Singh (1992) when they used annual data of non-export GDP growth and export growth. When they used total GDP growth and export growth, they found support for the validity of ELG. Support for non-causality wass also found by Pomponio (1996) using annual data of two variables, i.e., nominal manufactured output and exports, by Arnade & Vasavada (1995) using annual data of real agriculture exports and real agricultural output, and by Riezman et al. (1996) using annual data of GDP and export growth.

Bidirectional causality (both ELG and GLE valid) was found by Bahmani-Oskooee et al. (1991) when they used annual data of real GDP and export growth, and by Dodaro (1993) when they investigated annual data of real GDP growth, growth of real exports of goods and non factor services.

Here, the choice of variables used matters. Although two variables used are annual data of GDP and Export, but what kind of export data? It may be real exports, or real per capita exports, or nominal manufactured exports, or growth of real exports of goods and non factor services. What kind of GDP (output) data is used? It is may be real GDP growth, or real per capita GDP growth, or real non-export GDP growth, or nominal manufactured output.

In the multivariate models, the results also conflict with each other. The conclusion that ELGH is *valid* for Indonesia was found by Ram (1987) using annual data of five variables i.e., real investment as share of output, population growth, real GDP growth and real export growth (or % share of changes in exports in GDP), and a dummy variable for the 1973 oil crisis; by Piazolo (1996) using annual data of seven variables, i.e., rate of inflation, real gross fixed capital formation, population, real government consumption, real GDP, real exports, and real net foreign direct investment; by Islam (1998) using five variables, i.e., total investment share of GDP, imports as a share of GDP, share of non-defense expenditures in GDP, change in share of non export component in GDP, and proportion of export earnings in GDP; and by Liwan-lau (2007) using four variables, i.e., GDP, export, inflation and investment in nominal term.

But Hutchison and Singh (1992) found evidence to reject the ELG, and support for GLE, while using annual data of three variables, i.e., economic growth as total GDP, real exports and real investment. The same result, rejection of ELG and support for GLE, was found by Pomponio (1996) while using three variables: investment, nominal manufactured output and exports; by Pramadhani et al. (2007) using quarterly data of three variables: inward direct investment, growth and trade; and by Bahmani-Claire (2009) while using five variables: real GDP, labor, capital, export, and import.

In the multivariate models, some researchers used three variables (with investment as an additional variable), other used five variables (with real investment as share of output, population growth, and a dummy variable for 1973 oil crisis as three additional variables), and the other use seven variables (with real net foreign direct investment, rate of inflation, real gross fixed capital formation, population, and real government consumption as five additional variables). By using three variables, the result supported GLE, and rejected the ELG hypothesis. But when more variables were added into a model (say, five to seven variables in a model), then the ELGH was valid. This means, the number of variables used matters.

4.3.2. Lag orders selection of time series data

Some researchers preset to one lag and while the others preset to two lag orders in dealing with time series data. Examples of one lag order are Piazolo (1996), and Bahmani-Claire (2009); of two lags order are Jung & Marshall (1985), Dodaro (1993), Hutchison & Singh (1992), Liwan and Lau (2007) and

Nushiwat (2008); and of three lags order are Xu (1996), and Arnade & Vasavada (1995).

Bahmani-Calire (2009) use one lag for their model and the result is GLE. Nushiwat (2008) use two lags for his moodel and the result is NC. Hence, lag order selection matters.

4.3.3. Methods used to deal with non stationary data

Some authors used Vector Auto Regression in Level (VARL) and the others used Vector Auto Regression in Difference (VARD) to raw data. Some studies which used VARL are Dodaro (1993), and Nushiwat (2008); while Bahmani-Oskooee et al. (1991) used VARD with constant.

Some studies which used VARD are Jung & Marshall (1985), Hutchison & Singh (1992), and Ahmad et.al (1997). Studies which used VARD when the series were not cointegrated are: Xu (1996), Islam (1998), Ahmad & Harnhirun (1992), Arnade & Vasavada (1995), and Pomponio (1996) for non-cointegrated countries and VARL for cointegrated countries. Moreover, they used different cointegrating tests which can lead to different results of causality.

Dodaro (1993) use VARL and the result is BD. Ahmad et.al. (1997) use VARD and the result is GLE. Hence, methods used to deal with non stationary data matters.

4.3.4. Assumptions applied to deterministic trend

In using the Vector Error Correction Model (VECM), some authors used no deterministic components; while others used restricted intercept terms and deterministic trends.

Hutchison and Singh (1992) use assumption of no deterministic trend and the result is NC. Sharma and Dhakal (1994) use assuption of deterministic trend and result is BD. Hence, assumptions applied to deterministic trend matters.

This survey of time series studies concludes that there are four sources of variability causing the different results. *Firstly*, different definitions of the information set in the model lead to different results. Some authors used annual data while others used quarterly data. Some used bivariate data (export growth and GDP growth) while others used multivariate data (export growth, GDP growth, real net foreign direct investment, rate of inflation, real gross fixed capital formation, population, and real government consumption). *Secondly*, different lag orders selection of time series data lead to different results. Some researchers preset to one lag while others preset to two lag orders in dealing with time series data. *Thirdly*, different methods used to deal with non stationary data lead to different results. Some authors used Vector AutoRegression in level (VARL) while others used Vector Auto Regression in Difference (VARD) to raw data. Moreover, they used different cointegration tests which lead to different results of causality. *Finally*, different assumptions are applied to deterministic trends lead to different results. In using the Vector Error Correction Model (VECM), some used no deterministic components; others used restricted intercept term and

deterministic trends. Even if they worked with the same data, the same lag orders, the same methods for the same country, the results would be different due to different assumptions of trends. This is the situation we find in the literatures with economists arriving at different results and giving conflicting policy recommendations.

Based on the above situation, this study use some theories to check the validity of ELG by using chain bivariate models rather than use some variables by running multivariate analysis. The theories are BOP constraint theory for checking causality from export to economic growth, and verdoorn law for checking causality from economic growth to export growth.

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CHAPTER 5

DATA AND METHODOLOGY

In the literature review, we found conflicting results in assessments of the ELG Hypothesis. As a consequence, conflicting advices have been given to policy makers by economists. The question arises, why did this happen? There are two basic reasons (Mankiw, 2001):

1. Economists may disagree about the validity of alternative positive theories about how the world works.
2. Economists may have different values and, therefore, different normative views about what policy should try to accomplish.

5.1. Data

The data was collected from Ministry of Trade, Indonesia, International Financial Statistics (IFS 2008), and World Development Indicator (WDI 2007). The variables used are: exports, GDP, Gross Fixed Capital Formation (GFCF) and terms of trade time series data for the period 1983:2007.

5.1.1. Real Exports

We use 'real exports' which is exports of goods and services deflated by export price index rather than by GDP deflator. Chioce of variables is important. We choose export price index to deflate exports of goods and services rather than GDP deflator, because export price index is more appropiate measurement. Real exports is calculated as Real Exports = (Nominal exports of goods and services x 100/export price index).

5.1.2. Real GDP

In this study, the real GDP is used because we want a measure of the total quantity of goods and services the economy is producing that is not affected by changes in the prices of those goods and services. Real GDP is defined as the production of goods and services valued at constant prices. Real GDP is calculated as Real GDP = (Nominal GDP x 100/GDP Deflator).

Furthermore, we use growth of export and growth of GDP. Growth of Exports and growth of GDP is the percentage change in real exports and real GDP from one period to another.

In this study, we want to uncover the path through which exports may cause GDP or GDP may cause exports. For exports may cause GDP, the sequence is as follows: exports→ intermediate variables → GDP. For GDP may cause exports, the sequence is: GDP → intermediate variables → exports.

5.1.3. Gross Fixed Capital Formation (GFCF)

Why is Gross Fixed Capital Formation (GFCF) used as an intermediate variable from exports to economic growth? It is because expansion in export leads to better allocation of resources, creating economies of scale and production efficiency through employment generation, capital formation, and technological development.

The path can be described as follows: export growth → relaxes a BOP constraint on demand → all other types of demand (C, I, G) increase→ increase GDP[1]. So, investment (*capital formation*) is one of the intermediate variables to explain the path from Export → intermediate variable → Growth.

5.1.4. Terms of Trade (TOT)

Why is a variable called 'terms of trade' used as an intermediate variable from economic growth to export growth? It is because the economic growth leads to lower terms of trade (if a large economy), i.e., improvement in competitiveness. Lastly improvement in competitiveness leads to export growth. This is called verdoorn law or famous by The Virtous Circle Model of ELG.

As explained in the literature review of chapter three, this path is also called 'induced productivity growth' and is also widely known as the Verdoorn Law. The path can be described as follows: economic growth → productivity growth → price competitiveness → export growth. So, price competitiveness is one of the intermediate variables which can be measured by terms of trade. Terms

[1] It is widely known as the Balance Of Payments-constrained Growth Model

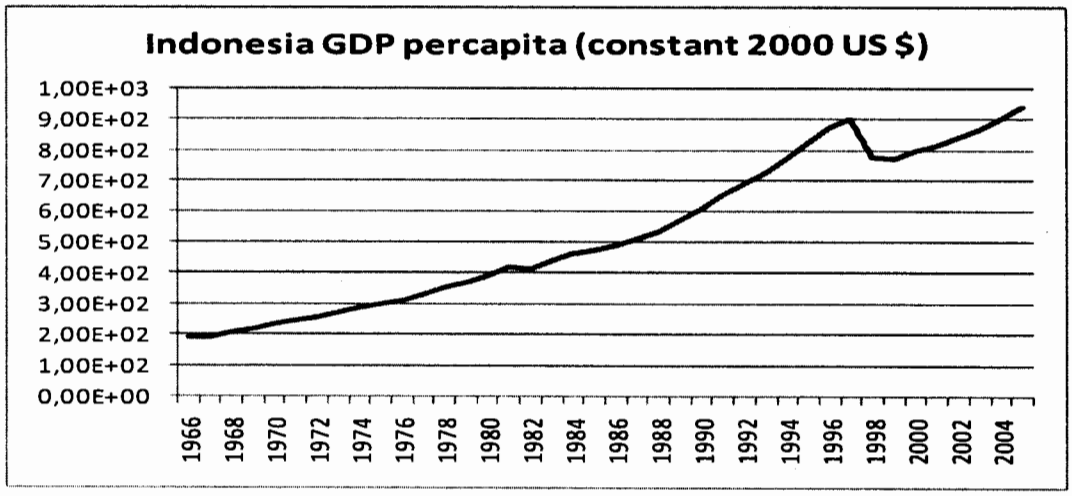
of trade is the ratio of a country's export price index to its import price index, multiplied by 100.

5.2. Methodology

In dealing with trend data series, we cannot use Ordinary Least Squares (OLS) directly, because it will result in spurious correlations/regressions. The next section will explain why trend data series result in spurious correlations.

5.2.1. Trend Data Series Result in Spurious Correlations

A trend is when something keeps increasing or decreasing. If it keeps going up and down then there is no trend. Here is an example of a trend. It is data of Indonesia's GDP per capita (constant 2000 US $). In 1966, the GDP per capita of Indonesia was US $ 196. It increased to US $ 474 in 1985 and to US $ 942 in 2005.



Source : WDI 2007

Figure 16. Indonesia GDP percapita 1966-2005

Actually, all of the correlation theory assumes normal distribution. The idea behind the correlation is that there is a standardized variable which fluctuates around the average value. If it fluctuates around the average value, then we have to explain why it is fluctuating.

The average GDP per capita of Indonesia from 1966 to 2005 is US $ 534 with standard deviation 245. Now, we generate data which has mean 534 and standard deviation 245. If Indonesia's GDP per capita were normal with mean 534 and standard deviation 245 then it would look like Figure 14.

We can see from Figure 14 that it does not have a trend. It fluctuates up and down because of random variation. The theory of normal distribution says that GDP per capita of Indonesia has no trend but the data say there is a trend. So, the theory has a problem here. The standardized variable is like Figure 17.

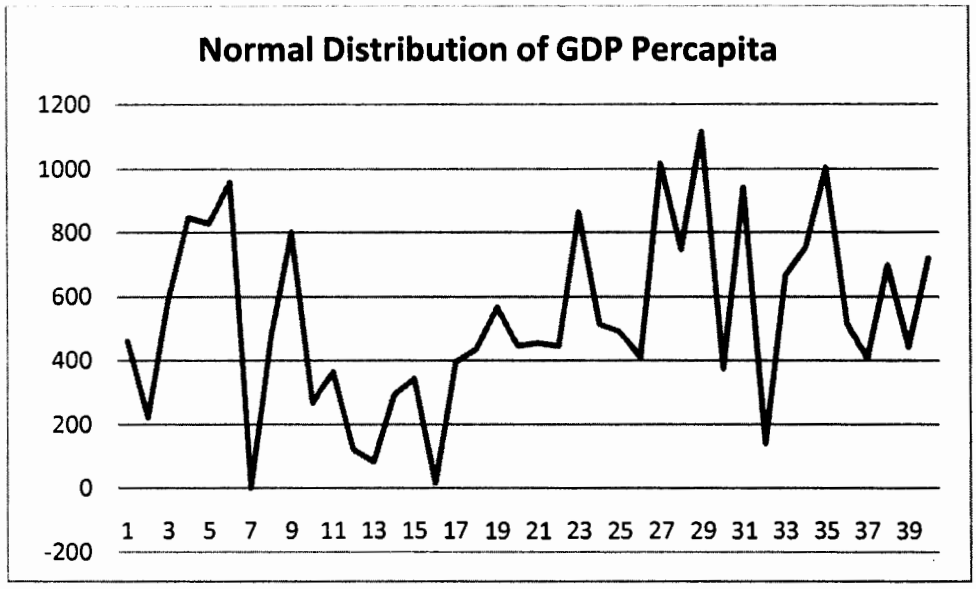


Figure 17. Normal Distribution of GDP Percapita

The standard normal distribution theory tells us that the GDP per capita is fluctuating, but the data tells us that the GDP per capita is systematically increasing. We can say after 1988 the GDP per capita are above the average and before 1988 below the average. It is a very clear pattern, but we can not say anything about the normality of data. The data of normal distibution fluctuates up and down. That is why in the trend data, the correlation does not have same meaning with the normal data distribution.

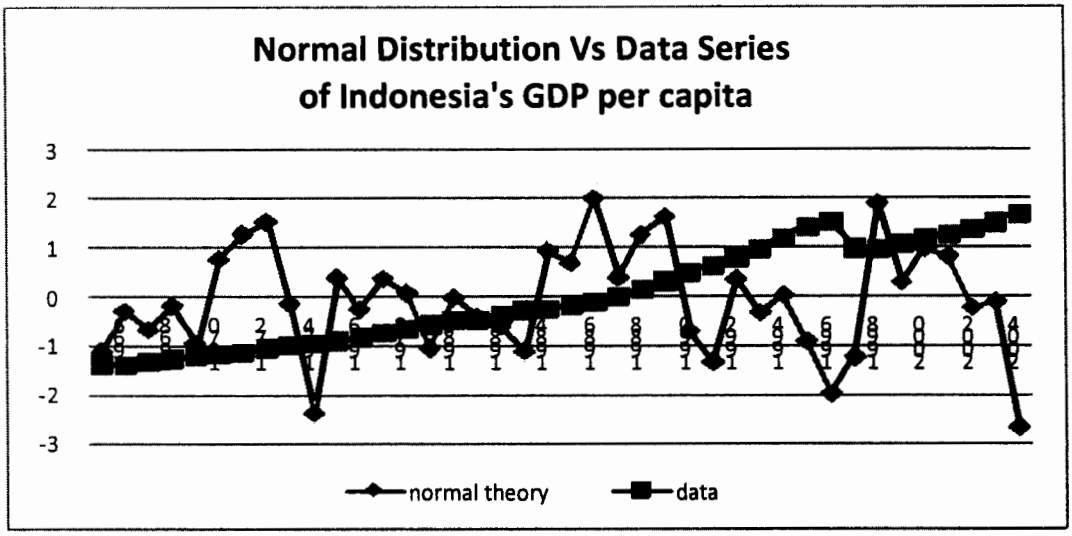
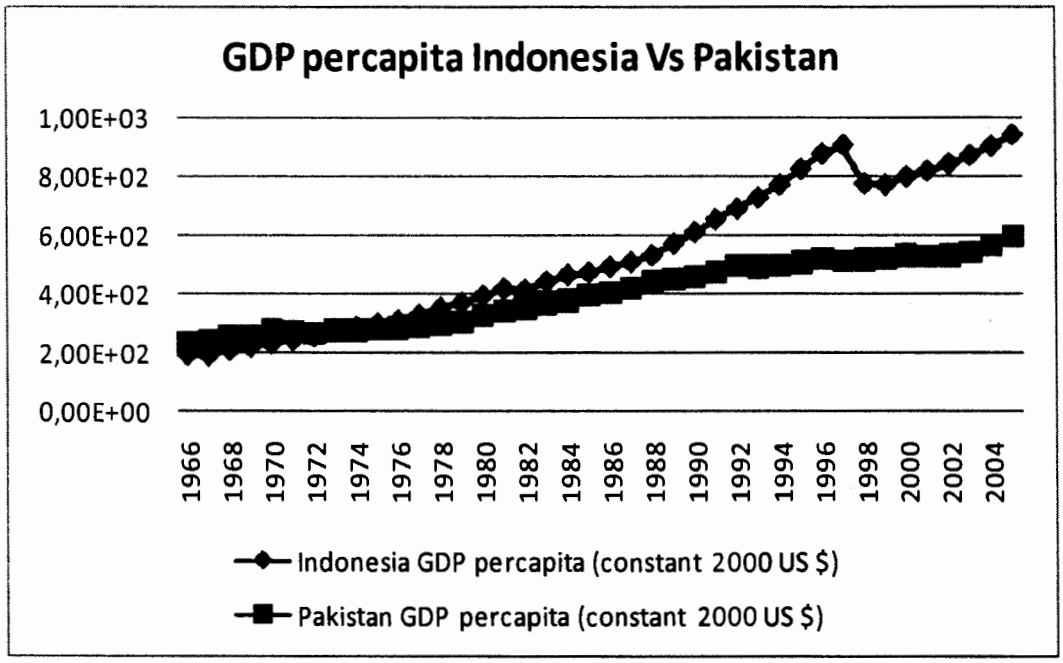


Figure 18. Normal Distribution Versus Data Series of Indonesia GDP Percapita

Now, let's look at another country totally different from Indonesia. Suppose we choose Pakistan. Obviously there should not be any relation between these two series of data. What happens in GDP per capita in Indonesia has nothing to do with GDP per capita in Pakistan. But the correlation is 98.5 percent. It is a very strong correlation. If we think that Indonesia GDP per capita is closely related to Pakistan GDP, then we are wrong. There is no relationship between the

two. The point in this case is that both have trends. Let's see the time plot of GDP percapita of Pakistan and GDP percapita of Indonesia (see Figure 19).

We can see that even though the series are not very strong, the trend still causes a very strong 98.5 % correlation. We usually have p-value around 0.00 when we have trend series.



Source : WDI 2007

Figure 19. GDP per capita Indonesia vs Pakistan

Actually, econometricians are very familiar with this problem. In fact, this problem became clear to econometricians in the 1980s. Before we do a correlation we have to get rid of the trends.

From the description above, for dealing with time series data, we cannot use OLS directly, because it will result in spurious correlations and regressions. The spurious results occur because the data are not stationary.

5.2.2. Stationary vs. Nonstationary

A stochastic process $\{X_t\}$ is said to be *stationary* if the means and the variances of the process are constant over time [$E(X_t)$=constant=μ; Var (X_t)=constant = σ^2], while the value of the covariance between the two periods depends only on the gaps between the periods, and not the actual time at which this covariance is considered [$Cov(X_t, X_{t+j}) = \sigma_j$]. If one or more of the conditions above are not fulfilled, the process is *nonstationary* (Charemza and Deadman, 1997).

5.2.2.1. How to make it stationary

The first step to take is to make the data stationary by using detrending. One common tactic is to take the first difference of the time series data. If the data is stationary in level, then we say that the data is I(0), integrated in order zero. If the data is stationary in the first difference, than we say that the data is I(1), or integrated in order one. If the data is stationary in the second difference, than we say that the data is I(2), or integrated in order two, and so on.

5.2.2.2. Unit Root Test

The tests for checking stationarity are called the Unit Root Tests. The unit root tests commonly used to test whether a time series data is stationary or not are the Augmented Dickey Fuller (ADF) test and the Philips Perron (PP) test.

5.2.2.2.1. ADF test

How we do the Augmented Disckey Fuller (ADF) Test? Firstly, look at the following equation

$$\Delta^2 y_t = \beta_1 \Delta y_{t-1} + \beta_2 y_{t-2} + u_t \quad [5.1]$$

Secondly, look at the residuals. Test residuals for autocorrelation by correllogram. There are two possible methods of augmentation: Simple to general (S to G) and General to simple (G to S).

For Simple to General (S to G), let's consider the equation

$$\Delta^2 y_t = \beta_1 \Delta y_{t-1} + u_t \quad [5.2]$$

When we estimate it, we get $\hat{\beta}_1, \hat{u}_1, \ldots, \hat{u}_r$. Now we should check whether the residuals are white noise or not. If the residuals are white noise then there is no need to augment. If the residuals are not white noise then we augment by 1 lag. Then, we check again whether the residuals are white noise or not. If the residuals are white noise then there is no need to augment. If the residuals are still not white noise then we augment by 2 lags. We do this iteration until there is no need to augment again.

For General to Simple (G to S), let's consider the equation

$$\Delta^2 y_t = \beta_2 \Delta^2 y_{t-1} + \tilde{\epsilon}_t \quad [5.3]$$

In the G to S, we do the same steps, i.e., look at the residuals and look at the correllogram. Firstly, choose the most general model. Secondly, choose the highest possible order by dropping the highest order until the residuals are not correlated.

At the end of S to G by adding enough lag, or at the end of G to S by dropping the highest order until residuals are not correlated, the residuals are white noise, and we can run the Dickey Fuller (DF) test.

5.2.2.2.2. Philip Perron (PP) test

The presence of a structural break makes testing for integration by Dickey Fuller (DF) unreliable. Philips and Perron (1988) used a non parametric method to correct the serial correlation of the disturbances.

There are three choices in using the ADF and PP tests, i.e., without trend (only intercept), with trend (intercept + trend), and none (without intercept and without trend).

The first choice, which is without trend (only intercept), is the most common choice for time series data, since almost all time series data look like this. The second choice, which is with trend (intercept+trend), is the choice when the series looks like a linear trend or a quadratic trend. The third choice, which is none (without intercept and without trend), is the choice when series fluctuate at one number. So, standard for ADF and PP tests is to include only intercept in the test equation. After performing the unit root test, the next step is to carry out cointegration test.

5.2.3. Cointegration test

Here, we use the Johansen Procedure because it is better than the Engle-Granger procedure. In the Engle-Granger modeling approach, the endo-exogenous division of variables is assumed (and therefore there might be only one

co-integration relation) while in the Johansen approach, based on VAR modeling, there are no exogenous variables. It seems that the Johansen Procedure can be used for single equation modeling as an auxiliary tool, checking the validity of the endo-exogenous variable division (Charemza and Deadman, 1997).

Johansen proposes a maximum likelihood (ML) method to estimate long run relationships and derive likelihood ratio (LR) test for cointegration, gives maximum likelihood estimators (MLE) of the unrestricted cointegrating vectors and also it provides tests for the number of cointegrating vectors. Johansen (1988) derives a LR cointegration test based on a vector autoregression model without a constant term. Johansen and Juselius (1990) consider an autoregressive model of order p, AR (p). That is

$$Y_t = \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \cdots + \Pi_p Y_{t-p} + \varepsilon_t \qquad [5.4]$$

Where Y_t is a sequence of random vectors with components (Y_{1p}, Y_{2p}, ... Y_{pt}) and is a vector of non-stationarity I(1) variables.

There are two test statistics for detecting the number of cointegrating vectors:

(1) Trace statistics

(2) The maximum eigen value statistics.

In the trace test, the null hypothesis is that the number of cointegrating vectors is less than or equal to r, where r is 0, 1, or 2, and the alternative hypothesis is a general one, such as $H_0 : r \leq 1$ vs H_1: r=2. The maximum Eigen value test is similar to the trace test except that the alternative hypothesis is explicit, such as H_0: r=0 vs H_1: r=1, or H_0: r=1 vs H_1: r=2, et cetera. The critical values are tabulated in Johansen and Juselius (Insel, 2003).

5.2.4. VAR Model

Vector Auto Regression (VAR) modeling is a pure time series method. It is a theoretical. We just have the sequence numbers then we develop the model. The equation of VAR modeling is very simple that we have M endogenous (y_{1t}, y_{2t}, ..., y_{mt}) and K exogenous variables (x_{1t}, x_{2t}, ..., x_{kt}). As far as we are concerned, we do not know what is endogenous and exogenous and we take one variable Z_t which combine all endogenous and exogenous variables. Now, we want to know how to predict from the previous Z. This is the ARMA model.

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + ... + u_t + \beta_1 u_{t-1} \qquad [5.5]$$

Where

$Z_{1t} = y_{1t}$, $Z_{2t} = y_{2t}$, ..., $Z_{mt} = y_{mt}$, $Z_{(1+m)t} = x_{1t}$, $Z_{(2+m)t} = x_{2t}$, ..., and $Z_{(k+m)t} = x_{kt}$,

The Moving Average (MA) term is not necessary. We can show that every ARMA model can be written purely as an AR model. Instead of put u_{t-1}, just add more lag. But it may be possible that some dynamics are more easily captured by using ARMA model than by using purely AR model.

In the VAR model, there is no distinction between endogenous and exogenous. There is no zero restriction and there is no economic theory on this mode. That is called a general Unrestricted Vector Autoregression and the model is like this:

$$Z_t = A_1 Z_{t-1} + ... + A_k Z_{t-k} + \varepsilon_t + \beta_1 \varepsilon_{t-1} + ... + \beta_m \varepsilon_{t-m} \qquad [5.6]$$

There are a number of complications in estimating such a model. Different matrices lead to the same stochastic vector.

Suppose we want to forecast what is going to happen next year. We may have a structural model but forecasting is still a problem. It is because suppose we have consumption function and we want to forecast consumption next year. Consumption function tells us that "First tell us GDP and then we tell you consumption". The problem is that we don't know GDP next year. So, firstly, we have to predict what the GDP will be. We can use a trend to find the GDP for next year or build an ARMA model for GDP, as is commonly done. Now, we have three sources of errors in the concumption forecast:

1. Maybe the forecast of GDP is not correct (forecast error)
2. Maybe our model of consumption is not correct (estimation error)
3. Even everything is correct; may be there is residual error.

As opposed to this, we can just use a VAR model by putting GDP and consumption and any other variable that might be relevant and we can run the VAR model and directly forecast consumption. Most of the time this is what has been done. It has been found that short term forecast for VAR models are relatively good compared to structural models. But in the long run, we must have some idea of what really happens otherwise we have no reason for the VAR model to behave in the long run.

If the residuals in the VARMA models are not correlated, then the forecasts are quite conforming. If there are some correlations in the error then there will be some complications in the forecasting.

In fact, it is not possible to avoid imposing the prior restrictions on the VAR system because the larger the lag and the number of variables, the more complex

it will be. So, one has to be careful about which model and how many lags to use because the estimation rapidly becomes very difficult even by computer.

5.2.5. Impulse Response Analysis

The idea of impulse response is to see what happens in the system if we put in a shock in one period. In fact, this way of thinking of it is not good because one cannot change the equation. So, instead we let the error change. The errors are independently coming in. They are exogenous. Z is not exogenous.

Let's say there is a shock in the 1st ε_1. Instead of coming in, we replace with +1 unit of error. Then it will affect the 1st component. But if the errors are uncorrelated, then it doesn't make any sense to say what happens if ε_1 changes by 1 unit. It is because ε_1 is uncorrelated to ε_2. This is the way the causality comes in that in an independent sequence, if we add +1 to ε_1 nothing will happen to ε_2. That's why we study impulse response, what happen if there is a shock.

5.2.6. Granger Causality Test

Granger causality is based on the assumption that the cause must occur before the effect. VAR models are used to test the causality relationship between the variables in the system. The standard form of VAR model for the two variable cases can be written as

$$y_t = \gamma_{10} + \gamma_{11} y_{t-1} + \gamma_{12} x_{t-1} + \varepsilon_{1t} \quad [5.7]$$

$$x_t = \gamma_{20} + \gamma_{21} y_{t-1} + \gamma_{22} x_{t-1} + \varepsilon_{2t} \quad [5.8]$$

The terms ε_{1t} and ε_{2t} are random innovations or shocks, and they are correlated if there are contemporaneous effects of y_t and x_t and of x_t on y_t, but the terms ε_{1t} and ε_{2t} are uncorrelated if there are no contemporaneous effects on each other (Insel, 2003).

Granger causality is useful tool for getting information about exogeneity. This means, x_t is set to be an exogenous variable if the current and past values of y_t do not affect x_t. In that case, all coefficients on current and past y_t should be zero. Granger noncausality shows that x_t sequence is dependent of both the u_{yt} shocks and y_t sequence. Here, x and y should be stationary. This causality reflects the long run relationship between variables.

If they are not stationary, I(1) variables and cointegrated, we estimate Vector Error Correction Model (VECM), and test causality based on the VECM. This causality reflects short run as well as long run relationships between variables. A VECM is a restricted form of VAR model. The VEC specification puts the restriction on long run behavior so that they converge to their long run equilibrium relationships and allow the short run dynamics.

If they are not stationary, I(1) variables and non-cointegrated, we estimate Vector Auto regression (VAR) estimation in difference and test causality based on the VARD. This causality reflects the short run relationship between variables.

5.2.7. Error Correction Model

Suppose when in equilibrium or steady state,

$Yt = K X_t^{\gamma 2}$ γ_2, K = constant [5.9]

For example, Y = consumer expenditure, and X=disposable income of consumers. We take log transformation of eq [5.9],

$y_t = \gamma_1 + \gamma_2 x_t$ [5.10]

if y and x were at all times in equilibrium then it is clear that $y_t - \gamma_1 - \gamma_2 x_t = 0$. However, there are many times when y will not be at its equilibrium value relative to x and at such time, the quantity $y_t - a - b x_t \neq 0$. Quantities such as $y_t - a - b x_t$ are therefore known as disequilibrium error. Since y and x are not always in equilibrium, we cannot observe the Long Run relationship [5.9] directly.

All we can observe is a disequilibrium relationship involving lagged values of y and x, which reduces to [5.9] whenever equilibrium happens to occur. We denote this disequilibrium relationship by

$$yt = \beta_0 + \beta_1 x_t + \beta_2 x_{t-1} + \alpha\, y_{t-1} + u_t \qquad 0<\alpha<1 \qquad [5.11]$$

The problem with [5.11] is that the levels of variables are likely to be non-stationary. [5.11] can be re-arranged and re-parameterized as follows:

Subtracting y_{t-1} from either sides yields

$$\Delta yt = \beta_0 + \beta_1 x_t + \beta_2 x_{t-1} - (1-\alpha)\, y_{t-1} + u_t \quad \text{or}$$

$$\Delta yt = \beta_0 + \beta_1 \Delta x_t + (\beta_1 + \beta_2) x_{t-1} - (1-\alpha)\, y_{t-1} + u_t \qquad [5.12]$$

Where

$\Delta yt = y_t - y_{t-1}$ and $\Delta xt = x_t - x_{t-1}$

We can re-parameterize [4.18] as

$$\Delta yt = \beta_0 + \beta_1 \Delta x_t - (1-\alpha)[y_{t-1} - \gamma_2 x_{t-1}] + u_t \qquad [5.13]$$

Where the new parameter $\gamma_2 = {(\beta_1 + \beta_2)}/{(1-\alpha)}$

Equation [5.13] can be further re-parameterized as

$$\Delta yt = \beta_1 \Delta x_t - (1-\alpha)[y_{t-1} - \gamma_1 - \gamma_2 x_{t-1}] + u_t \qquad [5.14]$$

Where $\gamma_1 = {}^{\beta_0}/_{(1-\alpha)}$

Equation [5.14] states that the changes in y depend on changes in x. $[y_{t-1} - \gamma_1 - \gamma_2 x_{t-1}]$ is the disequilibrium error from the previous period. The value of y is being corrected for the previous disequilibrium error. Hence, [5.14] is called the Error Correction Model (ECM).

Advantages of the ECM formulation:

1. We can safely refer to such measures as R^2 without being concerned about spurious correlation problems.
2. It makes use of any Long Run information about the levels of variables.
3. The disturbance u_t is non-auto-correlated.
4. It distinguishes between Long Run parameters ($\gamma_1 and\ \gamma_2$) and Short Run Parameters (α and β_1). It is an excellent vehicle for either assessing the validity of the Long Run implication of theory or of incorporating them into the estimation process.

5.2.8. Encompassing Model

There are two main objectives of econometrics, i.e., explain (behavior of variables we have seen) and forecast (behavior of variables we have not seen yet). To undertake econometric analysis, one must have economic theory, statistical data, a method (estimation theory), a know how which tells us how to apply the estimation theory to the statistical data. There are six properties to be considered

in evaluating a model, i.e. simplicity, relevance, theoretical plausibility, accuracy of coefficients, explanatory ability, and forecasting ability.

Earlier emphasis of econometrics was measurement of parameters. Haavelmo moved the emphasis from measurement of parameters to testing of theories (Charemza and Deadman, 1997). Tinbergen (1951) said there are two things for correct economic analysis of a relation:

1. What relation you are interested in?
2. What factors enter into this relation?

In modern parlance the Five Cowles Commission Assumptions are:

1. Zero restrictions are known.
2. The relations are invariant in time.
3. The parameters are structurally invariant.
4. It is known, which variables are exogenous and endogenous. Three additional conditions (Tinbergen) :
    a. Non significant error omitted. Specification error is more important than error of measurement.
    b. Length of lag can be determined by trial and error.
    c. Coefficient has a right sign.
5. Classical test, i.e. R^2 should be high, t-stat and F-stat should be good.

The above methodology (from Haavelmo up to the Cowles commissions) is called the Traditional methodology. Later, it turned out that the traditional methodology failed. Some events show this failure. The real practical problem of model specification and selection is rarely addressed. There is a gap between

theorist and applied econometricians. Applied econometricians build their own models and forecasting of the macro economy is very poor.

A consequence of the traditional methodology is that we can get the results we like. The weakness of traditional methodology is that it does not allow for testing of different models. We just assume the model is true and then apply it. The important idea of the Hendry method is to try another model. Hendry did this in the consumption function.

Earlier, there are three consumption functions: Keynes consumption function, Habit formation or Permanent Income Hypothesis, and Wealth Effect Model. Incorporating all those three consumption functions, Hendry used nested models to build a new consumption function. Later, this model became known as the 'encompassing model'. There are at least three reasons to use the encompassing model:

1. Research must be accumulated to get progress. If everybody starts from the beginning, there is not much progress in Economics.
2. A theoretical framework is essential.
3. An econometric model must account for the properties of the data.

To encompass the ELG model, the procedure is as follows:

1. Collect all models used by authors for explaining ELG Hypothesis.
2. Find reasons for differences between these models. It is found from literature review that there are seven reasons for differences in explaining the ELG Models: method of seasonal adjustment, data series, other data transformations, lag structures, functional form, diagnostic statistics and estimation method.

3. Transform all the models to a form in which they all can be put into a single large model, an encompassing model so that the theory of nested testing hypothesis can be used.

Let's consider a general case of one equation model with some dependent variables:

Model A : $Y = X\beta + u$

Model B : $Y = Z\gamma + v$

X includes at least one variable which is not in Z so that model A cannot be nested into model B. Likewise, Z includes at least one variable which is not in X so that model B cannot be nested in model A. However, there may be some common variables in X and Z.

There are three approaches to testing between non nested models:

1. Test based on artificial nesting.
2. J-test.
3. JA-test.

5.2.9. Artificial nesting

Model A : $Y = X\beta + u$ [5.15]

Model B : $Y = Z\gamma + v$ [5.16]

Multiply equation [5.15] by λ and equation [5.16] by 1-λ where $0 \leq \lambda \leq 1$

$\lambda Y = \lambda X\beta + \lambda u$

$(1 - \lambda)Y = (1 - \lambda)Z\gamma + (1 - \lambda)v$

By adding up both equations above, we get

$Y = X(\lambda\beta) + Z\big((1 - \lambda)\gamma\big) + \lambda u + (1 - \lambda)v$

$Y = Xb + Zc + \varepsilon$ [5.17]

Where $b = (\lambda\beta)$, $c = (1-\lambda)\gamma$, and $\varepsilon = \lambda u + (1-\lambda)v$

Model [5.17] is a hybrid of model [5.15] and [5.16] and it artificially nests [5.15] and [5.16] into itself. Setting $\lambda=0$, and hence $b=0$, makes model [5.17] become $Y = Z\gamma + v$ which is model [5.16]. Similarly, setting $(1-\lambda) = 0$, and hence $c=0$, makes model [5.17] becomes $Y = X\beta + u$ which is model [5.15]. Now, we test two hypotheses one by one.

$H_0^A : c = 0$

$H_1^A : c \neq 0$

$H_0^B : b = 0$

$H_0^B : b \neq 0$

The possible test outcomes are as follows:

		Result of H_0^B	
		Rejected	Accepted
Result of H_0^A	Rejected	$c\neq0$, $b\neq0$ None of the two models can be rejected. Test outcome is inconclusive	$c\neq0$, $b=0$ Model A is rejected and model B is accepted
	Accepted	$c=0$, $b\neq0$ Model A is accepted and model B is rejected	$C=0$, $b=0$ Both models are rejected. Test outcome is inconclusive

Two problems will be listed in this approach:

(1) The test outcomes may be inconclusive. This can happen especially when we have large samples and the two models differ by slight variation.

(2) The hybrid of model [5.17] may contain too many parameters and hence may be exposed to multicollinearity. For example n=40, number of variables in model A are 5 and number of variables in model B are 5, so hybrid model will have 9 variables. This problem becomes severe when we have more than two models.

(3) Consider for example H_0^A: c=0. It means $(1-\lambda)\gamma=0$. It will happen only if $\lambda=1$, or $\gamma=0$. So, if c=0, the conclusion is either model B is invalid ($\gamma=0$) or we do not give any weight to model A, means $\lambda=1$.

5.2.10. J-Test

We again consider the two models [5.15] and [5.16]:

Model A : $Y = X\beta + u$

Model B : $Y = Z\gamma + v$

The first step is to estimate the equation of model B to obtain $\hat{Y}_B = Z\hat{\gamma}$. Each step can be explained as follows:

Step 1 (a) Estimate equation [B], $Y = Z\gamma + v$ to obtain $\hat{Y}_B = Z\hat{\gamma}$

Step 1 (b) Augment model A by $\hat{Y}_B$

$$Y = X\beta + \lambda\hat{Y}_B + u \qquad [5.18]$$

Then we apply a standard list to test

$H_0^A : \lambda = 0$

$H_1^A : \lambda \neq 0$

Step 2 (a) Estimate equation (A), $Y = X\beta + u$ to obtain $\hat{Y}_A = X\hat{\beta}$

Step 2 (b) Augment model B by $\hat{Y}_A$

$$Y = Z\gamma + \theta\hat{Y}_A + v \qquad [5.19]$$

And then we apply a standard list to test

$H_0^B : \theta = 0$

$H_1^B : \theta \neq 0$

Possible outcomes and their interpretations are as follows:

		Result of H_0^B	
		Rejected	Accepted
Result of H_0^A	Rejected	$\lambda \neq 0, \theta \neq 0$ Both models are rejected and the true model is different from model A and model B.	$\lambda \neq 0, \theta = 0$ Model A is rejected and model B is accepted. Model A does not successfully challenge B. Model B successfully challenges model A.
	Accepted	$\lambda = 0, \theta \neq 0$ Model A is accepted and model B is rejected	$\lambda = 0, \theta = 0$ Both models are strong to challenge each other successfully. Test outcome is inconclusive.

The problems we find here is the same as the previous problem. We need one to be accepted and the others to be rejected.

Some important things in the J-test are:

(1) The J-test solves to a great extent the problem of loss in degree of freedom found in artificial nesting.

(2) The test may remain as inconclusive as in artificial nesting.

(3) Consider $H_0^A : \lambda = 0$. When we test this null hypothesis, the test is carried out under the assumption that H_0^A is true. For example, if we apply t-test, our test statistics will be

$$t = \frac{\hat{\lambda} - \lambda H_0^A}{SE(\hat{\lambda})}$$

And it will become

$$t = \frac{\hat{\lambda} - 0}{SE(\hat{\lambda})}$$

Likewise for testing $H_0{}^B$, we compute

$$t = \frac{\hat{\theta} - 0}{SE(\hat{\theta})}$$

Assuming that $H_0{}^B$ is true.

5.2.11. JA-Test

This is a modification of the J-test. We again consider the two models [5.15] and [5.16]

Model A : $Y = X\beta + u$

Model B : $Y = Z\gamma + v$

The first step is to estimate the equation of model B to obtain obtain $\hat{Y}_B = Z\hat{\gamma}$.

Each step can be explained as follows:

Step 1 (a) Estimate equation [A], $Y = X\beta + u$ to obtain $\hat{Y}_A = X\hat{\beta}$

Step 1 (b) Regress $\hat{Y}_A$ on Z model (B), $Y = Z\gamma + v$ and compute

$$\hat{\hat{Y}}_{AB} = Z\hat{\gamma}$$

Step 1 (c) Augment model A by $\hat{\hat{Y}}_{AB}$

$$Y = X\beta + \lambda\hat{\hat{Y}}_{AB} + u \qquad [5.20]$$

$\hat{\hat{Y}}_{AB}$ is an estimated model A predicted through model B. and then test

$H_0{}^A : \lambda = 0$, against

$H_1^A : \lambda \neq 0$

Step 2 (a) Estimate model B, $Y = Z\gamma + v$to obtain $\hat{Y}_B = Z\hat{\gamma}$

Step 2 (b) Regress $\hat{Y}_B$ on X using model (A) and compute

$$\hat{\hat{Y}}_{BA} = X\hat{\beta}$$

Step 2 (c) Augment model B by $\hat{\hat{Y}}_{BA}$

$$Y = Z\gamma + \theta\hat{\hat{Y}}_{BA} + v \qquad [5.21]$$

$\theta\hat{\hat{Y}}_{BA}$ is an estimated model B predicted through model A. and then test

$H_0^B : \theta = 0$, against

$H_1^B : \theta \neq 0$

The test has four possible outcomes with two outcomes being inconclusive. Some important things in the JA-test are:

(1) The JA-test solves the problem of loss in degree of freedom found in artificial nesting in the same manner as J-test.

(2) The test may remain as inconclusive as before.

(3) The test generally has low power (possibility of rejecting H_0 when H_0 is false).

(4) Indirectly we end up consuming more degree of freedom than indicated.

In general, it is found that the JA-test is more likely to produce inconclusive results than J-test. In the dependent variables if the two models appear in different form then JA-test is more likely to fail then J-test. Failure means inability to produce any of the four outcomes. Hence, as a conclusion, J-test is the best option.

5.3. Flowchart of Methods used in this study

This study will be presented as follows. Firstly, we apply a single bivariate model with different time period. The first time period is 1967:2007 (40 years) and the second time period is 1983:2007 (25 years). We want to see what happened after Indonesia intensively implemented import substitution in 1983 onwards. Some methods for this stage are unit root test, cointegration test, grager causality test, Vector Autoregression (VAR) / vector error correction model (VECM) and impulse response function.

Secondly, we apply a chain bivariate model for two channels. One channel is from export → investment → economic growth (using BOP constrained theory). The other channel is from economic growth → terms of trade → export (using Verdoorn law theory). Will the result support the single bivariate model? Some methods for this stage are unit root test, cointegration test, grager causality test, Vector Autoregression (VAR) / vector error correction model (VECM) and impulse response function.

Thirdly, we want to see, if all variables (main variables and instrument variables) were included in one multivariate model, what will happen? Will the result support the chain bivariate model? Some methods for this stage are unit root test, cointegration test, grager causality test, and Vector Autoregression (VAR) / vector error correction model (VECM).

Finally, we want to evaluate previous models which give contradictive results. In this stage, we use encompassing model by using nested model and non nested model. We use J-test for non nested model. We expect the results will

declare which are the right and the wrong models. Some methods for this stage are unit root test, cointegration test, grager causality test, Vector Autoregression (VAR) / vector error correction model (VECM) and J-test.

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CHAPTER 6

EMPIRICAL RESULTS

6.1. Bivariate Model of ELGH (1967-2007)

It is of interest to determine whether ELG is valid for Indonesia of the last 40 years from 1967 at the beginning of President Soeharto's economic liberalization to 2007, a decade after the 1997 financial crisis. Should Indonesia continue to follow an export promotion strategy post 1997 financial crisis? In other words, is ELG hypothesis valid for Indonesia? To start with, the graph of all the series are presented in figure 20 to show the pattern of the exports and GDP data series. All data was collected from IFS 2008 and WDI 2007.

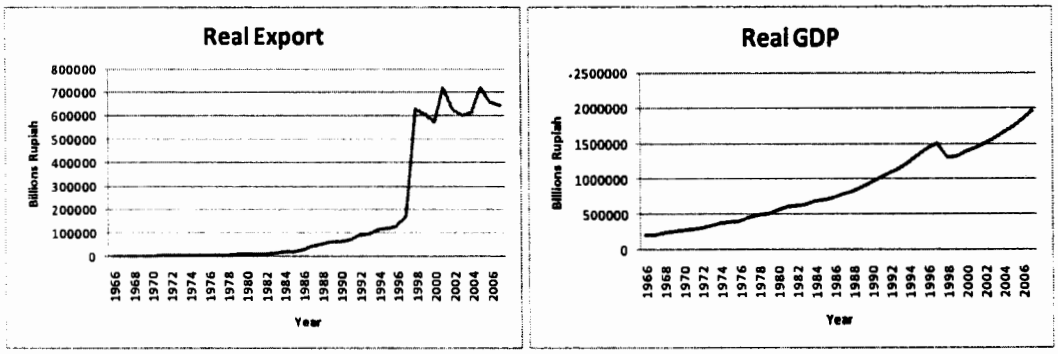

Figure 20. Trend Series of Real Exports and Real GDP

All of these series were transformed into log form. Log transformation is useful to overcome the problem of heteroscedasticity. Log transform compresses the scale in which the variables are measured. Therefore it reduces the difference between two values by manyfold. Table 7 shows the summary statistics for the data (in natural logarithm) for real gross domestic product, and real exports.

Table 7. Statistics of Log Real Export (lx) and Log Real GDP (ly), 1966-2007

Variable	Mean	Std Deviation	Minimum	Maximum
lx	10,444	2,170	6,016	13,965
ly	13,485	0,691	12,193	14,490

Figure 21 shows the pattern of the natural logarithm of export and GDP data series. In this figure the exports and GDP data are graphed to the same scale on the Y axis in order to ease comparisons between the series.

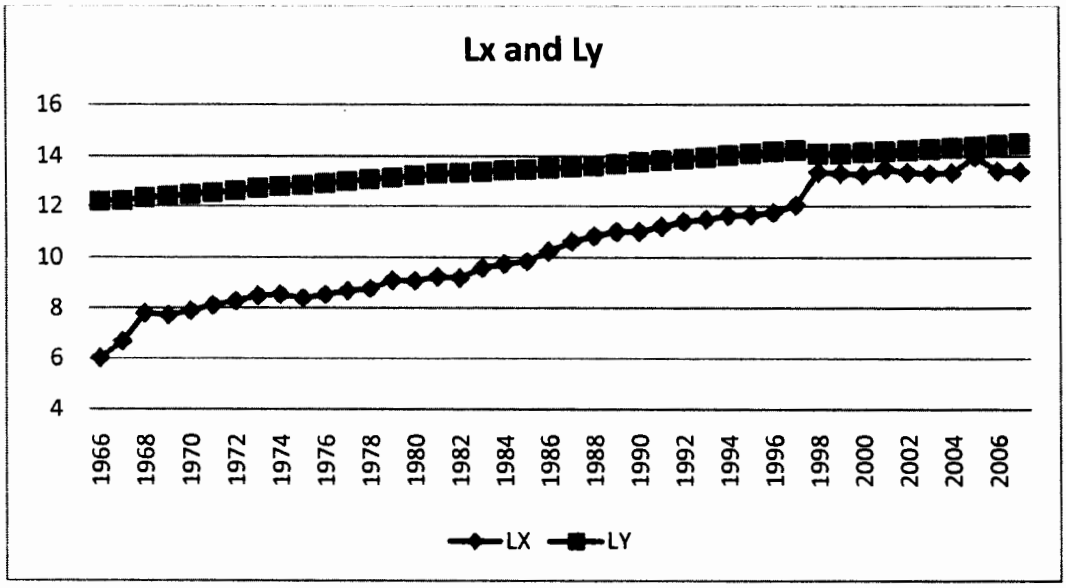

Figure 21. Pattern of The Natural Logarithm of Exports and GDP

Figure 21 shows that the series of exports (lx) is more volatile than the series of Economic Growth (ly). In other words, the series of economic growth (ly) is smoother than the series of (lx). It is also clear that the two series are trends and not stationary. To make it stationary, the first difference is applied. Figure 22 shows the series of the first difference of lx and ly.

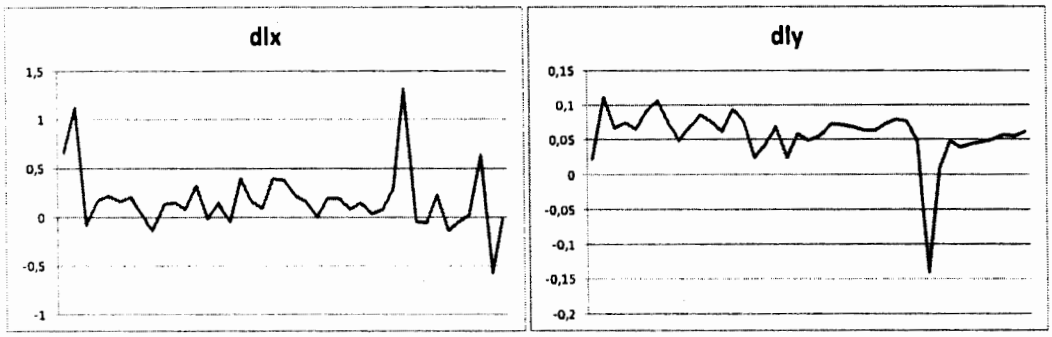

Figure 22. First Difference of lx and ly

6.1.1. Unit Root Test for real export and real GDP (1967-2007)

Figure 22 demonstrates that the series of natural log of real exports and real GDP seems to be stationary. To verify this, unit root test is applied on the two series. Augmented Dickey Fuller (ADF) and Philips Perron (PP) tests are applied to test for stationarity.

Here, we apply ADF test with and without trend as recomended by Engle and Granger (1987) and the PP test, again, with and without trend. Table 8 shows the results of the ADF test and the PP test. The PP test has an extra advantage over the ADF test since it has been adjusted to take serial correlation into account.

The results show that the real GDP and the real exports are not stationary in their level but are stationary in their first difference. Both unit root statistics show this indication. Hence, the null hypothesis of nonstationarity is rejected at the 1 percent level of significance for both series.

Table 8. Unit Root Test for Data 1966-2007

Variable	ADF Test		PP Test	
	Without trend	With trend	Without Trend	With Trend
lx	-1.392325	-3.240677*	-1.878809	-3.573003**
dlx	-6.063633***	-5.966309***	-6.497359***	-6.533641***
ly	-2.450347	-1.740417	-2.349531	-1.096861
dly	-3.759579***	-4.280813***	-4.629742***	-5.257311***

Key : ly = log of real Gross Domestic Product; dly = first difference of ly; lx = log of real export; dlx = first difference of lx;
* , **, *** significant at level 10%, 5% and 1% respectively

6.1.2. Cointegration Test for real export and GDP (1967-2007)

Since both series are integrated of order one , I(1), we use the Johansen cointegration test to examine the cointegration hypothesis between the variables. We assume that there is a linear deterministic trend in the data, since figure 21 shows the trends of export and GDP to resemble linear deterministic trends. Furthermore, we assume an intercept in the cointegration equation. The results of the Johansen integration test with these assumptions can be seen in Table 9.

Table 9. Johansen Integration Test for Data 1967-2007

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	32.62300**	15.41
r<=1	r=2	3.977131*	3.76

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Table 9 shows that L.R. test indicates two cointegrating equations at 5% significance level between export and GDP. This shows that the cointegration is not unique. This also means there is long run relationship between GDP and export. When two variables and two cointegrations exist, then both variables are I(0)[1]. For testing granger causality, we should base the granger causality on a VARL (Vector Auto Regression in Level).

[1] If there are two cointegrating vectors in a two equations VAR, the normalized long run relationships would be written as :
$x_t = \gamma_{12} y_t + u_{1t}$,
$y_t = \gamma_{21} x_t + u_{2t}$,
And since every cointegrating relationship is stationary, then it must be the case that $u_{1t} \sim I(0)$, $u_{2t} \sim I(0)$. The above equations can be solved for x_t, y_t:
Xt = f1(u1t, u2t)
Yt = f2(u1t, u2t)
It is clear from the equations above that xt, and yt are functions of I(0) variables only. Consequently, since there are no nonstationary terms on the right-hand sides of these equations, the left-hand sides must be stationary as well. Hence, if rank=2, both variables in the VAR must be I(0).

6.1.3. Granger Causality Test Based on VARL for real export and real GDP (1967-2007)

Since there are two cointegration vectors in the two variables, we use VARL. We add a dummy variable in the VARL model to catch the significance of crisis to export / GDP growth.

The VARL model is estimated with one lag for each variable plus a constant term in each equation. To summarize the VARL results, Equations (6.1 and 6.2) show the VARL calculated coefficients with the t-statistics shown in brackets below the corresponding variables.

$$LY = 0.868\ LY(-1) + 0.049\ LX(-1) + 1.332 - 0.096\ DUMMY$$

(26.938) (4.052) (4.214) (-4.622) R^2=99% [6.1]

$$LX = 1.198\ LY(-1) + 0.480\ LX(-1) - 10.730 + 0.703\ DUMMY$$

(4.274) (4.496) (-3.903) (3.893) R^2=98% [6.2]

The coefficient of the dummy variable which differentiates the year of crisis is significant in both equations [6.1] and [6.2]. This suggests the crisis significantly affects the GDP growth and the exports growth in long run. Table 10 shows that the coefficient of each variable.

Tabel 10. VARL Results for Data 1966-2007

Dependent Variables	Independent Variables		
	GDP (-1)	Exports (-1)	Dummy
GDP	0.868 (26.938)	0.049 (4.052)*	-0.096 (-4.622)*
Exports	1.198 (4.274)*	0.480 (4.496)	0.703 (3.893)*

Note: the t-statistics shown in brackets below the corresponding variable.

From Table 10, it is clear that in long run, there is relationship between exports and GDP. The causality runs from exports to GDP and from GDP to exports (bidirectional causality). To sum up, this suggests ELG is valid for Indonesia for the period 1967-2007 (pre and post crisis).

Indonesia implemented import substitution policy from 1973 to 1982 due to the hike prices of petroleum. Perhaps bidirectional causality between exports and GDP occured due to implementing mixed policy of import substitution and export promotion in the period 1967:2007. Now, we may limit our analysis only to when Indonesia promote export promotion policy intensively. We can ask if the ELG Hypothesis is valid during the period President Soeharto took the export promotion policy intensively until post crisis. On the other words, what does the result of ELG look like in the period of 1983-2007?

6.2. Bivariate Model of ELGH (1983-2007)

Figure 23 of the 1983-2007 time series data is shown to see the pattern of the exports and GDP data series.

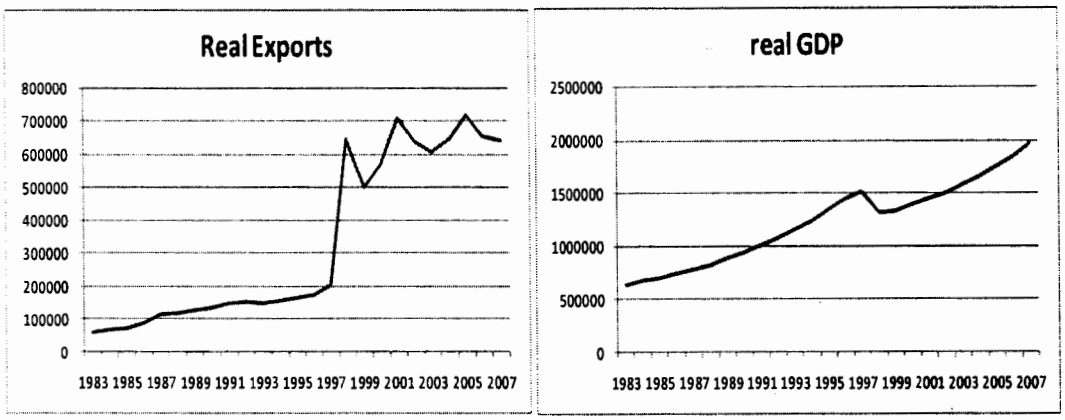

Figure 23. Trend series of Real Exports and Real GDP (1983-2007)

Figure 23 indicates that the two series are not stationary at level. In figure 24, all of the series were transformed into log form. Table 11 shows the summary statistics for real gross domestic products (y), real exports (x) in natural logarithm.

Table 11. Statistics of Log Real exports (lx) and GDP (ly), 1983-2007

Variable	Mean	Std Deviation	Minimum	Maximum
Lx	12.362	0.876	10.974	13.483
Ly	13.971	0.336	13.369	14.490

Table 11 shows that standard deviation for exports is greater than GDP. This indicates that exports fluctuate more compared to GDP.

Figure 24 shows the pattern of the natural logarithm of exports and GDP data series. If we look at figure 24, it shows more clearly that the growth of exports is more volatile than that of GDP.

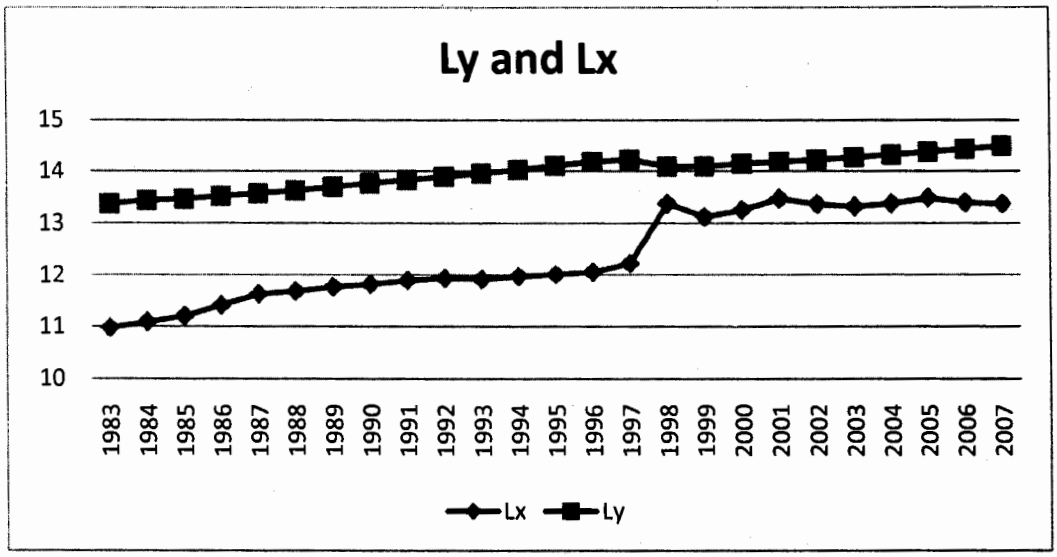

Figure 24. Pattern of the Natural Log of Exports and GDP (1983-2007)

Figure 24 shows that the series of exports (lx) and economic growth (ly) are trending and not stationary. To make them stationary, first difference is applied. Figure 25 shows the series of the first difference of lx and ly.

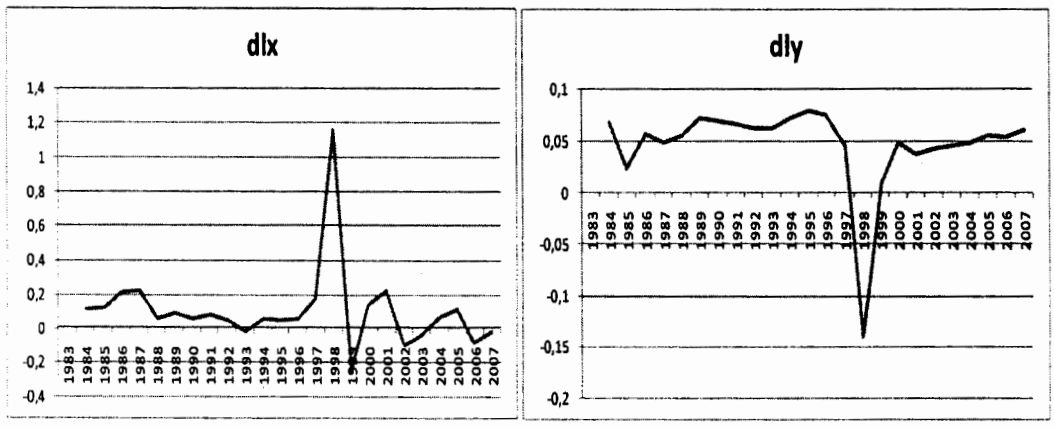

Figure 25. First Difference of Natural Log Real Exports and GDP (83-07)

6.2.1. Unit Root Test for real exports and real GDP (1983-2007)

Figure 25 demonstrates that the series of first difference of the natural log of real exports and real GDP seems to be stationary. To verify this, unit root test is performed on the two series. ADF and PP tests are applied as unit root tests. Table 12 shows the result of the ADF test and PP test.

Table 12. Unit Root test for data 1983-2007

Variable	ADF Test		PP Test	
	Without trend	**With trend**	**Without Trend**	**With Trend**
Lx	-1.107092	-1.875771	-1.135327	-2.223839
Dlx	-3.602592**	-3.590773*	-5.466800***	-5.425429***
Ly	-0.777060	-1.875771	-1.010127	-1.705338
Dly	-2.969855 *	-3.008375	-3.537368 **	-3.461501 *

Key : ly=log of real Gross Domestic Product; dly=first difference of ly; lx=log of real export; dlx=first difference of lx;
* , **, *** significant at level 10%, 5% and 1% respectively

The results in table 12 show that the real exports and the real GDP are stationary in their first difference. Both unit root statictics indicate this. Hence, the null hypothesis of nonstationarity is rejected at the 5 percent level of significance for both series.

6.2.2. Cointegration Test for real export and GDP (1983-2007)

Since both series are integrated of order one , I(1), we use the Johansen cointegration test to examine the cointegration hypothesis between the variables.

We assume that there is a linear deterministic trend in the data, since figure 18 shows the trends of exports and GDP to resemble linear deterministic trends. Furthermore, we assume an intercept in the cointegration equation. The results of the Johansen integration test with these assumptions can be seen in Table 13.

Table 13. Johansen Integration Test for Data 1983-2007

Number of Cointegrating Vectors Trace Statistics		**Likelihood Ratio Statistics**	**95% critical value**
Null	Alternative		
r=0	r>=1	49.27836**	15.41
r<=1	r=2	0.042717	3.76

** denotes rejection of the hypothesis at 1% significance level
L.R. test indicates 1 cointegrating equation at 1% significance level

Table 13 shows that L.R. test indicates one cointegrating equation at 1% significance level between export and GDP. This shows that the cointegration is unique. This also means there is long run relationship between GDP growth and exports growth. For testing granger causality, we should base the granger causality on a VECM (Vector Error Correction Model).

6.2.3. Granger Causality Test Based on VECM for Real GDP and Real Exports (1983-2007)

Since the data are stationary in level, we use VECM. We add a dummy variable in the VECM model to catch the significance of the crisis on exports / GDP growth.

The VECM model is estimated with one lag in each variable plus a constant term and dummy variable in each equation. To summarize the VECM results, Equations (6.3 and 6.4) show the results for the VECM specification with the t-statistics shown in brackets below the corresponding variable.

DLX = 0.771 ECT +1.150 LY (-1) +0.081 LX (-1) - 0.417 +1.047 dummy

(9.763) (1.093) (0.497) (-4.720) (9.357) R^2= 86%

[6.3]

DLY = -0.122 ECT – 0.135 LY (-1) - 0.076 LX (-1) +0.143 - 0.191 dummy

(-10.746) (-0.893) (-3.249) (11.255) (-11.118) R^2= 90%

[6.4]

Where the error correction term (ECT) :

$ECT = y_{t-1} - 1.139\, x_{t-1} + 0.133$

The t-statistic of coefficient x_{t-1} is -8.097. Table 14 shows the coefficient of each variable.

Tabel 14. VECM Results for data 1983-2007

Dependent Variables	Independent Variables			
	ECT	**Δ GDP (-1)**	**Δ Export (-1)**	**Dummy**
Δ Export	0771 (9.763)*	1.150 (1.093)	0.081 (0.497)	1.047 (9.357)*
Δ GDP	-0.122 (-10.746)*	-0.135 (-0.893)	-0.076 (-3.249)*	-0.191 (-11.118)*

Note: the t-statistics shown in brackets below the corresponding variable.

From Table 14, because the coefficients of error correction term are significants in both equations, we can say that there is long run relationship between exports and GDP. A significant error correction term indicates long run Granger causality from the explanatory to the dependent variables (Granger 1988). Therefore, long run granger causality runs from exports to GDP and from GDP to exports (bidirectional causality).

In short run, the causality runs from exports to GDP. The dummy variable is significant in both equation [6.3] and [6.4]. This means that the crisis affects both GDP and exports in short run.

To sum up, there is long run relationship between exports and GDP in Indonesia. The causality runs from exports to GDP in short run.

***

However, previous results show that there is a long run relationship between exports and GDP in the period 1966-2007. There are two cointegration equations in two variables. The causality runs from exports to GDP, and from GDP to exports. When we change the period to 1983-2007, the result shows one cointegration equation in two variables. This means, the length of period matters. However, the result still shows a bidirectional causality in long run relationship between exports and GDP. The period when government of Indonesia started export promotion policy intensively from 1983 until 10 years post crisis was proved as the period of exports led economic growth and also a period of growth led exports.

***

We will discuss the channel from exports growth to economic growth as well as from economic growth to exports growth in the next section using annual data from 1983-2007.

A chain of bivariate models is used to dig out the channels through which exports (or GDP) may cause GDP (or exports) for Indonesia. A Model can be described as follows: exports may cause GDP and GDP may cause exports.

Exports may cause GDP

Exports versus intermediate variables

Intermediate variables versus GDP.

GDP may cause exports

GDP versus intermediate variables

Intermediate variables versus exports.

In this model, as explained earlier in Chapter 4, we follow BOP constrained model of ELG by using real investment as an intermediate variable to explain the channel from exports to GDP growth. Verdoorn law model of ELG is followed by using terms of trade as an intermediate variable to explain the channel from GDP to export growth.

6.3. Exports may cause GDP (1983-2007)

To know whether exports may cause GDP or not, a chain of bivariate models is used. The chain is as follows: Exports versus investment; and Investment versus GDP. To start with, the graphs of all the series are presented in Figure 26 to see the pattern in exports, investment, and GDP data series.

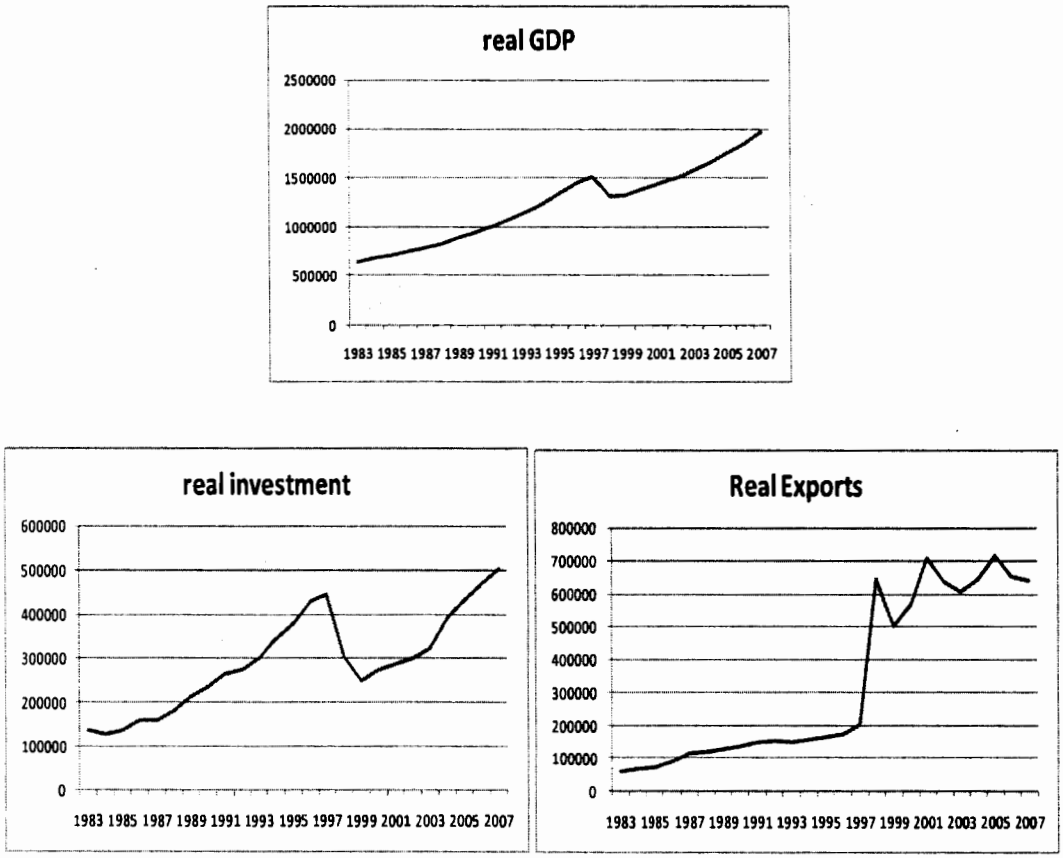

Figure 26. Trend series of Real Exports, Real Investment and Real GDP.

Figure 26 indicates that all series are not stationary at level. Table 15 shows the summary statistics for real exports (LX), real investment (LI) and real GDP (LY) data in natural logarithm.

Table 15. Statistics of LX, LI and LY

Variable	Mean	Std Deviation	Minimum	Maximum
LX	12.362	0.876	10.974	13.483
LI	12.514	0.410	11.761	13.131
LY	13.971	0.336	13.369	14.490

6.3.1. Exports versus Investment

The variable which is used in this study to portray investment is Gross Fixed Capital Formation (GFCF). GFCF time series data is often used to analyse the trends in investment activity over time, deflating or reflating the series using a price index. The price index used here is Producer Price Index. Figure 27 shows the pattern of the natural logarithm of real investment and real exports data series. If we look at figure 27, it shows that the growth of investment is more volatile than that of exports.

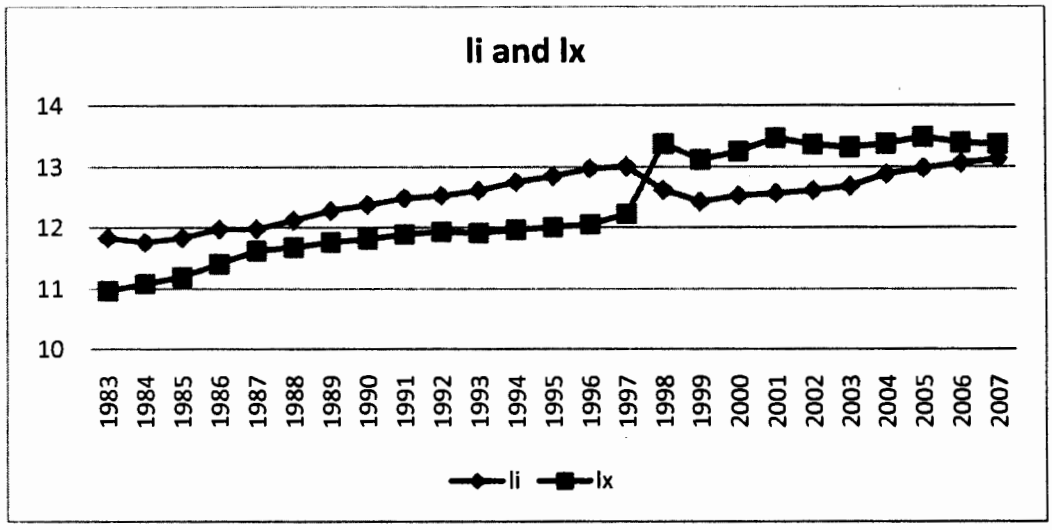

Figure 27. Pattern of the Natural Log of Real Investment and Real Exports

Figure 27 shows that the two series are trends and not stationary. To make it stationary, the first difference is applied. Figure 28 shows the series of the first difference of li and lx.

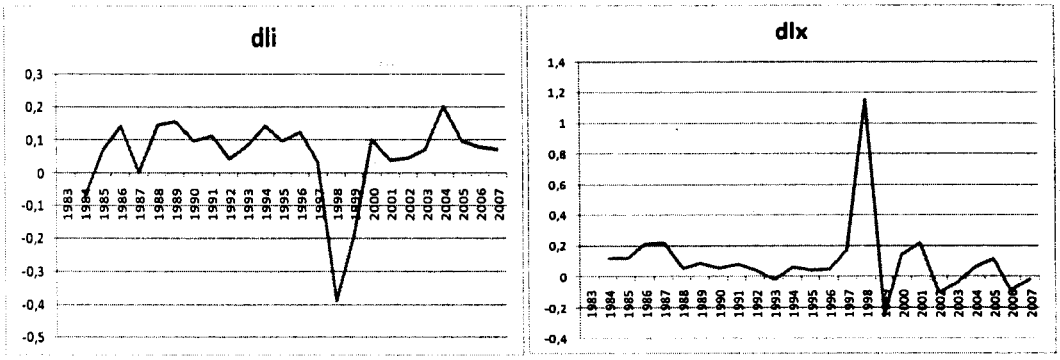

Figure 28. First Difference of Natural Log Real Investment (dli) and Export (dlx)

6.3.1.1. Unit Root Test for Real Investment and Real Exports

Figure 28 demonstrates that the series of the first difference of the natural log of real investment and real exports seem to be stationary. To verify this, unit root test is performed on the two series. The ADF and PP tests are applied to test for stationarity. Table 16 shows the result of the ADF test and PP test.

The results in table 16 indicate that the real investment and the real exports are stationary in their first difference. Both unit root statictics show this. Hence, the null hypothesis of nonstationarity is rejected at the 5 percent level of significance for both series.

Table 16. Unit Root test for LX and LI

Variable	ADF Test		PP Test	
	Without trend	With trend	Without Trend	With Trend
LI	-1.767582	-2.490257	-1.041161	-1.704081
DLI	-3.231859 **	-3.179808	-3.195863 **	-3.156601
LX	-1.107092	-1.875771	-1.135327	-2.223839
DLX	-3.602592**	-3.590773*	-5.466800***	-5.425429***

Key : li=log of real Investment; dli=first difference of li; lx=log of real export; dlx=first difference of lx; * , **, *** significant at level 10%, 5% and 1% respectively

6.3.1.2. Cointegration Test for Real Investment and Real Exports

Since both series are integrated of order one or I(1), we use the Johansen cointegration test to examine the cointegration hypothesis between the variables. Assume that there is a linear deterministic trend in the data, since figure 29 shows the trends of investment and exports to resemble linear trends. Furthermore, we assume an intercept in the cointegration Equation. The result of the Johansen integration test with these assumptions can be seen in Table 17.

Table 17. Johansen Test for Cointegration between Investment and Exports

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	56.54468**	15.41
r<=1	r=2	7.364004**	3.76

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Table 17 shows that there are two cointegration equations between investment and export. This means there is long run relationship between exports and investment. Hence, for the test of granger causality, we should estimate Vector Auro Regression in Level (VARL).

6.3.1.3. Granger Causality Test Based on VARL for Real Investment and Real Export

Since there are two cointegration vectors in the two variables, we use VARL. We add a dummy variable in the VARL model to catch the significance of the crisis on investment/exports growth.

The VARL model is estimated with one lag of each variable plus a constant term and dummy variable in each equation. To summarize the VARL results, Equations (6.5 and 6.6) show the results for the VARL specification, with the t-statistics shown in brackets below the corresponding variable.

$$LI = 0.812\ LI(-1) + 0.287\ LX(-1) - 0.966 - 0.444\ dummy \qquad [6.5]$$

(12.329) (4.633) (-1.332) (-4.798) R^2=96%

$$LX = 0.489\ LI(-1) + 0.253\ LX(-1) + 2.778 + 0.992\ dummy \qquad [6.6]$$

(5.277) (2.898) (2.725) (7.619) R^2=98%

The coefficient of the dummy variable for the crisis year is significant in both equation [6.5] and [6.6]. This means the crisis affects the investments and exports. Table 18 shows the coefficient of each variable.

Tabel 18. VECM Results of Investment and Exports

Dependent Variables	Independent Variables		
	Investment (-1)	**Export (-1)**	**Dummy**
Investment	0.812 (12.329)	0.287 (4.633)*	-0.444 (-4.798)*
Export	0.489 (5.277)*	0.253 (2.898)	0.992 (7.619)*

Note: the t-statistics shown in brackets below the corresponding variable.

From Table 18, we can say that exports is a granger cause of investment, and investment is a granger cause of exports in the long run. To sum up, there is long run relationship between exports and investment growth in Indonesia. The causality is bidirectional.

6.3.2. Investment versus GDP growth

Figure 29 shows the pattern of the natural logarithm of real investment and real GDP data series. If we look at Figure 29, it shows that the growth of investment is more volatile than that of GDP.

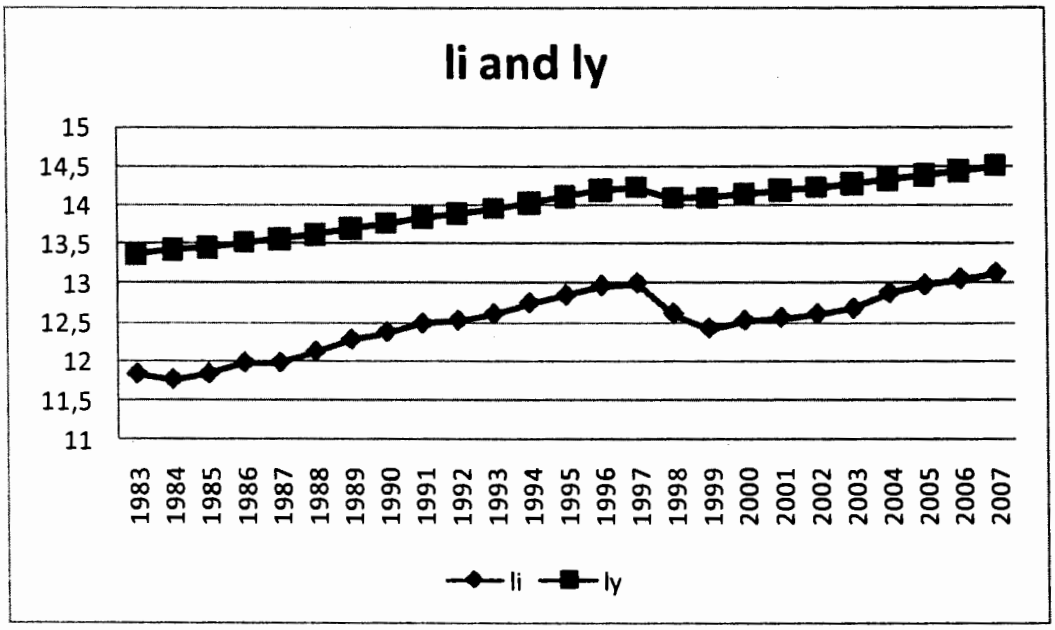

Figure 29. Pattern of the Natural Logarithm of Real Investment and GDP

Figure 29 shows that the two series are trending and not stationary. To make it stationary, first difference is applied. Figure 30 shows the series of the first difference of li and ly.

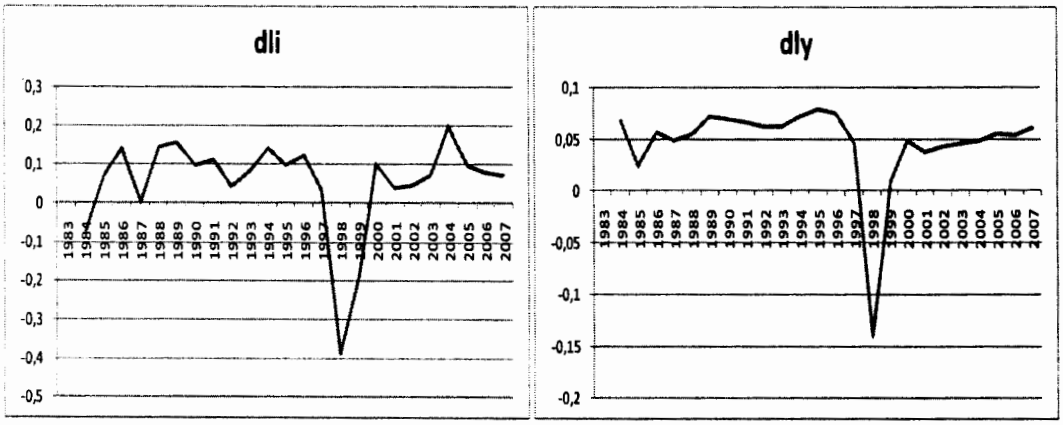

Figure 30. First Difference of Natural log Real Investment and GDP

6.3.2.1. Unit Root Test for real investment and real GDP

Figure 30 demonstrates that the series of first difference of the natural log of real investment and real GDP seems to be stationary. To verify this, unit root test is performed on the two series. The Augmented Dickey Fuller (ADF) and Philips Perron (PP) tests are applied to test for stationarity. Table 19 shows the result of the ADF test and PP test.

Table 19. Unit Root Test for LI and LY

Variable	ADF Test		PP Test	
	Without trend	With trend	Without Trend	With Trend
LI	-1.767582	-2.490257	-1.041161	-1.704081
DLI	-3.231859 **	-3.179808	-3.195863 **	-3.156601
LY	-0.777060	-1.875771	-1.010127	-1.705338
DLY	-2.969855 *	-3.008375	-3.537368 **	-3.461501 *

Key : li=log of real investment; dli=first difference of li; ly=log of real GDP; dly=first difference of ly; * , **, *** significant at level 10%, 5% and 1% respectively

The results given in table 19 indicate that the real investment and the real GDP are stationary in their first difference. Both unit root statictics show this. Hence, the null hypothesis of nonstationarity is rejected at the 5 percent level of significance for both series.

6.3.2.2. Cointegration Test for Real Investment and Real GDP

We assume that there is a linear deterministic trend in data, since Figure 32 shows the trends of investment and GDP to resemble linear trends. Furthermore

we assume an intercept in the cointegration Equation. The result of the Johansen integration test with these assumptions can be seen in Table 20.

Table 20. Johansen Test for Cointegration between Investment and GDP

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	14.56367	15.41
r<=1	r=2	0.727637	3.76

Table 20 shows that there is no cointegration between investment and GDP. It means there is no long run relationship between investment and GDP. Hence, to test for granger causality, we should estimate VARD (1 1).

6.3.2.3. Granger Causality Test Based on VARD for Real Investment and Real GDP

Since there is no cointegration vector in the two variables, we use VARD (Vector Auto Regression in Difference). We add a dummy variable in the VARD model to catch the significance of the crisis to investment/GDP growth.

The VARD model is estimated with one lag of each variable plus a constant term in each equation. To summarize the VARD results, Equations (6.7 and 6.8) show the results for the VARD specification with the t-statistics shown in brackets below the corresponding variables.

$$DLI = -0.022\ DLI(-1) + 1.238\ DLY(-1) + 0.024 - 0.469\ dummy \quad [6.7]$$

$$(-0.122) \quad (2.377) \quad (1.168) \quad (-7.917) \quad R^2=81\%$$

$$DLY = 0.058\ DLI(-1) + 0.113\ DLY(-1) + 0.046 - 0.194\ dummy \quad [6.8]$$

$$(1.488) \quad (1.006) \quad (10.318) \quad (-15.188) \quad R^2=93\%$$

The coefficient of the dummy variable is significant in both equation [6.7] and equation [6.8]. This means the crisis affects the growth of investment as well as the growth of GDP in short run. Table 21 shows that the coefficient of each variable.

Tabel 21. VARD Results of Investment and GDP

Dependent Variables	Independent Variables		
	Δ investment (-1)	**Δ GDP (-1)**	**Dummy**
Δ investment	-0.022 (-0.122)	1.238 (2.377) *	-0.469 (-7.917) *
Δ GDP	0.058 (1.488)	0.113 (1.006)	-0.194 (-15.188) *

Note: the t-statistics shown in brackets below the corresponding variable.

Table 21 shows that GDP is a granger cause of investment, but investment is not a granger cause of GDP in the short run. So, the causality runs from GDP to investment in short run.

Figure 31 shows that when there is a shock in GDP growth, investment growth will respond positively in the first following year but return back to zero effect in the second following year. This means there is a short run effect of GDP growth on investment growth.

To sum up, there is no long run relationship between GDP and investment growth for period 1983-2007 in Indonesia. A short run relationship runs from GDP to investment growth.

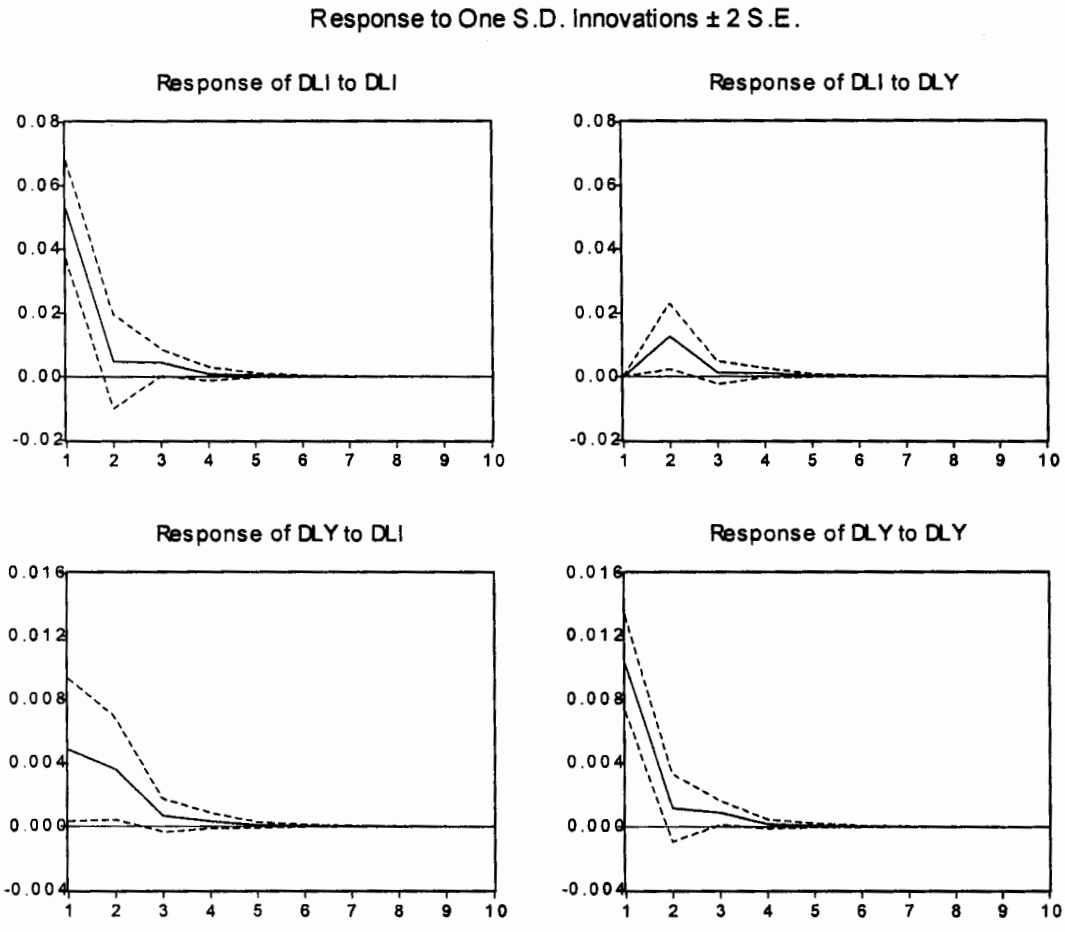

Figure 31. The Impulse Response Function of DLI and DLY

Now, we have got result from the chain that,

Export versus investment:

There is long run relationship between exports and investment growth in Indonesia. The causality runs from investment to exports (investment → exports) and from exports to investment (exports → investment) or bidirectional causality.

Investment versus GDP growth:

No Long run relationship between investment and GDP growth in Indonesia.

In the short run, the causality runs from GDP to investment growth (GDP → investment)

From the direct single bivariate model of exports and GDP, we have got the result that there is long run relationship between export and GDP in Indonesia. The long run causality runs from exports to GDP and vice versa. In short run, the causality goes from exports to GDP. Hence, the result of the chain bivariate model (exports→investment→GDP) does not support the result of the direct bivariate model.

Through the path of Export → investment → Growth, long run relationship exists between exports and investment, but it does not exist between investment and economic growth. Therefore, we fail to prove that exports leads to economic growth through investment in Indonesia.

Now, what happen if we include all the variables in the one multivariate model?

6.3.3. Multivariate Model of ELG (Exports, investment, GDP)

First of all, we look at the stationarity of the data. Since the all variables are not stationary in their level, then we apply Johansen test for cointegration test. The results can be seen at Table 22.

Table 22. Cointegration between Exports, Investment and GDP

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	64.98816**	29.68
r<=1	r=2	13.70230	15.41
r<=2	r=3	0.000211	3.76

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation at 5% significance level

Table 22 shows that there is one cointegration equation amongs export, investment and GDP. This means, we may apply VECM for granger causality.

6.3.3.1. Granger Causality Test Based on VECM for Real Exports, Investment and GDP

Since there is one cointegration vector in the three variables, we use VECM (Vector Error Correction Model). We add a dummy variable in the

VECM model to catch the significance of the crisis to exports, investment, and GDP.

The VECM model is estimated with one lag of each variable plus a constant term and dummy variable in each equation. To summarize the VECM results, Equations (6.9, 6.10 and 6.11) show the results for the VECM specification with the t-statistics shown in brackets below the corresponding variables.

$$\begin{aligned} DLX = {} & -0.769\ ECT - 0.124\ DLX(-1) + 0.391\ DLI(-1) - 0.367\ DLY(-1) - \\ & (-10.858) \quad (-0.769) \quad (1.174) \quad (-0.245) \\ & 0.394 + 1.155\ dummy \\ & (-4.381) \quad (10.745) \end{aligned}$$

R^2=89% [6.9]

$$\begin{aligned} DLI = {} & 0.259\ ECT - 0.319\ DLX(-1) + 0.156\ DLI(-1) - 0.948\ DLY(-1) + \\ & (5.953) \quad (-3.220) \quad (0.764) \quad (-1.032) \\ & 0.329 - 0.463\ dummy \\ & (5.967) \quad (-7.009) \end{aligned}$$

R^2=82% [6.10]

$$\begin{aligned} DLY = {} & 0.113\ ECT - 0.071\ DLX(-1) + 0.096\ DLI(-1) - 0.442\ DLY(-1) + \\ & (11.278) \quad (-3.115) \quad (2.034) \quad (-2.075) \\ & 0.157 - 0.204\ dummy \\ & (12.268) \quad (-13.319) \end{aligned}$$

R^2=92% [6.11]

Where the error correction term (ECT) :

$$ECT = x_{t-1} - 0.818\, inv_{t-1} + 0.504\, y_{t-1} - 9.188$$

The t-statistic of coefficient y_{t-1} is 0.553.

The coefficient of the dummy variable is significant in three equations, i.e., eq [6.9], [6.10] and [6.11] . This means the crisis affects the GDP, terms of trade and exports in short run. Table 23 shows that the coefficient of each variable.

Tabel 23. VECM Results of Exports, Investment and GDP

Dependent Variables	Independent Variables				
	ECT	**Δ export (-1)**	**Δ Investment (-1)**	**Δ GDP (-1)**	**Dummy**
Δ Export	-0.769 (-10.858)*	-0.124 (-0.769)	0.391 (1.174)	-0.367 (-0.245)	1.155 (10.745)*
Δ Investment	0.259 (5.953)*	-0.319 (-3.220)*	0.156 (0.764)	-0.948 (-1.032)	-0.463 (-7.009)*
Δ GDP	0.113 (11.278)*	-0.071 (-3.115)*	0.096 (2.034)*	-0.442 (-2.075)	-0.204 (-13.319)*

Note: the t-statistics shown in brackets below the corresponding variable.
* denotes rejection of the hypothesis at 5% significance level.

Table 23 shows that there is long run relationship between exports, investment, and GDP. A significant error correction term indicates longrun Granger causality from the explanatory to the dependent variables (Granger

1988). Therefore, longrun granger causality runs from exports to GDP and from GDP to exports (bidirectional causality).

In short run, exports is a granger cause of GDP. So, there is causality runs from exports to GDP in short run. This finding is in line with the result of single bivariate model. Hence, we prove that exports leads to economic growth in short run for Indonesia.

***

Now, we want to uncover the path from economic growth to exports. Once economic growth occurs, there will be an improvement in competitiveness which will lead to a fall in terms of trade (TOT), hence, exports will grow. So, a possible path is Growth → terms of trade → exports.

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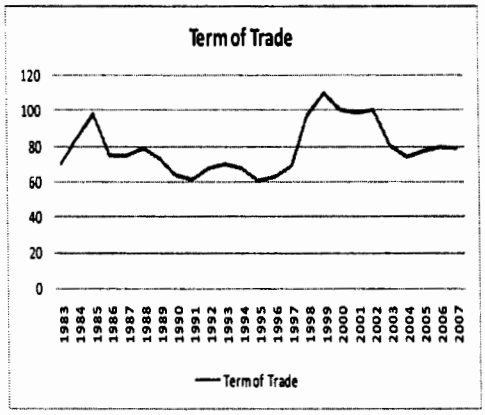
6.4 GDP may Cause Exports (1983-2007)

To know whether GDP may cause exports or not, a chain of bivariate models is used. The chain is as follows: GDP versus terms of trade; and terms of trade versus exports.

To start with, the graphs of all the series are presented in Figure 32 to see the pattern of real GDP, terms of trade, and real exports data series.



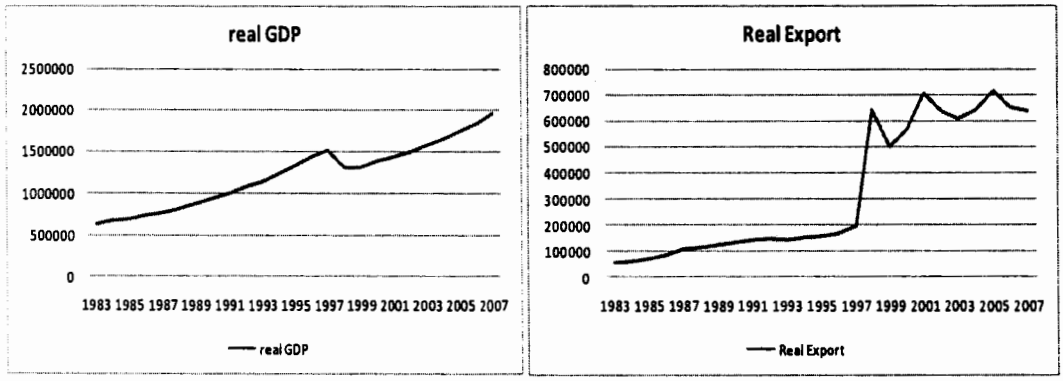


Figure 32. The series of Real GDP, Terms of Trade and Real Exports

Figure 32 indicates that all series are not stationary at level. Table 24 shows the summary statistics for real GDP (LY), terms of trade (LT), and real exports (LX) data in natural logarithm.

Table 24. Statistics of LY, LT, and LX

Variable	Mean	Std Deviation	Minimum	Maximum
LY	13,971	0,336	13,369	14,490
LT	4,351	0,172	4,099	4,695
LX	12,362	0,876	10,974	13,483

6.4.1. GDP versus Terms of Trade

Figure 33 shows the pattern of the natural logarithm of real GDP and terms of trade data series. If we look at figure 33 it shows that the growth of terms of trade does not appear to have any trend.

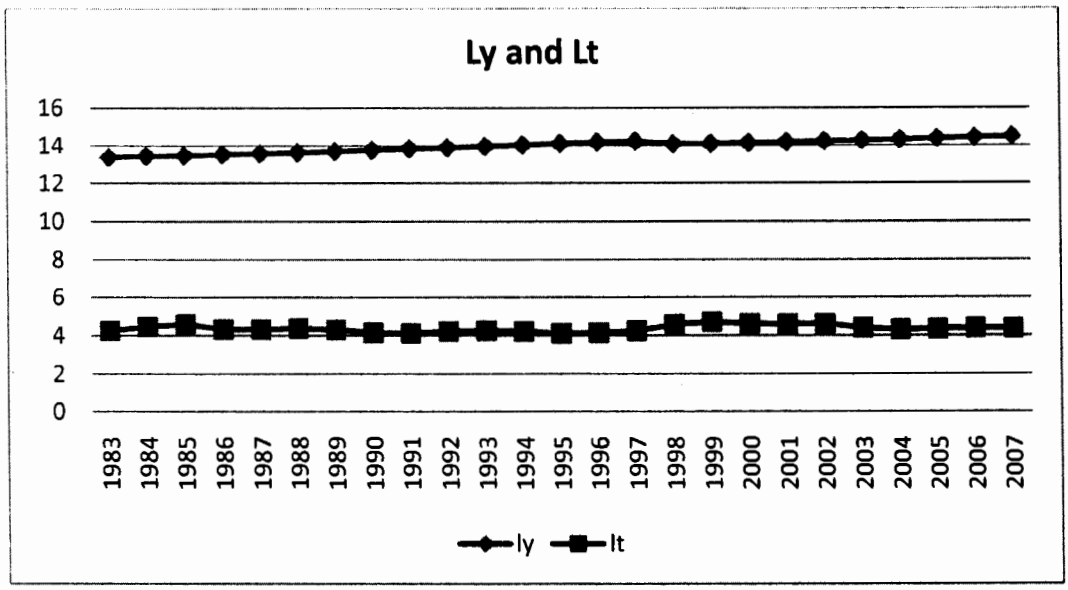


Figure 33. Pattern of the natural logarithm of real GDP and terms of trade.

6.4.1.1. Unit Root Test for real GDP and Terms of Trade

The ADF and PP test are applied to test for stationarity, and Table 25 shows the results. The results in Table 25 indicate that the terms of trade and the real GDP are stationary in their first difference. Both unit root statictics indicate this. Hence, the null hypothesis of nonstationarity is rejected at the 10 percent level of significance for both series.

Table 25. Unit Root test of GDP and Terms of trade

Variable	ADF Test		PP Test	
	Without trend	With trend	Without Trend	With Trend
Ly	-0.777060	-1.875771	-1.010127	-1.705338
Dly	-2.969855 *	-3.008375	-3.537368 **	-3.461501 *
Lt	-2.500438	-2.735790	-2.135887	-2.108146
Dlt	-4.485530***	-4.406269**	-3.891296***	-3.776640**

Key : lt=log of terms of trade; dlt=first difference of lt; ly=log of real GDP; dly=first difference of ly; * , **, *** significant at level 10%, 5% and 1% respectively

6.4.1.2 Cointegration Test for Terms of Trade and Real GDP

We assume that there is a linear deterministic trend in the GDP data, since figure 39 shows the trend of GDP to resemble a linear deterministic trend. Furthermore, we assume an intercept in the cointegration Equation. The results of the Johansen integration test with these assumptions can be seen in Table 26.

Table 26. Cointegration Test between GDP and Terms of Trade

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	25.87280**	15.41
r<=1	r=2	4.231919*	3.76

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Table 26 shows that there are two cointegration equations between GDP and terms of trade. Hence, for the test of granger causality, we should estimate VARL.

6.4.1.3. Granger Causality Test Based on VARL for Real GDP and Terms of Trade

Since there are two cointegration vectors in the two variables, we use VARL (Vector Auto Regression in Level). The VARL is estimated with one lag of each variable plus a dummy variable and a constant term. To summarize the VARL results, Equations (6.12 and 6.13) show the results for the VARL specification with the t-statistics shown in brackets below the corresponding variable. Table 27 shows that the coefficient of each variable.

$$LY = 1.093\ LY(-1) + 0.142\ LT(-1) - 1.828 - 0.110\ \text{dummy} \qquad [6.12]$$

(21.828) (1.918) (-1.972) (-2.783) $R^2 = 98\%$

$$LT = -0.365\ LY(-1) + 0.175\ LT(-1) + 8.543 + 0.362\ \text{dummy} \qquad [6.13]$$

(-2.733) (0.884) (3.449) (3.413) $R^2 = 70\%$

Table 27 shows that GDP is a granger cause of terms of trade, and terms of trade is not a granger cause of GDP. The dummy variable is significant in both equation [6.12] and [6.13]. This means that the crisis significantly affects GDP and terms of trade.

Tabel 27. VARD Resultsof GDP and Terms of Trade

Dependent Variables	Independent Variables		
	GDP(-1)	Terms of Trade (-1)	dummy
GDP	1.093 (21.828)	0.142 (1.918)	-0.110 (-2.783)*
Terms of Trade	-0.365 (-2.733)*	0.175 (0.884)	0.362 (3.413)*

Note: the t-statistics shown in brackets below the corresponding variable.

Figure 34 shows that when there is a shock in the terms of trade, GDP does not respond significantly. However, when there is a shock in GDP, terms of trade responds significantly.

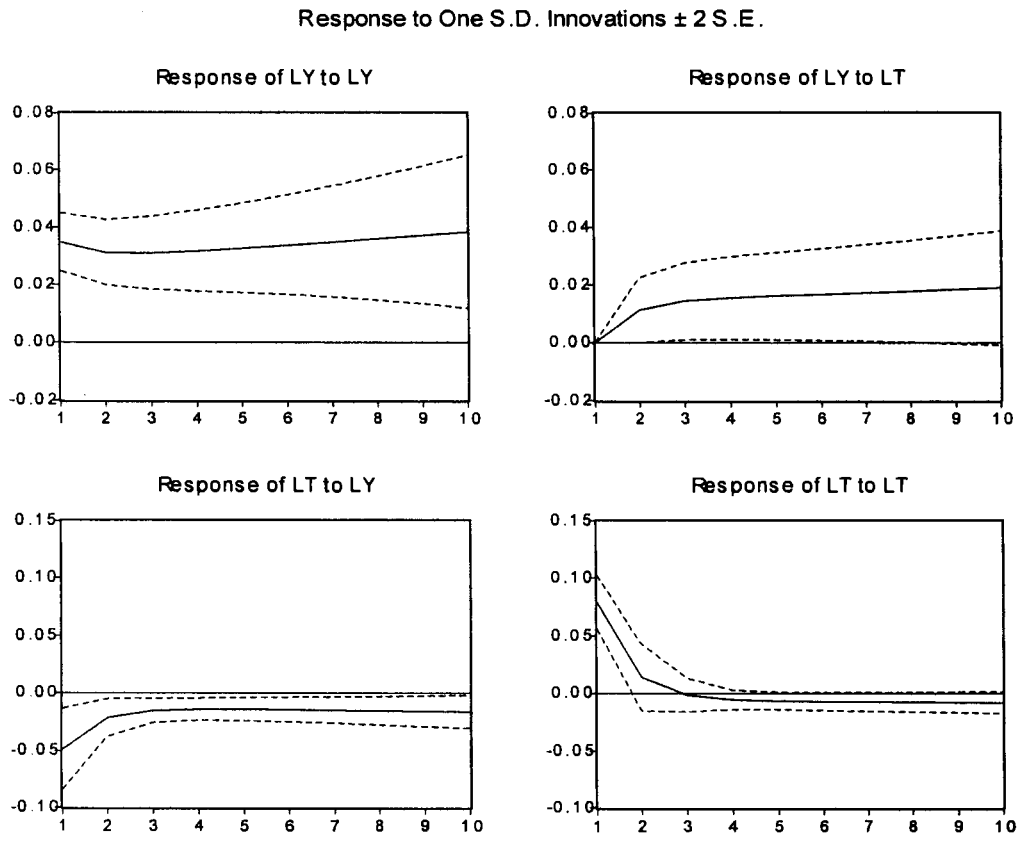


Figure 34. The Impulse Response Function of LY and LT

To sum up, there is long run relationship between GDP and Terms of Trade. The causality runs from GDP to Terms of trade in Indonesia.

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6.4.2. Terms of Trade versus Exports

Figure 35 shows the pattern of the natural logarithm of real exports and terms of trade data series. If we look at Figure 35 it shows that the growth of terms of trade does not appear to be a linear trend.

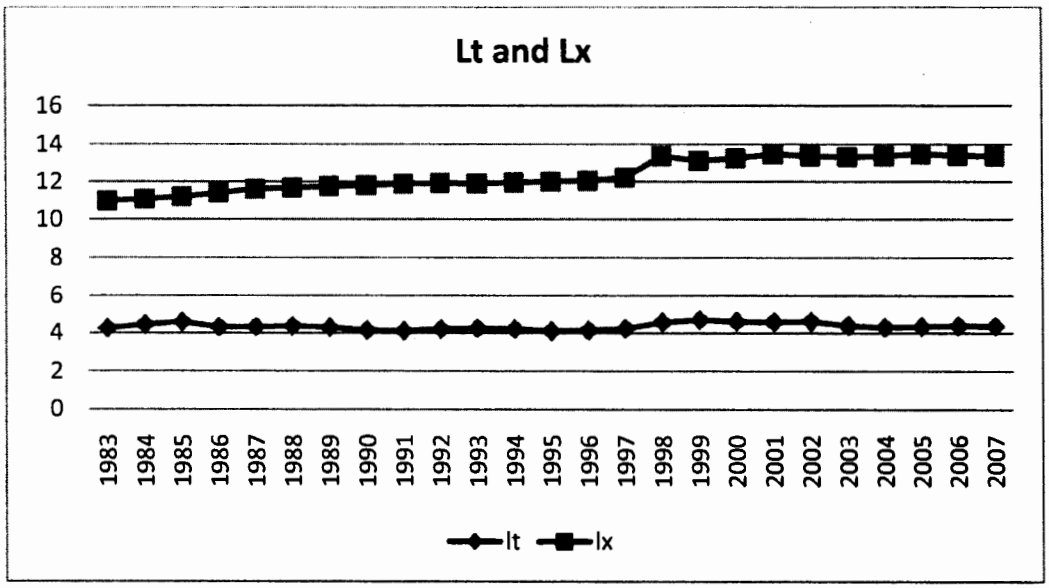

Figure 35. Pattern of the Natural Logarithm of Real Export and Terms of Trade.

6.4.2..1. Unit Root Test for Terms of Trade and Real Exports

The ADF and PP test are applied to test for stationarity, and Table 28 shows the results.

Table 28. Unit Root Test of Exports and Terms of Trade

Variable	ADF Test		PP Test	
	Without trend	With trend	Without Trend	With Trend
LX	-1.107092	-1.875771	-1.135327	-2.223839
DLX	-3.602592**	-3.590773*	-5.466800***	-5.425429***
LT	-2.500438	-2.735790	-2.135887	-2.108146
DLT	-4.485530***	-4.406269**	-3.891296***	-3.776640**

Key : lx=log of real exports; dlx=first difference of lx; lt=log of real terms of trade; dlt=first difference of lt;
* , **, *** significant at level 10%, 5% and 1% respectively

The results in Table 28 indicate that the terms of trade and the real exports are stationary in their first difference. Both unit root statictics indicate this. Hence, the null hypothesis of nonstationarity is rejected at the 5 percent level of significance for both series.

6.4.2.2. Cointegration Test for Real Exports and Terms of Trade

We assume that there is a linear deterministic trend in data, since figure 41 shows that the trends of exports resemble linear deterministic trends. Furthermore we assume an intercept in cointegration Equation. The result of the Johansen integration test with these assumptions can be seen at Table 29.

Table 29 shows that there are two cointegration equations between exports and terms of trade. Hence, for the test of granger causality, we should estimate VARL.

Table 29. Johansen Test for Cointegration between Terms of Trade and Real Exports

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	52.74014**	15.41
r<=1	r=2	11.43844**	3.76

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

6.4.2.3. Granger Causality Test Based on VARL for Terms of Trade and Real exports

Since there are two cointegration vectors in the two variables, we use VARL (Vector Auto Regression in Level). The VARL is estimated with one lag of each variable plus a constant term and dummy variable. To summarize the VARL results, Equations (6.14 and 6.15) show the results for the VARL specification with the t-statistics shown in brackets below the corresponding variables.

$$LX = 0.448\ LX(-1) - 0.733\ LT(-1) + 9.647 + 1.043\ \text{dummy} \qquad [6.14]$$

(4.765) (-3.101) (5.874) (5.872) $R^2 = 97\%$

$$LT = -0.185\ LX(-1) + 0.429\ LT(-1) + 4.591 + 0.421\ \text{dummy} \qquad [6.15]$$

(-3.149) (2.911) (4.474) (3.800) $R^2 = 72\%$

The dummy variable is significant in both equation [6.14] and [6.15]. This means that the crisis affect both export and terms of trade. Table 30 shows that the coefficient of each variable.

Tabel 30. VARD Results of Terms of Trade and Export

Dependent Variables	Independent Variables		
	Export (-1)	**Terms of Trade (-1)**	**dummy**
Export	0.448 (4.765)	-0.733 (-3.101)*	1.043 (5.872)*
Terms of Trade	-0.185 (-3.149)*	0.429 (2.911)	0.421 (3.800)*

Note: the t-statistics shown in brackets below the corresponding variable.

Table 30 shows bidirectional causality from export to terms of trade and from terms of trade to export in the long run. Exports is a granger cause of terms of trade and terms of trade is a granger cause of exports.

Figure 36 shows that when there is a shock in terms of trade, exports will respond significantly in the next succeeding years. The same applies when there is a shock in exports, terms of trade will respond significantly in the next succeeding years.

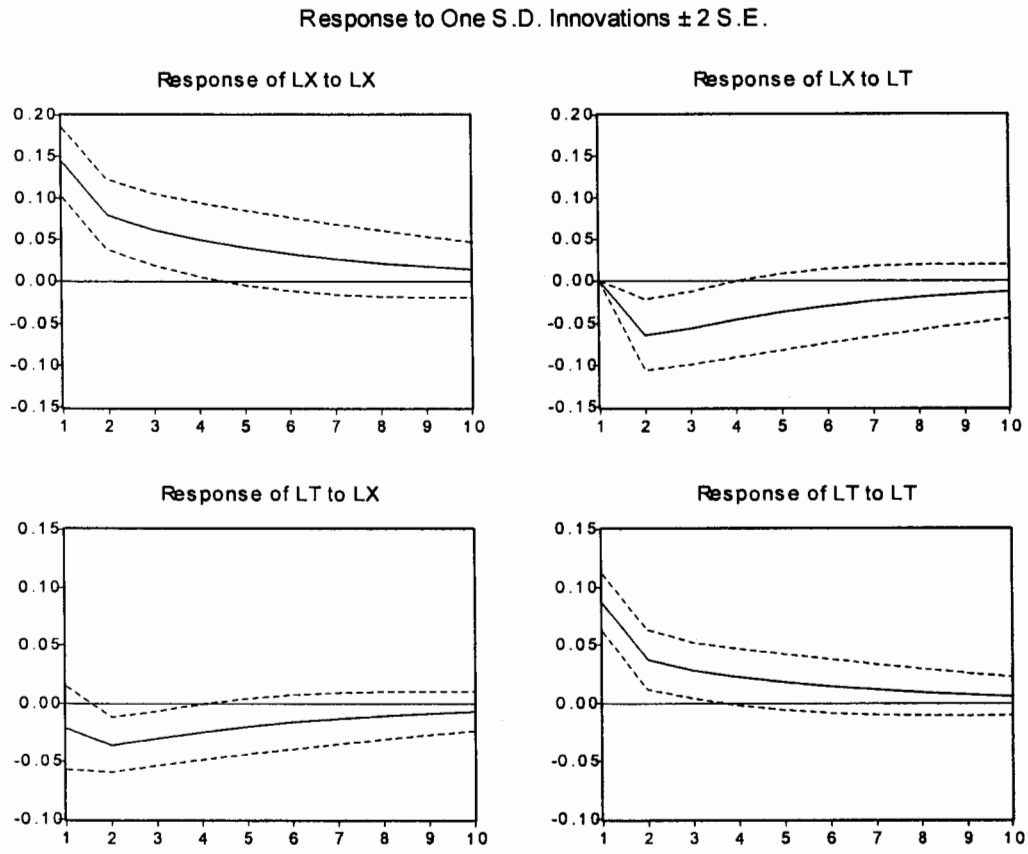

Figure 36. The Impulse Response Function of DLT and DLX

To sum up, there is long run relationship between exports and terms of trade in Indonesia.

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Now, we have these results from the chain,

GDP versus terms of trade:

There is long run relationship between GDP and terms of trade in Indonesia. The causality runs from GDP to terms of trade.

Terms of trade versus export growth:

There is long run relationship between terms of trade and exports in Indonesia. The causality runs from terms of trade to exports and vice versa (bidirectional causality).

This means chain bivariate model from GDP→ Terms of Trade→Exports reveal that GLE are valid. Hence, there is causality from GDP to Exports.

From direct single bivariate model of export and GDP, we have the result that there is Long run relationship between export and GDP growth in Indonesia. The causality runs from export to GDP and from GDP to exports.

Therefore, the results of the chain bivariate model do not support the results of the bivariate model between export and GDP. Through the path GDP → terms of trade → exports, we fail to prove that exports leads to economic growth in Indonesia.

***

Now, what happen if we include all the variables in the one multivariate model?

6.4.3. Multivariate Model of ELG (GDP, Terms of Trade, Export)

First of all, we look at the stationarity of the data. Since the all variables are not stationary in their level, then we apply Johansen test for cointegration test. The results can be seen at table 31.

Table 31. Johansen Test for Cointegration between GDP, Terms of Trade and Exports

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	60.61029**	29.68
r<=1	r=2	11.82308	15.41
r<=2	r=3	0.670734	3.76

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Table 31 shows that there is one cointegration equation amongs GDP, terms of trade and exports. This means, we may apply VECM for granger causality.

6.4.3.1. Granger Causality Test Based on VECM for Real GDP, Terms of Trade and Real Exports

Since there is one cointegration vector in the three variables, we use VECM (Vector Error Correction Model). We add a dummy variable in the VECM model to catch the significance of the crisis to GDP, terms of trade, and exports.

The VECM model is estimated with one lag of each variable plus a constant term and dummy variable in each equation. To summarize the VECM results, Equations (6.16, 6.17 and 6.18) show the results for the VECM

specification with the t-statistics shown in brackets below the corresponding variables.

DLY = -0.109 ECT - 0.147 DLY(-1) – 0.018 DLT (-1) - 0.072 DLX (-1) +
(-9.792) (-0.798) (-0.539) (-2.979)

0.144 – 0.194 dummy
(10.760) (-11.729) R^2=90% [6.16]

DLT = 0.146 ECT + 2.777 DLY(-1) +0.239 DLT (-1) + 0.513 DLX (-1) -
(2.123) (2.428) (1.147) (3.392)

0.322 + 0.312 dummy
(-3.876) (3.053) R^2=56% [6.17]

DLX = 0.751 ECT – 0.342 DLY(-1) – 0.396 DLT (-1) - 0.029 DLX (-1) -
(10.546) (-0.289) (-1.840) (-0.188)

0.363 + 1.113 dummy
(-4.236) (10.539) R^2=88% [6.18]

Where the error correction term (ECT) :

$ECT = y_{t-1} - 0.169\ tot_{t-1} - 1.231\ x_{t-1} + 2.009$

The t-statistic of coefficient x_{t-1} is -4.657. This means that coefficient $x_{t-1}$is significant at 5% significance level.

The coefficient of the dummy variable is significant in three equations, i.e., eq [6.16], [6.17] and [6.18] . This means the crisis affects the GDP, terms of trade and exports in short run. Table 32 shows that the coefficient of each variable.

Table 32. VECM Results of GDP, Terms of Trade and Export

Dependent Variables	Independent Variables				
	ECT	Δ GDP (-1)	Δ Terms of Trade (-1)	ΔExport (-1)	Dummy
Δ GDP	-0.109 (-9.792)*	-0.147 (-0.798)	-0.018 (-0.539)	-0.072 (-2.979)*	-0.194 (-11.729)*
Δ Terms of Trade	0.146 (2.123)*	2.777 (2.428)*	0.239 (1.147)	0.513 (3.392)*	0.312 (3.053)*
Δ Export	0.751 (10.546)*	-0.342 (-0.289)	-0.396 (-1.840)	-0.029 (-0.188)	1.113 (10.539)*

Note: the t-statistics shown in brackets below the corresponding variable.
* denotes rejection of the hypothesis at 5% significance level.

A significant error correction term indicates longrun Granger causality from the explanatory to the dependent variables (Granger 1988). Therefore, longrun granger causality runs from export to GDP and from GDP to export (bidirectional causality).

Table 32 shows that exports is a granger cause of GDP in short run. So, the causality runs from exports to GDP. Hence, we prove that exports leads to economic growth in long run. By using both single bivariate model and multivariate model, we prove that exports lead to economic growth in Indonesia.

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6.5. Encompassing ELG Models

The idea of encompassing is that we are able to explain econometric results obtained by other authors, both right ones and wrong ones. We choose models which produce different results for performing this encompassing model. Firstly, the Liwan and Lau model (2007) produced support for Export leads to Growth (ELG). Secondly, the Nushiwat (2008) model produced support for Non Causality between export and economic growth (NC). Thirdly, the Bahmani Oskoee (2009) model produced support for Growth leads to export (GLE). The models which we want to encompass are the models which were recently published in journals. Before encompassing the three models, we would like to look at the models one by one.

6.5.1. Liwan and Lau model

Liwan and Lau use annual data from 1976-2005 (30 sample size) collected from International Financial Statistics (IFS), the South East Asian Central Banks (SEACEN) Research and Training Centre, and Department of Statistics Malaysia (DOS). The data are GDP, exports, inflation and investment. Two lags are used for all variables. All data are nominal terms (not real terms).

They perform Johansen Cointegration for checking cointegration between variables. If they found the variables are cointegrated then they applied a Vector Error Correction Model (VECM). If not, they simply applied a Vector Auto Regression in difference (VARD).

Their results supported a long run relationship between Export and Growth. Export is positive to growth. There is no Short Run Relationship between Export and Growth.

6.5.1.1. Replicate Liwan and Lau model

Now, we replicate the same model using the same data, and find that there is one cointegration as Liwan and Lau find in their paper. Table 33 shows this.

Table 33. Cointegration between Exports, GDP, Investment, and inflation.

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	49.24938*	47.21
r<=1	r=2	26.01979	29.68
r<=2	r=3	11.55925	15.41
r<=3	r=4	0.476095	3.76

* denotes rejection of the hypothesis at 5% significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Then, we run the error correction model using 2 lags. The result is that the GDP equation is the only one in the system where the Error Correction Term (ECT) is statistically significant (t-stat = 2.56), just as Liwan and Lau found in their work.

$$\Delta y_t = 0.1971 + 1.1263\ (ECT) - 1.4156\ \Delta y_{t-1} - 0.3678\ \Delta y_{t-2} + 0.7926\ \Delta x_{t-1} + 0.4191\ \Delta x_{t-2} - 0.0449\ \Delta inf_{t-1} - 0.0199\ \Delta inf_{t-2} + 0.3545\ \Delta inv_{t-1} + 0.0215\ \Delta inv_{t-2}$$

[6.19]

$$ECT = y_{t-1} - 0.670603\, x_{t-1} + 0.051977\, inf_{t-1} - 0.299804\, inv_{t-1} - 2.337593$$

[6.20]

Based on significance of the ECT in equation [6.19] and because the sign of the export (x) coefficient is negative in equation [6.20], Liwan and Lau conclude that Export leads to Growth (ELG).

6.5.2. Nushiwat Model

Nushiwat use annual data from 1981-2005 (25 sample size) collected from International Financial Statistics (IFS). The data are the annual growth rate of real GDP (Y) and the annual growth rate of exports (X). Both variables are in real terms, deflated using the GDP deflator for each country. At the end of his paper, he gives the data which can be seen as in Table 34.

Table 34. Growth Rate of Real GDP (Y) And Exports (X) From 1981-2005

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989
Y	7,9	2,2	4,2	7	2,5	5,9	4,9	5,8	7,5
X	-1,3	-11,2	10,2	7	-11,1	-6,9	28,8	7,9	11,9
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Y	7,2	7	6,5	6,5	7,3	8,2	7,9	4,7	-13,1
X	12,1	10,3	14,3	-6,2	3,9	7,6	5,7	13,1	65,3
Year	1999	2000	2001	2002	2003	2004	2005		
Y	0,7	4,9	3,8	4,4	4,7	5	5,6		
X	-32,2	21	-3,3	-12,6	-1,3	11,8	10,4		

He used Granger Causality to find whether exports leads to growth (ELG) or Growth leads to Exports (GLE). He used two lags for the model. His finding was that, there is no causality (NC) between Export and Growth.

6.5.2.1. Replicate of Nushiwat Model

Now, we replicate the same model use same data and same methodology. The results reveals that there is no causality (NC) between Export and Growth.

$$Y = -0.011\ X(-1) + 0.017\ X(-2) + 0.208\ Y(-1) - 0.103\ Y(-2) + 3.603 \qquad [6.21]$$

(-0.133) (0.269) (0.692)(-0.334) (1.957) $R^2 = 7\%$

$$X = -0.115\ X(-1) + 0.145\ X(-2) + 1.552\ Y(-1) + 1.227\ Y(-2) - 4.980 \qquad [6.22]$$

(-0.412) (0.646) (1.461)(1.124) (-0.767) $R^2 = 28\%$

From the t-statistics of the coefficients of the variables in equation [6.21] and [6.22], shown in brackets below, we can see that there are no lags of variable X significant to Y and no lags of variable Y significant to X. This means that exports are not a granger cause of GDP and GDP is not a granger cause of exports. In other words, there is no causality between GDP and exports, exactly the same result which Nushiwat found in his paper.

6.5.2.2. Comments of Nushiwat Model

The Nushiwat model is very poor: R^2 is very low, only 28% for X and 7% for Y. The F statistics are only 1.733 for X and 0.324 for Y. To make the R^2 high, some variable should be included which is very significant to the equation. How? Look at the series. What problems are there with the series? There is a huge drop in GDP growth, and a huge jump up of export growth in 1998. What happened in 1998? That was the Asian financial crisis. So The crisis can be captured by a dummy variable. The dummy variable contains 1 in year 1998 and zero for the other years. After including the dummy , the result becomes:

$$X = -0.149X(-1) + 0.055X(-2) + 1.412Y(-1) + 0.631Y(-2) - 3.929 + 59.246\ \text{dummy}$$

(-0.859) (0.394) (2.152)(0.924) (-0.979) (5.496)

$R^2 = 74\ \%$ [6.23]

$$Y = -0.0001X(-1) + 0.045X(-2) + 0.252Y(-1) + 0.082Y(-2) + 3.275 - 18.468\ \text{dummy}$$

(-0.004) (1.442) (1.710)(0.537) (3.632) (-7.627)

$R^2 = 79\ \%$ [6.24]

Equation [6.23] and [6.24] are better than equation [6.21] and [6.22] since the R^2 and F statistics are greater. R^2 is 74% and 79% and F stat is 9.7 and 12.7 for equation [6.23] and [6.24] respectively.

From equation [6.23] we can see that one lag of variable Y is significant to X. This means Growth is a granger cause of Exports. From equation [6.24] we

can see that no lags of variable X are significant to Y. This means exports are not a granger cause of Growth. So, the conclusion is that Growth causes exports.

The model built by Nushiwat is actually a short run relationship, not a long run relationship. Economics is primarily concerned with long run relationships rather than with short run relationships.

Consider :

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + a_3 x_{t-1} + a_4 x_{t-2} + u_t \quad [6.25]$$

$$x_t = ß_0 + ß_1 x_{t-1} + ß_2 x_{t-2} + ß_3 y_{t-1} + ß_4 y_{t-2} + v_t \quad [6.26]$$

y_t is the growth rate of GDP, and x_t is the growth rate of export.

Growth rate of GDP, (Y) $= \frac{Y_t - Y_{t-1}}{Y_{t-1}} x100$, and

Growth rate of export, (x) $= \frac{X_t - X_{t-1}}{X_{t-1}} x100$,

So, Equation [6.25] can be written as follows:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} x100 =$$

$$a0 + a1 \frac{Y_{t-1} - Y_{t-2}}{Y_{t-2}} x100 + a2 \frac{Y_{t-2} - Y_{t-3}}{Y_{t-3}} x100 + a3 \frac{X_{t-1} - X_{t-2}}{X_{t-2}} x100 +$$

$$a4 \frac{X_{t-2} - X_{t-3}}{X_{t-3}} x100 + ut \quad [6.27]$$

Divide each side of equation [6.25] by 100:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = a0/100 + a1 \frac{Y_{t-1} - Y_{t-2}}{Y_{t-2}} + a2 \frac{Y_{t-2} - Y_{t-3}}{Y_{t-3}} + a3 \frac{X_{t-1} - X_{t-2}}{X_{t-2}}$$

$$+ a4 \frac{X_{t-2} - X_{t-3}}{X_{t-3}} + ut/100$$

$$\frac{Y_t}{Y_{t-1}} - 1 = ao/100 + a1\left(\frac{Y_{t-1}}{Y_{t-2}} - 1\right) + a2\left(\frac{Y_{t-2}}{Y_{t-3}} - 1\right) + a3\left(\frac{X_{t-1}}{X_{t-2}} - 1\right) + a4\left(\frac{X_{t-2}}{X_{t-3}} - 1\right) + ut/100$$

$$\frac{Y_t}{Y_{t-1}} = ao/100 + a1\left(\frac{Y_{t-1}}{Y_{t-2}}\right) + a2\left(\frac{Y_{t-2}}{Y_{t-3}}\right) + a3\left(\frac{X_{t-1}}{X_{t-2}}\right) + a4\left(\frac{X_{t-2}}{X_{t-3}}\right) + 1 - a1 - a2 - a3 - a4 + ut/100$$

Let ao* = a0/100 + 1-a1-a2-a3-a4, and ut*=ut/100, we find

$$\frac{Y_t}{Y_{t-1}} = ao* + a1\left(\frac{Y_{t-1}}{Y_{t-2}}\right) + a2\left(\frac{Y_{t-2}}{Y_{t-3}}\right) + a3\left(\frac{X_{t-1}}{X_{t-2}}\right) + a4\left(\frac{X_{t-2}}{X_{t-3}}\right) + ut* \qquad [6.28]$$

Transform each variable in equation [6.28] into log form:

$$Ln\frac{Y_t}{Y_{t-1}} = ao* + a1\,Ln\left(\frac{Y_{t-1}}{Y_{t-2}}\right) + a2\,Ln\left(\frac{Y_{t-2}}{Y_{t-3}}\right) + a3\,Ln\left(\frac{X_{t-1}}{X_{t-2}}\right) + a4\,Ln\left(\frac{X_{t-2}}{X_{t-3}}\right) + ut*$$

$$LnY_t - \ln Y_{t-1} = a* + a1\,(\ln Y_{t-1} - \ln Y_{t-2}) + a2(\ln Y_{t-2} - \ln Y_{t-3}) + a3\,(\ln X_{t-1} - \ln X_{t-2}) + a4\,(\ln X_{t-2} - \ln X_{t-3}) + ut* \qquad [6.29]$$

Let Ln Y_t = y_t and ln X_t = x_t;

$$\Delta y_t = a0* + a1\Delta y_{t-1} + a2\Delta y_{t-2} + a3\Delta x_{t-1} + a4\Delta x_{t-2} + Ut* \qquad [6.30]$$

So, equation [6.25] can be written as equation [6.30] which is the short run equation of growth and export.

Similarly, equation [6.26] can be written as:

$$\Delta x_t = b0 * + b1\Delta x_{t-1} + b2\Delta x_{t-2} + b3\Delta y_{t-1} + b4\Delta y_{t-2} + vt * \quad [6.31]$$

Where $b0 *$= b0/100 + 1-b1-b2-b3-b4, and

vt*=vt/100

hence, equation [6.25] and [6.26]

yt = a0 + a1yt-1 + a2yt-2 + a3xt-1 + a 4xt-2 + ut [6.25]

xt = ß0 + ß1xt-1 + ß2xt-2 + ß3yt-1+ ß4yt-2 + vt [6.26]

can be written as equation [6.30] and [6.31]

$$\Delta y_t = a0 * + a1\Delta y_{t-1} + a2\Delta y_{t-2} + a3\Delta x_{t-1} + a4\Delta x_{t-2} + ut * \quad [6.30]$$

$$\Delta x_t = b0 * + b1\Delta x_{t-1} + b2\Delta x_{t-2} + b3\Delta y_{t-1} + b4\Delta y_{t-2} + vt * \quad [6.31]$$

6.5.3. Bahmani and Claire Model

Bahmani and Claire use annual data from 1960-1999 (40 sample size). The data are real GDP, Labor, capital, exports, and imports. At the end of their paper, they give the description and source of the data. Real GDP (Y)is GDP in constant 1995 US $. Labor (L) is total labor force in thousands. Capital (K) is gross capital formation in constant 1995 US $. Export (X) is exports of goods and services in constant 1995 US $, and Import (M) is imports of goods and services in constant 1995 US $. All data were collected from WDI (2001) by the World Bank. Lag = 1 to optimum # lag (S to G), but most of the lag = 1.

They performed Johansen Cointegration to check for cointegration between variables. If they found the variables were cointegrated then they applied the Weak Exogeneity test (Johansen). Their results supported a long run relationship, based on the weak exogeneity test, from growth to export (GLE).

6.5.3.1. Replicate Bahmani Claire Model

Now, we replicate the same model use same data and find that there is one cointegration as Bahmani and Claire found in their paper. Table 35 shows the results.

Table 35. Cointegration between Exports, GDP, Imports, Capital and Labor

Number of Cointegrating Vectors Trace Statistics		Likelihood Ratio Statistics	95% critical value
Null	Alternative		
r=0	r>=1	75.64145 *	68.52
r<=1	r=2	46.76659	47.21
r<=2	r=3	24.37789	29.68
r<=3	r=4	12.85692	15.41
r<=4	r=5	5.801607*	3.76

* denotes rejection of the hypothesis at 5% significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

This means there is one cointegration equation, so, they ran an exogeneity test. The result can be seen in equations [6.32], [6.33], and [6.34] with t-statistic in brackets below the coefficient of each variable.

$$\Delta y_t = 0.00351 - 0.1672\,(ECT) + 0.31541\,\Delta y_{t-1} + 0.0018\,\Delta x_{t-1} + 0.8279\,\Delta l_{t-1}$$
$$(0.145) \quad (-2.66) \quad (1.15) \quad (0.021) \quad (1.81)$$
$$+ 0.03569\,\Delta m_{t-1} + 0.0897\,\Delta k_{t-1}$$
$$(0.605) \quad (-1.12) \qquad [6.32]$$

$$ECT = y_{t-1} - 0.199217\,x_{t-1} - 0.598466\,k_{t-1} - 1.154828\,l_{t-1} + 0.490806\,m_{t-1} - 0.304235 \qquad [6.33]$$

The t-statistic of the ECT is -2.66 with p value 0.012 in equation [6.32]. This means that the ECT is significant in equation [6.32]. Therefore, Δy may not be considered as weakly exogenous for the long run parameters. Moreover, this result also implies that growth is a granger cause of exports.

$$\Delta x_t = -0.09371 - 0.12152\,(ECT) + 1.70411\,\Delta y_{t-1} + 0.08176\,\Delta x_{t-1}$$
$$(-1.50) \quad (-0.753) \quad (2.43) \quad (0.381)$$
$$+1.18570\,\Delta l_{t-1} - 0.04768\,\Delta m_{t-1} - 0.14812\,\Delta k_{t-1}$$
$$(1.01) \quad (-0.315) \quad (-0.719) \qquad [6.34]$$

The t-statistic of the ECT is -0.753 with p value 0.457 in equation [6.34]. This means that the ECT is not significant in equation [6.34]. Therefore, Δx may be considered as weakly exogenous for the long run parameters. Moreover, this result also implies that exports are not a granger cause of GDP.

6.5.4. Encompassing All Three : Liwan-Lau, Nushiwat and Bahmani-Claire models

Liwan and Lau Model: 1976-2005

$$\Delta y_t = a0 + b0\,(ECT) + a1\,\Delta y_{t-1} + a2\,\Delta y_{t-2} + a3\,\Delta x_{t-1} + a4\,\Delta x_{t-2} + a5\,\Delta inf_{t-1} + a6\,\Delta inf_{t-2} + a7\,\Delta inv_{t-1} + a8\,\Delta inv_{t-2}$$

With the coefficients:

$$\Delta y_t = 0.1971 + 1.1263\,(ECT) - 1.4156\,\Delta y_{t-1} - 0.3678\,\Delta y_{t-2} + 0.7926\,\Delta x_{t-1} + 0.4191\,\Delta x_{t-2} - 0.0449\,\Delta inf_{t-1} - 0.0199\,\Delta inf_{t-2} + 0.3545\,\Delta inv_{t-1} + 0.0215\,\Delta inv_{t-2}$$

$$ECT = y_{t-1} - 0.670603\,x_{t-1} + 0.051977\,inf_{t-1} - 0.299804\,inv_{t-1} - 2.337593$$

Nushiwat Model: 1981-2005

$$\Delta y_t = a0 + a1\Delta y_{t-1} + a2\Delta y_{t-2} + a3\Delta x_{t-1} + a4\Delta x_{t-2}$$

With the coefficients:

$$\Delta y_t = 0.924179 + 0.103384\,\Delta y_{t-1} - 0.103384\,\Delta y_{t-2} - 0.010614\,\Delta x_{t-1} + 0.017211\,\Delta x_{t-2}$$

Bahmani Model: 1960-1999

$$\Delta y_t = a0 + b0\,(ECT) + a1\,\Delta y_{t-1} + a3\,\Delta x_{t-1} + b1\,\Delta l_{t-1} + b2\,\Delta m_{t-1} + b3\,\Delta k_{t-1}$$

With the coefficients:

$$\Delta y_t = 0.00351 - 0.1672\,(ECT) + 0.31541\,\Delta y_{t-1} + 0.0018\,\Delta x_{t-1} + 0.8279\,\Delta l_{t-1} + 0.03569\,\Delta m_{t-1} + 0.0897\,\Delta k_{t-1}$$

$$ECT = y_{t-1} - 0.199217\,x_{t-1} - 0.598466\,k_{t-1} - 1.154828\,l_{t-1} + 0.490806\,m_{t-1} - 0.304235$$

6.5.4.1. Nushiwat Model nested into Liwan-Lau Model:

$$\Delta y_t = a0 + b0\,(ECT) + a1\,\Delta y_{t-1} + a2\,\Delta y_{t-2} + a3\,\Delta x_{t-1} + a4\,\Delta x_{t-2} + a5\,\Delta inf_{t-1} + a6\,\Delta inf_{t-2} + a7\,\Delta inv_{t-1} + a8\,\Delta inv_{t-2} \quad \text{[LL]}$$

$$\Delta y_t = a0 + a1\Delta y_{t-1} + a2\Delta y_{t-2} + a3\Delta x_{t-1} + a4\Delta x_{t-2} \quad \text{[N]}$$

H_0 : it is true that bo=a5=a6=a7=a8=0, or model [N] is true

H_1: it is *not* true that bo=a5=a6=a7=a8=0, or model [LL] is true

The result is that H_0 is rejected. This means H_1 is accepted. We find that we can not set b_0=0 in the Liwan Lau model to get the Nushiwat Model. In other words, we could not exclude a long run relationship in the equation. From testing

by excluding ECT, we find that subset F(1,17) = 6.5577 [0.0203]*. This means we can not exclude this variable. So, the Liwan and Lau Model can not be reduced to the Nushiwat Model. Hence, the Nushiwat model is wrong model. Since the Nushiwat model is nested in the Liwan–Lau Model, we can use the Liwan-Lau model to encompass the Bahmani-Claire Model.

6.5.4.2. Non-nested Models of Liwan-Lau and Bahmani-Claire

We have the Liwan-Lau Model, [LL] and Bahmani-Claire Model [BC] as follows:

$$\Delta y_t = a0 + b0\,(ECT) + a1\,\Delta y_{t-1} + a2\,\Delta y_{t-2} + a3\,\Delta x_{t-1} + a4\,\Delta x_{t-2} + a5\,\Delta inf_{t-1} + a6\,\Delta inf_{t-2} + a7\,\Delta inv_{t-1} + a8\,\Delta inv_{t-2} \quad \text{[LL]}$$

$$\Delta y_t = a0 + b0\,(ECT) + a1\,\Delta y_{t-1} + a3\,\Delta x_{t-1} + b1\,\Delta l_{t-1} + b2\,\Delta m_{t-1} + b3\,\Delta k_{t-1} \quad \text{[BC]}$$

To encompass both the Liwan-Lau model and the Bahmani-Claire model, we cannot use a nested model, instead we use a non-nested model. For encompassing the variance we will use the J test.

6.5.4.2.1. Testing whether LL model encompasses BC model.

Firstly, we estimate Δy in the LL model, say Δy^LL. Then we put this Δy^LL into the BC model to become:

$$\Delta y_t = a0 + b0\ (ECT) + a1\ \Delta y_{t-1} + \ a3\ \Delta x_{t-1} + b1\ \Delta l_{t-1} + \ b2\ \Delta m_{t-1} +$$
$$b3\ \Delta k_{t-1} + b4\Delta \hat{y}_{tLL} \qquad [6.35]$$

We want to test whether $b_4=0$ or not. If $b_4 \neq 0$, then we can say that the LL model encompasses the BC model. The result can be seen in equation [6.36] with t-statistics in brackets below the coefficient of each variable.

$$\Delta y_t = 0.067 - 0.171(ECT) - 0.060\Delta y_{t-1} + \ 0.105\Delta x_{t-1} - 0.350\Delta l_{t-1} +$$
$$(2.42) \quad (-2.30) \qquad (-0.233) \qquad (1.51) \qquad (-0.651)$$
$$0.031\Delta m_{t-1} - 0.107\Delta k_{t-1} + 0.036\ \Delta \hat{y}_{tLL}$$
$$(0.724) \qquad (-1.59) \qquad (1.72) \qquad [6.36]$$

We can see that the coefficient of variable Δy^LL is not significant with t-stat=1.72 and p-value =0.106. Thus we can say that the Liwan-Lau model does not succeed in encompassing the Bahmani-Claire model. So, we can accept the Bahmani-Claire model.

6.5.4.2.2. Testing whether BC model encompasses LL model.

Firstly, we estimate Δy in BC model, say Δy^b. Then we put this Δy^b into the LL model to become:

$$\Delta y_t = a0 + b0\,(ECT) + a1\,\Delta y_{t-1} + a2\,\Delta y_{t-2} + a3\,\Delta x_{t-1} + a4\,\Delta x_{t-2} + a5\,\Delta inf_{t-1} + a6\,\Delta inf_{t-2} + a7\,\Delta inv_{t-1} + a8\,\Delta inv_{t-2} + a9\,\Delta \hat{y}_b \quad [6.37]$$

We want to test whether $a_9 = 0$ or not. If $a_9 \neq 0$, then we can say that the BC model encompasses the LL model. The result is :

$$\Delta y_t = \underset{(5.93)}{5.380} - \underset{(-2.49)}{0.588}(ECT) + \underset{(7.83)}{2.106}\Delta y_{t-1} + \underset{(1.93)}{0.473}\Delta y_{t-2} + \underset{(-6.39)}{-1.161}\Delta x_{t-1}$$

$$\underset{(-0.512)}{-0.056}\Delta x_{t-2} + \underset{(1.11)}{0.075}\Delta inf_{t-1} - \underset{(-3.22)}{0.213}\Delta inf_{t-2} - \underset{(-2.53)}{0.752}\Delta inv_{t-1} + \underset{(2.00)}{0.581}\Delta inv_{t-2} + \underset{(2.03)}{2.266}\Delta \hat{y}_b \quad [6.38]$$

We can see that the coefficient of variable Dyb^ is significant at 10% significance level with t-stat = 2.03 and p-value = 0.064. Thus we can say that the Bahmani-Claire model succeed encompassing the Liwan-Lau model. So, we can not accept the Liwan-Lau model. As a conclusion, we accept the Bahmani-Claire Models and reject Liwan lau Model.

6.6. The Importance of Findings

Causality is a feature of the world (or the economy). It is part of the way the world is. Causality in economics is not like causality in physics. Causality in physics is 'asymmetric'. Although the real causality is asymmetric, but the existence of reaction functions distinguishes economics from Physics.

Causality in economics is based on the assumption that the variable that moves first is the cause. For example, if we see an increase in exports and then GDP rises, we reach one conclusion (Export Led Growth -ELG). If we see GDP rises and then an increase in exports, we reach the other conclusion (Growth Led Export - GLE). The same thing in business cycle, if we see an increase in money demand and then output boosts, we reach one conclusion (Monetary Business Cycle - MBC). If we see output swells and then an increase in money demand, we reach the other conclusion (Real Business Cycle -RBC).

The importance of causality in economics is for adopting economic policy. For example, if exports cause economic growth, so obviously export promotion is taken as a policy for economic growth.

It is not easy to find the real causality in economics. As we find in this study, that different models reveal different results. A single bivariate model supports bidirectional causality between exports and economic growth. However, a chain bivariate model from exports to economic growth gives different result (i.e. non causality). A chain bivariate model from economic growth to exports gives another result (i.e., GLE). How about the multivariate models? The two multivariate models give results in line with the single bivariate model.

Zaman (2008) proposes using natural experiments to find causality by using knowledge of the history outside the purely statistical data. This study attempts to look at the history of the Indonesian economy carefully to explain it in detail.

From the history of Indonesian economy from 1967 to 2007, we find bidirectional causality from exports to economic growth. Perhaps, the first period 1966:1972 is the period when Indonesia applied export promotion policy. For the second period of 1973:1982, Indonesia applied import substitution policy. For the third period of 1982:2007, Indonesia applied export promotion policy again. So, economic growth led to exports in some part of the periods and exports led to economic growth in some other parts. Therefore, it is important to look at the history of Indonesian economy first, and then take the data and run the models. Because Indonesia started export promotion policy intensively from 1983, then we are interested to analyze the period from 1983 to 2007.

In the sub chapter 6.3, we try to prove BOP constraint model for Indonesia, whether it holds or not. BOP constraint model says that there are instrument variables from exports to economic growth i.e. consumption, investment and government expenditure. In this study, we choose investment as an instrument variables from exports to economic growth (Export → Investment → GDP growth).

In the subchapter 6.4, we try to prove Verdoorn Law model. Verdoorn Law model of ELG says that there are instrument variables from economic growth to exports growth, i.e. price competitiveness. In this study, terms of trade is

represented as price competitiveness. So, terms of trade is considered as an intermediate variable from GDP to export growth (GDP→ terms of trade→ export growth). An improvement in a nation's terms of trade (the increase of the ratio) is good for that country in the sense that it has to pay less for the products it imports. That is, it has to give up fewer exports for the imports it receives. Thus terms of trade are widely used instruments to measure the benefits derived by a nation from international trade.

6.6.1. Exports Lead to Economic Growth and Vice versa

Our finding is that a long run relationship between exports and GDP growth exist in Indonesia. The long run causality runs from GDP to exports and from export to GDP (bidirectional causality). This finding support both the ELG and GLE hypotheses. This means we have to apply both export promotion and import substitution policies to achieve growth which is being implemented by Indonesian government.

One of some reasons for supporting this finding is that economic growth of Indonesia is heavily depend on external factors outside the country. For example, the shock in oil price benefited the Indonesian economy for a decade from 1973-1982, and the decline in the oil price in 1982 changed the economic policy suddenly.

The oil money windfall of 1973-1982 lead to huge projects such as the Asahan project, the aircraft industry in Bandung, and the Cold Rolling Steel Mill in Cilegon. In March 1983, Indonesia devaluated the rupiah by 38.5 percent

against the US Dollar. This effort aimed at boosting Indonesian exports. In june 1983, Indonesia issued trade, investment and banking regulations which liberalized the Indonesian economy. The reformation of the banking sector included removing controls over state bank deposit rates, abolishing some credit ceilings, and scaling down liquidity credit schemes.

6.6.2. Investment is not the intermediate variable from Exports to Economic Growth

In explaining the path from exports to growth, the logic is as follows: exports growth leads to savings growth; savings growth leads to investment growth; and finally investment growth leads to economic growth. This logic follows BOP constraint model of ELG. So, investment growth is the intermediate variable.

In this study, we fail to prove that investment is the intermediate variable, since there is no long run relationship between investment and economic growth. Hence, BOP constraint model of ELG does not hold in Indonesia.

6.6.3. Terms of Trade is the intermediate variable from Economic Growth to Exports Growth.

In explaining the path from economic growth to export growth, the logic is as follows: economic growth leads to productivity growth; productivity growth leads to price competitiveness; and finally price competitiveness leads to export

growth. This logic follows Verdoorn Law of ELG. So, price competitiveness is the intermediate variable.

This study finds proof that price competitiveness is the intermediate variable, since there is long run relationship between GDP and terms of trade. The causality runs from economic growth to exports.

This study finds that there is long run relationship between exports and terms of trade in Indonesia and between terms of trade and GDP. So, terms of trade is an intermediate variable from GDP to exports (GDP→terms of trade→exports). This means, Verdoorn law model of ELG is valid, here.

6.6.4. Crisis affects Export, Investment, GDP, and Terms of trade.

The crisis affects export, GDP, and terms of trade in short run as well as in long run. The crisis boosts exports. The crisis reduces GDP growth. The crisis raises terms of trade. The crisis decreases investment.

6.6.5. Previous Models might be Right and might be Wrong.

From subchapter 6.5, we find that not all previous models are right. Some of them are wrong. We prove that Nushiwat Model of ELG is wrong. Nushiwat found Non causality between exports and economic growth.

Between the right models, we can reject Liwan Lau Model and accept Bahmani-Claire Model. Liwan Lau found export led growth Hypothesis valid for Indonesia whereas Bahmani-Claire rejected the hypothesis. Bahmani-Claire found that Growth led Exports hypothesis was valid for Indonesia. This is because the Bahmani-Claire model succeed encompassing the Liwan-Lau model. On the other side, the Liwan-Lau model failed to encompass Bahmani-Claire Model. Hence, we could not trust all previous models of ELG published by authors. We should be careful when dealing with Export Led Growth issues.

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CHAPTER 7

CONCLUSION AND POLICY IMPLICATIONS

7.1. Conclusion

Some conclusions of this study are as follows:

1. There are at least four reasons for different results while assessing the ELG hypothesis: choices of variables, lags order selection of data, methods used to deal with non stationary data, and assumptions applied to deterministic trend.
2. We find there is a long run relationship between exports and GDP growth in Indonesia over the period 1967-2007. The causality runs from GDP to exports and from exports to GDP (bidirectional causality). This means both ELG and GLE are valid for Indonesia.
3. In the period 1983:2007 when Indonesia apply export promotion policy intensively, we find there is long run relationship between exports and GDP growth in Indonesia. The causality runs from GDP to exports and from

exports to GDP (bidirectional causality). This means both ELG and GLE are valid for Indonesia.

4. A chain bivariate model through the path Export → investment → Growth finds long run relationship between export and investment. However, the long run relationship does not exist between investment and growth. We fail to prove BOP constraint model of ELG in Indonesia.
   i. There is long run relationship between exports and investment in Indonesia. The causality runs from investment to exports and from export to investment (bidirectional causality).
   ii. There is no long run relationship between investment and GDP in Indonesia. A short run relationship runs from GDP to investment.
5. Multivariate models using three variables (Exports, investment and GDP) reveal that there is longrun relationship between Exports and GDP. The causality runs from GDP to exports and from exports to GDP (bidirectional causality). This means both ELG and GLE are valid for Indonesia.
6. A chain bivariate model through the path GDP → terms of trade → exports finds long run relationship exists between GDP and terms of trade and between terms of trade and exports. We prove Verdoorn Law model of ELG in Indonesia.
   i. There is long run relationship between GDP growth and terms of trade in Indonesia. The causality runs from GDP to terms of trade.
   ii. There is long run relationship between terms of trade and exports growth in Indonesia. The causality runs from terms of trade to exports and vice versa.

7. Multivariate models using three variables (GDP, terms of trade and exports) reveal that there is long run relationship between Exports and GDP. The causality runs from exports to GDP and from GDP to exports (bidirectional causality).
8. The crisis significantly affects all variables in this study in the short run as well as in the long run: GDP growth, export growth, terms of trade, and investment.
9. While dealing with the export led growth issue, policy makers should be careful to take policy as an implication of the result. They have to look at the history of the export and the growth of the economy, and analyze it to know what happen actually in the economy.
10. A new approach applied to assess the ELG hypothesis here is using chain bivariate model to see what happen in the exports, intermediate variables and the economic growth.
11. According to the encompassing model, some authors came up with right models (Liwan-Lau and Bahmani-Claire Model) and some with wrong models (Nushiwat Model). Between the right models of ELG model, Bahmani-Claire model succesfully encompasses Liwan-lau Model. Hence, we accept Bahmani-claire model and reject Liwan-Lau Model. Bahmani-Claire model says that ELG is not valid in Indonesia. They found that GLE is valid for Indonesia.
12. This research recommends to maintain the policy of export promotion for Indonesian economy with caution. This does not mean that export promotion should be undertaken at any cost. For Indonesia, which is encountering both

internal and external imbalances, a successful strategy to raise GDP and lower the imbalances would require a rise not only in export but also in the domestic absorption of domestically-produced goods and services. One possible solution may be by lowering import more than in proportion to the decline in gross domestic absorption.

7.2. Policy Implications

Before we discuss policy implications, it is important to discuss briefly the role of government on the economy and Islamic Concept of Growth. As a matter of fact, the role of government is the seeking of benefit and repelling of harm for everyone in the country. In Islamic terminology, the seeking of benefit and repelling of harm for everyone is called *maslahah* and it is a well-recognized Sharia principle. In other words, we call it "The Doctrine of Maximizing Human Welfare". However, scholars have put some conditions on what can be considered as *maslahah*. Shatibi has put three conditions:

1. Any rule adopted under *maslahah* must be in conformity with the overall objectives of *Sharia*;
2. When the solution is presented to people, common logic accepts it;
3. It must fulfill some genuine need.

Once something is accepted as *maslahah*, the next condition is that the means to achieve that *maslahah* must also be compatible with *Sharia*. A means to achieve that maslahah could be in the form of policy.

Regarding Islamic concept of growth, Faridi (1996) outline the Islamic approach to economic growth as folows:

1. It considers economic growth to be an important ingredient of the larger objective of ethico-social growth. Adjustments in the rate, composition and desirable volume of output will have to be made in the light of order social priorities.
2. It does not recognize 'all increases in all supplies' as a legitimate goal. Instead, it favours appropriate increases in a selected bag of goods and services-chosen with reference to the current economic needs and ethico-social values and aspirations.
3. The selection of goods and services will depend on the distributive requirements of the society, but, of course, subject to moral and social imperatives. It implies that except for some permanently prohibited goods, no universally valid composition of additional output is envisaged.
4. Although it assigns due importance to investments in tangible producer goods, it recognizes the significance of human, moral, and institutional changes as factors of individual and social uplift and progress.

After a careful analysis of the Indonesian economy, some implications of this study can be explained as follows.

7.2.1. Export promotion and import substitution have to be undertaken according to condition of the economy

According to Umer Chapra (1992) if industry and agriculture are both to be developed, then, the strategic importance of both import substitution and export promotion in the socio-economic advancement of the developing countries needs to be clearly visualized. There is no reason to emphasis one to the exclusion of the other. Both are necessary, even though their importance may vary over a longer time horizon in step with the different phases in a country's development.

In fact, the policy of export promotion and import substitution was taken by Indonesia according to the economy condition. In its broad guidelines and government policies, Indonesia wants to be an industrialist country based on agriculture. So, the path to be an industrialist country was taken by President Soeharto from the mids of 1960s.

When the price of oil jumped in the world market in 1973, Indonesia changed the policy from export promotion to import substitution. The money received from oil export was used to enhance education, health, investment and also to import many manufactured goods. Many manufactured imports came into Indonesia. From 1973 to 1982, manufactured imports were 71 percent of merchandise imports and merchandize imports itself were 68 percent of total imports of goods and services. So, the manufactured imports were 48 percents of total Indonesia's imports. This meant about 50 percent of the total imports were

manufactured imports. These manufactured imports was utilized to enhance manufactured exports.

As a matter of fact, since 1983, there was a rapid growth in Indonesia's manufactured exports until 1993. In 1983, the manufactured exports were 7 percent of merchandise exports. 11 years later in 1993, the manufactured exports jumped to 53 percent of merchandise exports. In 11 years, the manufactured exports jumped more than sevenfold. In this way, Indonesia became a semi-industrialised country. This is the success story of Indonesia's manufactured exports. However, in this period, fuel exports declined from 76 percent of merchandise exports in 1983 to 28 percents of merchandise exports in 1993.

This does not mean that import substitution should be undertaken at any cost. This may be clearly seen from the identity, Y=C+I+G+X-M, where Y= gross domestic product, C=consumption, I=gross domestic investment, G=government spending, X=export and M=imports. If C+I+G=A, where A represents gross domestic absorption, then Y=(A-M) + X. For developing countries, which are encountering both internal and external imbalances[1], a successful strategy to raise Y and lower the imbalances would require a rise not only in X but also in (A-M), which is the domestic absorption of domestically-produced goods and services.

[1] External imbalances defined as when the balance of trade is adverse, passive or unfavorable, when the value of a country's visible imports exceeds that of visible exports (Webster's online dictionary)

Since A needs to be reduced to remove the internal imbalance[2], the only way (A-M) may be raised is by lowering M more than in proportion to the decline in A.

Prior to import substitution, usually, we maximize imports. By maximizing import, domestic absorption of domestically-produced goods and services becomes low. Further, this will make internal imbalances soaring. But this internal imbalance will be removed if the revenue from export is high enough to cover the imbalance. This is what happened to the Indonesian Economy. When the goverment maximized imports, at the same time, revenue from oil export was enough to cover the imports cost.

The path of the development process of Indonesia is different from Japan, Taiwan and South Korea. The three countries got foreign currencies from exports of agriculture products. With that money, they imported machinary for light industry, and then export that light industry. Indonesia got foreign currencies from exports of oil and gas. Indonesia has rich natural resources in Oil and Indonesia exports oil. The opportunity came when the oil price jumped in 1973 and the government had so much money from oil exports revenue. The money was utilized for development in the fields of education, health, investment, and importing manufacturing goods.

The oil boom of the 1970s also enabled the government to make large investments in the improvement and expansion of infrastructure,

[2] Internal Imbalance or internal deficit defined as the gap between revenues and expenditures for a government (over a given period of time); often referred to as a public deficit or fiscal deficit (http://www.urbandictionary.com/define.php?term=internal%20imbalance, 25 nov 2010)

including roads, transport and communications facilities, grain storage facilities, and fertilizer plants (Tabor, 1992).

As far as agriculture is concerned, the policy of import substitution would have been used initially to support primarily agriculture. Large investment was taken for grain storage and fertilizer plants. As a result, yield growth accounted for 71 percent to the growth of rice output cultivated on irrigated rice fields in Indonesia during the period 1971 through 1985.

These intense efforts to raise rice production, in fact bore high fiscal costs. The fiscal costs of these subsidies grew faster than the government's ability to mobilize domestic resources. Hence, internal imbalances occurred. It seems that the management to raise rice production was not proper. This type of management should be improved in the future.

Once the oil boom had ended in 1982, the Indonesian government could no longer afford to pursue this import-substituting pattern of industrializing, as it had now to pursue a more outward-looking, export promoting industrialization strategy (Thee, 1989).

7.2.2. Export promotion at all cost is not desirable

If import substitution at all cost is bad, export promotion at all cost is also not desirable. When a number of inefficient large-scale industries have been established, devaluation of the local currency and freezing of nominal wages may enable the inefficient urban industries established by

the rich and the influential to export and thus survive, but would hurt the poor by substantially lowering their real wages.

UNCTADs 1989 Trade and Development report pours some cold water on the idea that trade policy reforms necessarily promote the economic growth of developing countries. A study of 32 developing countries which followed varying trade policies during the 1980s, revealed that favorable export performance was not always synonymous with good overall economic performance[3].

Those who overemphasize the strategy of export promotion to the neglect of import substitution may also wish to bear in mind that the exports of developing countries have always faced and continue to face all kinds of tariff barriers in industrial countries. "Poor countries are the main victims of some of the most pernicious barriers to trade, such as Europe's common agricultural policy and the rich countries 'Multi fiber agreement"[4].

The Finance Minister of Indonesia on February 2009 warned that protectionism during this global recession would harm both the national and global economy by saying "Indonesia continues its attempt to fulfill international commitments and hopes all countries will do alike. By killing the flow of international trade all countries will feel the effects,". The minister stressed the

[3] See also "*Export Reforms No Guarantee of Economic Growth*", Financial Times, 6 September 1989, p.6

[4] *The economist*, 22 July 1989, p.65. Multi Fiber Agreement (MFA) is an International tradeagreementunder which two countries may negotiatequotarestrictionsontextile and apparel imports from each other. MFA restrictions are normally prohibited under World Trade Organization (WTO)rules and must have been phased out by 2005.

message to the 15 new Indonesian ambassadors on February 3, 2009. The minister also asked them to increase cooperation on bilateral trade.

The argument is obviously comprehensive. If one country reduces its imports by imposing high tariffs, it will spoil other countries' exports. And if all countries do the same, trade will come to a halt.

The "Buy American" provisions in the US$819 billion stimulus bill passed by the US House of Representatives on January 28, 2009 have proved that "protectionism" is not wrong at all, although it will reduce free trade. The Senate went further, requiring all stimulus funded projects including highways, bridges, energy grids and school to use only American-made steel, iron and goods, even if they are more expensive. Since Chinese steel is cheaper than American steel, steel factories in some cities like Indiana, Ohio, Pennsylvania and Alabama have been running at only 45 percent of their capacity. The impact will be that many people lose their jobs. This act will convey to the world that there is no longer free trade. It seems that the sentiments defeated rationale.

The sentiment ignores efficiency if it creates unemployment in the country. If we count unemployed people in the US, the amount will be 2.6 million in 2008 alone. So, the reason why America resulted to this protectionist measure was very realistic. Other countries have attempted to do the same. French trade unions attacked President Nicolas Sarkozy, demanding both public and private-sector jobs be protected. In Germany, Ernst & Young indicated that 78 percent of small and medium sized companies favored the state embracing "protectionist measures" to shield them from the global recession. Russia has

increased duties on imported cars by 20 percent. Many other countries have followed suit.

Referring to the stimulus bill, Japanese prime minister was againts protectionism. Obviously this is indubitable right. In an autarchy system, when there is no trade between countries, the price of a commodities will be higher compared to the price in free trade. In other words, there are gains from free trade to involved countries. If a country tries protectionism then all countries will be affected and as a reaction, they too will result to protectionism. At the end, the effect on a given country's economy will be detrimental because of market inefficiency. This is what the theory says. But when we put into practice, there are so many factors which fly in the face of the theory.

Prior to that, in July 2008, The New York Times reported that the US refused any kind of protectionism, which caused the Doha Round of talks to collapse after seven years of negotiations. India and other developing nations proposed protecting sensitive agricultural products from competition in the event of a surge of imports which would harm their own farmers. The United States argued that such protectionist measures, which are now not permitted, would mean moving backward on current world trade commitments.

Responding to the US, Indonesian Trade Minister said the failure of the talks reflected the inability of the rich industrial powers to deal with the growing influence of China, India and Brazil in the global economy. She complained that what she called, "a reasonable request," had been blocked because the United States, "is not going to show flexibility."

In a situation when America protects their market and other countries begin to do the same, should Indonesia maintain its international commitment to free trade? This study shows that we may continue our commitment to free trade as indicated that export led growth hypothesis was valid for period 1983 to 2007. But, at the same period, growth led export hypothesis was also valid that means we may apply protectionism as well.

But, in the time of 2008 global crisis, it is not simple to maintain the commitment in view of the fact that global financial turmoil has hit every country. If we uphold the commitment in a lieu of protectionism, unemployment will explode. If use protectionist measures in the short run, we have to bear the costs, which in the future will be felt by the tax payers.

This is a lesson from American experience. In rebuilding the San Francisco-Oakland Bay Bridge in the 1990s, the use of domestic steel was required by the California transit authority, even though it was more costly than imported steel. Because of the abundance steel used in the project, California taxpayers had to pay $400 million more for the bridge.

But we have to make combating unemployment the first priority. As other countries have done, we should provide incentives to our economy. The reason is simple; human beings are more valuable than wealth. We sacrifice wealth for human lives and not the reverse. President Obama was right when he said that the enticement was aimed at creating jobs and reducing unemployment. Furthermore, he stated that this kind of inducement was a short term investment for maintaining equilibrium in the long run. There is also the fear that we cannot solve unemploy-

ment the long terms costs will be greater. So, what American did is understandable and could be followed by Indonesia.

Another way to create jobs in lieu of global crisis is to engage in beneficial trade. This can be done through bilateral trade. We should cooperate with other countries with a spirit of "helping each other". Indonesia for example, can export furniture made from wood, bamboo and rattan to Pakistan because Indonesia is rich in forest products and Pakistan cannot afford those products from its own resources. At the same time, Pakistan can export leather products like jackets, shoes and so on since Indonesia lacks the necessary resources to make these products.

Many other export products can be traded between Indonesia and Pakistan. If each country can boost exports based on beneficial trade, both sides will create more jobs and ultimately will get better economically. A similar spirit can be made with other developing countries.

Therefore, what Indonesia should do is to apply the concept of beneficial trade. Instead of competition, we should build our trade relationships based on regional cooperation in which economies of all participating countries will improve.

7.3. Avenues for Further Research

This research has uncovered some areas for further research. Further research in the following areas may help to derive some important policy recommendations. Future research:

1. Study the relationship between tariffs and exports.Tariff is a type of policy which is undertaken by government to boost export.
2. Study the other chain of bivariate model from export to GDP by using the path: export → foreign exchange → Import of raw material → economic growth.
3. Study the other chain of bivariate model from GDP to export by using the path: GDP → excess supply of exportable goods→ export growth.

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