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EXPORTS, IMPORTS, FDI AND GDP IN
THE REPUBLIC OF KOREA: 1980-2014

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Abstract

In this paper, we have set up an empirical analysis of the economic growth in Korea between 1980 and 2015, in order to identify the potential relationships between relevant variables. We chose to study Korea because is a country notable for applying industrial policies. We compare the export-led growth versus growth-driven exports hypotheses, we also compare the contribution of FDI to economic growth hypothesis versus its opposite, the idea that a rapid economic growth attracts FDI; we also compare other opposing hypotheses. A four-variable vector autoregression (VAR) is used to study the relationships between trade, foreign direct investment (FDI) and economic growth using quarterly data from 1980 to 2014. We estimated the Granger causality/Block exogeneity test, and calculated the Impulse Response Functions and Variance Decomposition. The main findings are that the three tests confirm the growth-driven exports hypothesis, as well as that FDI has no effect on economic growth or exports. We consider that these results for Korea have a significant relevance for Latin America and other regions that are searching for policies to enhance economic growth.

I. Introduction

The Republic of Korea (Korea), identified as one of the Asian tigers, has received much attention due to its phenomenal growth in recent decades. For some, this is the result of market-friendly policies[1]; for others, it derived from the actions taken by "the developmental state."[2] Its growth strategy has sometimes been oversimplified and described as an export-led growth model, as if Korea's success could be solely explained by its export promotion. While indeed the Korean government actively promoted exports during the 1960s and 1970s, its development policy was much more complex and far-reaching.[3]

The variety of policies implemented and the particularities of the Korean economy generated a particular interaction in the macroeconomic variables. This process was the result of a successful strategy which consisted of fostering the creation and development of competitive firms, so they could reach a world-class status. Once they reached such a level, Korean firms did not need as much protection as those from other countries; exports came as a natural result of achieving efficiency. Korea's success should not be seen as the expected outcome of a liberalization process, but the result of a specific development strategy applied step by step under precise circumstances. In order to give a better explanation of the causality effects found in the quantitative analysis, we begin with a brief historical review of development and industrial policies carried out by the Korean government, focusing on those that are related to the external sector, as well as some key points of its liberalization process.

The Korean economy has shown great strength that has resulted in a consistent growth of its real GDP per capita (5.24% average annual real growth from 1950 to 2015). The economic policies carried out by the Republic of Korea (Korea) transformed the country from a rural economy into an industrialized one, through the most rapid developing process that a
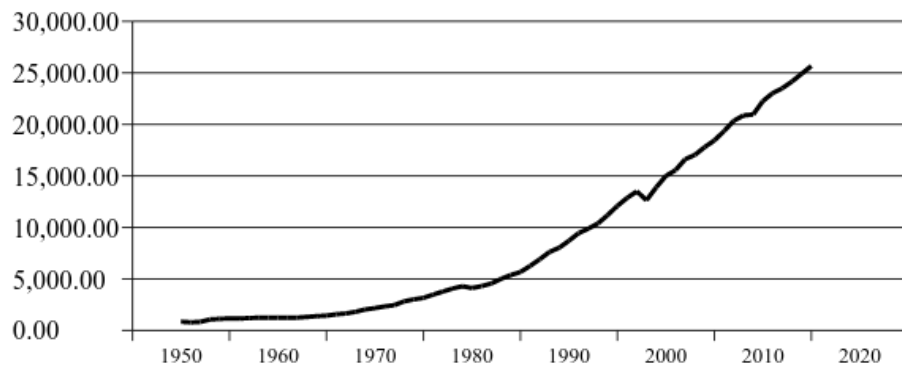
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[1] Westphal (1976), Krueger (1979), World Bank (1993)
[2] Amsden (1989), Haggard (1990), Woo-Cumings, Meredith (1999)
[3] Chang, Ha-Joon (1994)

country has ever experienced. Given its results, the Korean case must constitute an example of policies to be considered by a developing country. (See Figure 1)

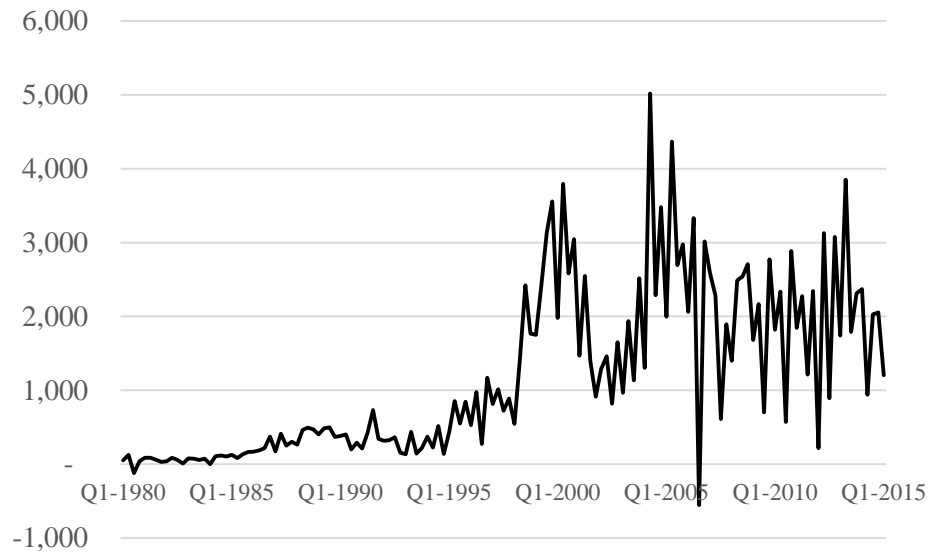Figure 1. Annual GDP per capita in 1990 US$ (converted at Geary Khamis PPPs)

The Conference Board. 2015. The Conference Board Total Economy Database™, May 2015, http://www.conference-board.org

Figure 2 Real Exports, Imports and FDI (mill. $ - 2000)
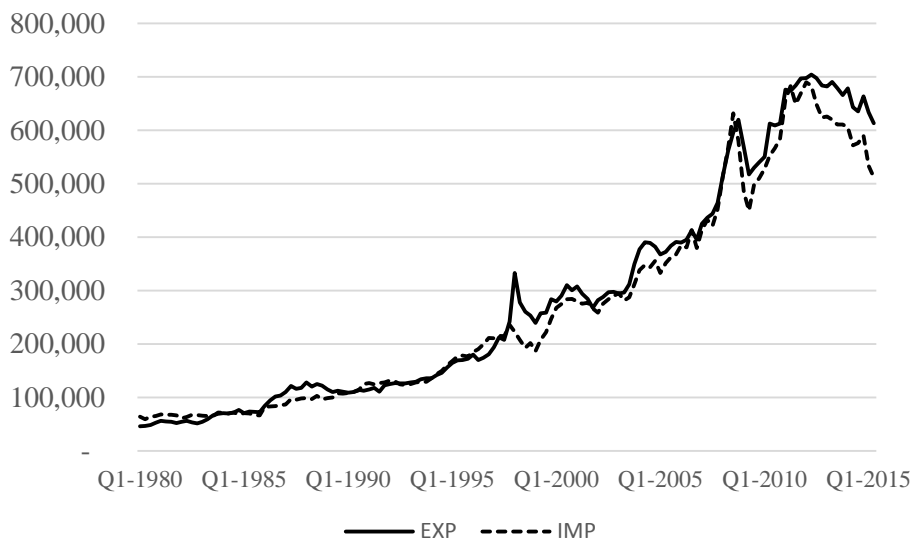
Figure 3. Real foreign direct investment inflows

Misleadingly, Korea has been described as an example of the export-led growth model. As we can observe in Figure 2, international trade, expressed in terms of real exports and imports, has grown enormously over the last decades. As a frame of reference, real exports in the second quarter of 2014 were 13 times those of the first quarter in 1980, while imports grew 8 times during the same period. Indeed, although the fast economic growth in Korea has been accompanied by the rapid growth in exports, we shall not rush into conclusions about the direction of causality

Following the Japanese example, one of the key characteristic of the Korean strategy was to limit the access of FDI to the Korean economy, although it was forced to partially liberalize it after the Asian crisis in the nineties. Consequently, FDI experienced a rapid growth after the 1997 crisis and changes in regulation, but stagnated after 2000, within a range of variability. (See Figure 3.)

The purpose of this study is to analyze the causal relationships between the Korean foreign sector and its economic growth and to test the traditional hypothesis of the sources of

economic growth. We do that by estimating and analyzing a VAR model with four variables (GDP, exports, imports and foreign direct investment (FDI)), since the 1980s. The study tests the long-run and short-run relationships between GDP, exports, imports and FDI for Korea from 1980Q1 to 2015Q1 using quarterly data, contributing to the debate on the sources of economic growth in Korea, as well as to the literature on the connection between economic growth, trade liberalization and industrial policies.

Our methodology is close to that used by Nguyen (2011), who implements a set of econometric procedures, including the unit root test of four series, lag structure, the VAR diagnostic, the Johansen co-integration test, the Granger Causality/Block Exogeneity Wald Test (GCBEW test), analysis of impulse response and analysis of variance decomposition, to study the impact of trade liberalization on economic growth for annual data on Malaysia and South Korea. This methodology is relevant for our study for two reasons. First, it has the advantage of avoiding misspecification and minimizing the resulting omitted-variables bias. Second, it allows us to test and estimate the causal relationship among variables (GDP, exports, imports and FDI) through a four-variable VAR model.

The remainder of the paper is organized as follows. The second section presents a brief history of South Korea's industrialization process; the third presents the theoretical justification for relating the four variables. The fourth section discusses some of the relevant literature. The fifth section describes the data set. The sixth section describes the methodology as well as the estimation results, and the seventh is the conclusion.

II. Development Policy in Korea

Japanese colonialism is often seen as one of the reasons why Koreans consider FDI as a yielding of sovereignty over the production means. Although this period should not be overlooked when analyzing Korean industrialization, as Koreans may have imitated the Japanese developmental state, Korean GDP per capita did not experience any significant differential growth with respect to other comparable countries.

In 1946 the government determined which goods could or could not be imported, although no quantitative limit was established. In 1949, the Import Quota System included quantitative limits (Lee et al., 2012, p. 160). The Republic of Korea was born as a country with a high level of protectionism. Syngman Rhee continued with this policy during the 1950s in order to promote industrialization through import substitution. This period is relevant when studying Korean industrialization since the share of industrial GDP increased from 8% to 14% between 1953 and 1960 (León and Lopez, 2009, p.150). Although Rhee's regime promoted the export of manufactured goods from light industry, as a way of absorbing labor and obtaining foreign currency, the external sector was dominated by aid from the United States and the United Nations.

Park Chung Hee, who seized the government through a military coup on May 16, 1961, and become president by popular election in 1963, established an intense industrial policy which transformed the Korean economy. Instead of taking direct action by nationalizing industrial enterprises, the government established numerous incentives, including access to credit facilities for the acquisition of foreign currency, loans through the nationalized banking system and the relaxation of trade restrictions to promote selected industries. (Cho, 1997, p. 213). In addition, Park Cung Hee devaluated the won in 1964 from an average of 130 to an official 255 won per dollar rate (Haggard et al., 1990, p.25). Although the measure may have originated in order to balance previous overvaluations which tended to increase the received aid, it had a tremendous expansionary effect on the economy through the increase of exports (Bahmani-Oskooee and Rhee, 1997). Together with the industrial promotion and the devaluation, Korea's inclusion in international markets was vital to support its increase of exports. The Korean government first tried to join the GATT in 1950, an attempt that failed due to the Korean War. Its second attempt was on May 20, 1966, and it was formally accepted in 1967 (Ahn, 2005, p. 288). In addition to joining the GATT, the Korean Trade Promotion Corporation (KOTRA) was created in 1962 with the objective of actively promoting Korean exports.

Governmental intervention in the 1970s and 1980s created enormous investment rates in the heavy and chemical industries that would not correspond to the optimal levels according to the market conditions (Ueda, 2000). This overinvestment, however, boosted sectors that subsequently became competitive. As it is known, heavy industry requires significant investments in order to obtain an efficient production scale. Due to the limited size of the Korean market, once such scale was obtained, firms were encouraged to export. Thus, the promotion of exports was complementary to the boost of the local industry, rather than being the origin of the Korea's economic growth.

After the death of Park Chung-Hee and short-lived government of Choi Kyu-hah, Chun Doo-Hwan took power through a *coup d'état* in 1980 and began a slow process of liberalization, which also affected trade policy. This was a slow process in order to minimize the potential negative impact of a rapid liberalization in a country with a very restricted external sector. For instance, it is notable that, by 1982, 93% of total imports were subject to some quantitative restriction (Chang, 2006, p. 65). In 1984, Korea established the Advanced Notice of tariff reductions, as a means to help businesses adapt to the measure. Thus, tariffs were gradually reduced over a period of 11 years. The gradual nature of the measure over a long period of time allowed companies to improve their competitiveness and increase government's credibility in regard to the measure (Lee et al., 2012, p. 171).

This initial liberalization of the economy was homemade and not imposed by Breton Woods institutions; it was the result of the development strategy to make successful industries, already nourished by previous government policies, reach world-class status.

The 1997 crisis, mainly driven by the contagion effect from Thailand and Philippines, the structure of the indebtedness of *chaebols*[4] (Shin and Chang, 2003, p. 39) and the lower international prices of Korean exports (Shin and Chang, 2003, p. 37), accelerated Korea's liberalization process. As a condition of the bailout from the International Monetary Fund, the Kim Dae Jung administration moved towards attracting international capital. For instance, foreigners acquired greater rights to trade in the Korean stock market, allowing them

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[4] Chaebol: large, family-run conglomerates.

to invest in real estate and to take control of Korean companies (Seth, 2011, p. 469). They also agreed to eliminate subsidies on exports, reduce licensing restrictions for importing, as well as to clarify import certification processes (Lee et al., 2012, p. 174).

But despite this intrusion in the South Korea economy, foreign equity limits still remain in some strategic sectors, such as telecommunications. In 1998 the Center for Investment Services of the Republic of Korea was created, which, after its enlargement of 2003, changed its name to *Invest Korea*; and it is currently operated by KOTRA. In addition, by 2008, free economic zones were created in Incheon, Busan/Jinahe, Gwangyan Bay, Hwanghae, Saemangeum-Kunsan and Daegu-Gyeungbuk (Lee et al., 2012, p. 183). Park Geun Hye's current strategy to promote the creative economy shows that the Korean interventionist industrial policy did not disappear with the arrival of democracy nor with the 1997 crisis. This quick review of some elements of the Korean industrial and external policy of the last decades shows that we should be cautious before assuming any particular thesis on the causal connections between the external sector and the economic growth. Such causal links must be carefully studied before trying to adapt the successful Korean development strategy to other countries.

III. External Sector and Growth

When analyzing the effects on growth of trade liberalization, we need to distinguish between industrialized and developing countries. In the latter, although exports may grow after trade liberalization, as happens in industrialized countries, imports may increase by a greater magnitude, which would worsen the trade balance (Santos-Paulino and Thirlwall, 2004).

However, such a dynamic is not generalizable to all developing countries. Awokuse (2007) analyzed the cases of trade liberalization in Bulgaria, the Czech Republic and Poland, and found a virtuous circle between exports and economic growth in the first, but negatively affected the growth of imports in the case of the other two countries. Therefore, we must discard any orthodoxy on the effects of liberalization with respect to the external sector, whether it is the commercial sector or even capital markets. The effects of trade liberalization

policies may have different effects depending on, for example, the initial conditions and the strength of institutions of the referred country.

It has been studied how the causal relationship between productivity and exports may not be bidirectional, but from the first to the second (Kunst and Marin, 1989). Therefore, the initial conditions of a country can greatly affect the expansion of exports and their relationship with respect to the expected growth of imports. The strength of institutions could have explained the differential in the performance of Asian and Easter Europe economies during the transitional period towards liberalization (Popov, 2000).

Exports can also interact with domestic industrial policies as a mechanism to introduce competitiveness. Ahmad and Harnhirun (1995) did not find a good basis to establish the export led growth for the ASEAN region (Indonesia, Malaysia, the Philippines, Singapore and Thailand). Instead, they claimed that the interaction of exports with interior mechanisms could be a more suitable explanation for the economic growth of these countries.

The cautious observations of liberalization processes and the dynamics between growth and the external sector in different countries, especially the Asian ones, is of great importance for Latin American countries. This is of particular interest for countries where there has been significant increase, during the twentieth century, in the elasticity of the ratio of exports and imports with respect to income, such as Mexico, Argentina, Brazil, Peru and Uruguay (Guerrero de Lizardi, 2006).

FDI is, along with exports and imports, a key variable when explaining the relationship between a country and its external sector. When purchasing goods abroad, companies can, basically, decide between importing those goods or producing them in the foreign country, depending on the existence of convenient comparative advantages. Companies face a similar decision between investing in a foreign country and exporting their goods to such market. Because of these substitutabilities, FDI has also been studied, along with foreign trade, to determine its relationship with economic growth.

Among the variables that may influence FDI inflows, the following have been mentioned: the market size of the receiving country; the political stability of the receiving

country; its level of protectionism; and the differences in the relative prices of production factors (de Mello, 1997). FDI, depending on the factors that may generate it, can affect the imports and/or the exports of a country. In addition, the increased provision of capital, FDI can have, in the short term, positive effects on growth. Its effects on long run growth could arise from technological spillovers, imports and synergies with local companies. These effects, which theoretically do not generate much discussion, have been difficult to be empirically proven (de Mello, 1997).

This study tests the long-run and short-run relationships between GDP, exports, imports and FDI for the Korea from 1980 to 2015 using quarterly data, contributing in this way to the debate on the sources of economic growth in Korea, as well as to the literature on the connection between economic growth, trade and capital liberalization, and industrial policies and government intervention.

IV. Theoretical Background

Since the 1970's, in most of the developing world, there has been a considerable shift towards export promotion strategies, supported by the idea that export expansion leads to better resource allocation, "creating economies of scale and production efficiency through technological development, capital formation, and employment generation" (Shirazi and Abdul Manap, 2005). After a period of inward-oriented policies, it was thought that promoting exports would enable developing countries to correct imbalances in the external sector and assist them in their full recovery.

Although there has been a wide discussion among researchers over the appropriateness of trade policy for promoting economic growth and development (Todaro and Smith 2003, p. 556), theoretical agreement on export-led growth has "emerged among neoclassical economists due to the success of the free-market, and outward-oriented policies of the East Asian Tigers" (World Bank 1993). Export-led growth hypothesis has not only been widely accepted by academicians (Feder 1982; Krueger 1980), and evolved into a "new conventional wisdom" (Tyler 1981; Balassa 1985), but it has also shaped the development

path of a number of countries as well as the policies of the World Bank (World Bank 1987)"
(Shirazi and Abdul Manap, 2005).

But international trade theory says nothing about the effects of trade liberalization on the product or the productivity growth rate. Different models, equally reasonable, can produce results quite opposite in this respect. "Conventional effects of trade are the welfare gain only once, and although those gains can accumulate over time, not necessarily place the economy on a higher path of technological efficiency." (Rodrik, 1992; p. 157)

The net benefits of increased trade on economic growth are not necessarily positive, as Grossman and Helpman (1992), and Young (1991), among others, have demonstrated.[5] Brunner (2003; p.3) summarizes these results in the following manner:

> "While there may be an improvement in efficiency that raises the level of income, growing trade liberalization can also change the relative price of tradable and move the resources of the country away from the activities where there are increasing returns. Whether increasing competition push the economy away from the activities that generate increases in the long-term growth in favor of the comparative advantages of the country at the time of the commercial release. Put differently, if one economy is delayed technologically, a temporary protection may allow the country achieves economies more advanced, rather than forcing them to specialize in the production of traditional goods and experience a reduction in their rates of long-term growth."

On the other hand, empirical work also supports the idea that greater openness in general leads to a higher rate of growth. Although numerically speaking most empirical works support the idea that trade promotes growth (Dollar, 1992; Sachs and Warner, 1995; Berg and Krueger, 2003), these works are very controversial and are subject to a variety of criticisms (Rodríguez and Rodrick, 2003). Many of these studies have found a positive relationship between trade and income, but the relationship is generally not robust. There are methodological and econometric problems that explain these limitations (Brunner, 2003; p. 3). Most of this literature consists of analysis of cross-section data for many countries (with

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[5] The lack of fundamental theories linking trade with productivity have been replaced by a myriad of arguments about how free trade increases productivity, most of which do not have much rationale. Those that stand out most are 'X efficiency," economies of scale, and "macroeconomic discipline." To know the limitations of each of these arguments, see Rodrik (1988).

very different realities), where income ,or income growth, in several countries is correlated with some measure of "openness." The problem of these works is precisely that these openness measures are built, in most cases, using quantitative and qualitative judgments that are very questionable (Rodríguez and Rodrick, 2003; p. 3).

In fact, the consensus is that there is no empirical evidence solid enough to establish that trade liberalization implies increases in productivity and per capita income. Rodrick (1992; p. 172) puts it eloquently: "[. . .] We don't have any good reason to expect that trade liberalization is generally good for the technological performance." And he adds:

> "Until more evidence becomes available, then, a healthy skepticism is in order. In the meantime, if truth-in-advertising were to apply to policy advice, each prescription for trade liberalization would be accompanied with a disclaimer: "Warning! Trade liberalization cannot be shown to enhance technical efficiency; nor has it been empirically demonstrated to do so." Rodrick (1992; p. 172)

But let us assume that growth and exports are correlated. Then we can ask: Do exports determine growth? Does growth determine exports? Or is there feedback between both variables? Should a country promote exports to speed up economic growth or should it primarily focus on economic growth, which in turn would generate exports? There are basically four propositions. According to the so-called export-led growth hypothesis, export activity leads economic growth. Trade and macroeconomic theory provides several plausible explanations in favor of this idea; besides classical effects, there exists the possibility of exploiting economies of scale, the induction of technological change, the increase in labor productivity, capital efficiency, etc. The second proposition, the growth-driven exports hypothesis, postulates a reverse relationship.[6] It is based on the idea that economic growth induces trade flows, as the former can create comparative advantages in certain areas leading to specialization and facilitating exports. These two approaches are certainly not mutually exclusive; therefore the third notion is a feedback relationship between exports and economic

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[6] Scholars such as Bhagwati (1988) have noted that an increase in GDP generally leads to a corresponding expansion of trade.

growth. Finally, there is also potential for a simple contemporaneous relationship between these two variables.

There is another possible source of growth, especially for developing countries: multinational corporations. In fact, according to Nguyen (2011), multinational firms consider the option of exporting goods or establishing factories in foreign markets. The choice between exports and FDI depends on the level of convenience, risk, profit and long-run developing strategy of firms, competitors, etc. (Liu et al., 2001). In consequence, multinational corporations face the dilemma of whether to export to a market or to establish a subsidiary to avoid barriers to trade.

But what can we say about the FDI as a promoter of efficiency and diffusion of technologies in developing countries? This has neither a theoretical nor an empirical basis. Actually, as the reason that moves foreign firms towards FDI is precisely to prevent the spread of industrial know-how, it would be naïve to expect that the host country would benefit from the mere presence of FDI. A reason why multinational companies have been expanded so much, is precisely to maximize the use of their knowledge capital, preventing these intangibles from appropriation by other companies. In theory, this could be achieved through licensing, but the possibility to foresee all the possibilities and avoid "holes" in contracts, makes this alternative infeasible most of the time (Caves, Frankel and Jones, 2002; p. 157).

The empirical evidence showing that there are positive externalities in the host countries by the presence of FDI is scarce. As Rodrik (1992) points out: "the literature on economic policy is full of extravagant claims about the existence of positive spillovers arising from FDI, but the evidence in this regard is very austere." Similarly, Smarzynska (2002) states: "indeed the difficulties associated with untangling the different effects that come into play and the data limitations prevent researchers from providing conclusive evidence for the existence of positive externalities arising from FDI."

Moreover, Helpman and Krugman (1985) point out that the effect of trade on technical efficiency is not conclusive in models of imperfect competition and increasing returns to scale. In such cases the trade effects depends on the type of competition assumed in

the domestic market, entry, exit and on how market structures change in response to a trade disturbance. As a result, the effect of trade on technical efficiency is still an empirical issue.

Finally, we have the relationship between imports and economic growth. The import-substitution policies in Latin America were accused of having a negative impact of imports on economic growth. Since these policies were abandoned, some economists have emphasized the importance of imports in economic growth. Currently, the imports-compression growth hypothesis suggests that a shortage in imports will restrict economic growth.[7] The imports-compression growth hypothesis (Asafu-Adjaye and Chakraborty, 1999, p.164; Esfahani, 1991, p.95-99; Kim et al., 2009, p.1821) is based on the following arguments: "(1) Importing consumption goods forces the domestic import-substitution firms to innovate and restructure themselves, which improves their productivity, (2) Imports can increase productivity through improving input quality, varieties of inputs and the reallocation of capital and labor to importers, (3) Imports of capital and intermediate goods can increase economic growth through technological diffusion." (Nguyen, 2011)

In contrast, imports in developing countries could displace the import competing industries and destroy the domestic productive chains, producing low levels of domestic-added value. The opening of the economy to imports may produce a reallocation of resources from productive employment, to unemployment or underemployment.

On the other hand, the relationship between exports and imports can be carried out through two channels. Exports provide foreign exchange which might be used for importing consumption goods, as well as intermediate or capital goods. Moreover, importing high-technological equipment [and] intermediate goods for production will accelerate production for exports (Nguyen, 2011). Conversely, imports of intermediate and capital goods might

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[7]The import compression hypothesis was originated in the early eighties as a result of the debt crisis. Import compression refers to the effect of government policies that are specifically intended to reduce the volume of imports in order to obtain a rapid improvement in the merchandise trade balance in the face of binding external finance constraints. In other words, import compression occurs when the domestic authorities impose tariffs, quotas, or licensing schemes – or engage in severe domestic deflation – with the purpose of servicing external debt or rebuilding official exchange reserves, Khan and Knight (1986). Later on, this hypothesis was extended to relate imports and growth.

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discourage the increase of national content of exports, which leads to a diminishing impact of exports on GDP.

Moreover, "an increase in FDI may require a high level of importing essential intermediate goods and capital goods for production. But a higher level of importing consumption goods may have a negative effect on the import-substitution industry with foreign capital, and thus FDI may decrease. Therefore, there may be causality between FDI and imports." (Nguyen, 2011).

On the whole, we have reasons to support or deny the existence of an array of interactions between GDP, exports, imports and Foreign Direct Investment (FDI).

V. Literature Review

There is a significant number of studies on the relation between economic growth, export and FDI. Jung, and Marshall (1985) perform causality tests between exports and growth for 37 developing countries; the results cast considerable doubt on the validity of the export promotion hypothesis. Henriques and Sadorsky (1996) investigate the export-led growth hypothesis for Canada by constructing a vector autoregression (VAR) in order to test for Granger causality between real Canadian exports, real Canadian GDP, and real Canadian terms of trade; they find that these variables are co-integrated and evidence of a one-way Granger causal relationship in Canada whereby changes in GDP precede changes in exports (i.e. Growth-driven exports hypothesis). Zestos and Tao (2002) studied the relations between the growth rates of exports, imports, and the GDP, for the 1948-1996 period for Canada and the United States, finding bidirectional causality for Canada from the foreign sector to GDP and vice versa, and a weaker relationship between the foreign sector and GDP for the United States. Kónya (2004) investigates the possibility of export-led growth and growth-driven export by testing for Granger causality between the logarithms of real exports and real GDP in twenty-five OECD countries with annual data for the 1960-1997 period, and finds mixed

results.[8] Shirazi and Abdul Manap (2005) examine the export-led growth hypothesis for five South Asian countries through cointegration and multivariate Granger causality tests, they also find mixed results.[9]

Our paper is methodologically close to that of Nguyen (2011), who analyzes the impact of trade liberalization on economic growth for Malaysia and South Korea; he uses a four variable vector autoregression (VAR) to study the relationship between trade, FDI and economic growth over the time period from 1970 to 2004 (for Malaysia) and from 1976 to 2007 (for Korea). Using Granger Causality/Block exogeneity tests, impulse response functions and variance decompositions, he finds different results for each country, arguing that these differences in the estimated results are explained by the dissimilarities in the economic policies between the two countries.[10]

VI. THE DATA SET

We use quarterly data from Q1-1980 to Q1-2015. The four time series are: LRGDP (logarithm of real GDP); LREXP (logarithm of real exports); LRIMP (logarithm of real imports) and LRFDIL (logarithm of real FDI liabilities). The data has been sourced from the OECD statistics. In order to express them in real terms, we have taken the series in current prices and transformed them by using a GDP deflator, so that all variables were expressed in millions of 2000 US dollars before taking logs. Due to the high volatility of FDI, when analyzing

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[8] "There is no causality between exports and growth (NC) in Luxembourg and in the Netherlands, exports cause growth (ECG) in Iceland, growth causes exports (GCE) in Canada, Japan and Korea, and there is two way causality between exports and growth (TWC) in Sweden and in the UK. Although with less certainty, we also conclude that there is NC in Denmark, France, Greece, Hungary and Norway, ECG in Australia, Austria and Ireland, and GCE in Finland, Portugal and the USA. However, in the case of Belgium, Italy, Mexico, New Zealand, Spain and Switzerland the results are too controversial to make a simple choice."

[9] "Strong support for a long-run relationship among exports, imports, and real output for all the countries except Sri Lanka. Feedback effects between exports and GDP for Bangladesh and Nepal and unidirectional causality from exports to output in the case of Pakistan were found. No causality between these variables was found for Sri Lanka and India, although for India GDP and exports did induce imports. A feedback effect between imports and GDP was also documented for Pakistan, Bangladesh, and Nepal, as well as unidirectional causality from imports to output growth for Sri Lanka."

[10] "Although both countries implemented policies of export-orientated industrialization, the Malaysian government promoted FDI as a tool of industrialization, while the Korea government built an "integrated national economy" using "chaebol" industrial structures and minimizing the role of FDI."

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quarterly data, we have considered the average FDI of the last four periods before taking logs.

Figure 4
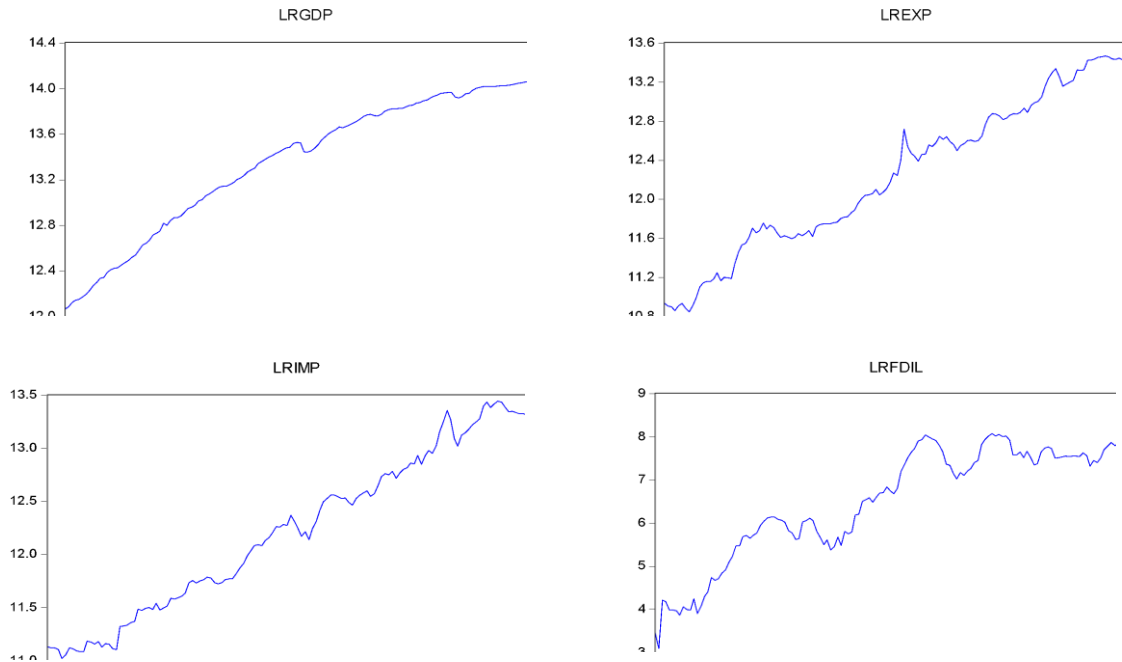
VII. Estimations

In this section, we estimate the relationship among the four variables. In order to do so, we will proceed as follows:

1. Unit root test of four time series;
2. Test the lag-length of the VAR model;
3. Estimate four variable VAR model;
4. VAR diagnostics (residual autocorrelation and residual normality tests);
5. Johansen cointegration test;
6. Granger causality Wald test;
7. Dynamic simulation (impulse response function and variance decomposition).

We begin by implementing a unit root test on our four series (LRGDP, LREXP, LRIMP and LRFDIL) by using the Phillip-Perron test. If all series are found to be I(1), they will be used in a four variable VAR. Table 1 and Table 2 provide the evidence that the four time series are non-stationary of order one

Table 1: PHILIPS-PERRON TEST (LEVELS)

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Variables	Intercept	Trend and Intercept	None
LRGDP	-5.217	-1.183	6.634
LREXP	-1.127	-2.512	3.407
LRIMP	-0.857	-2.536	3.069
LRFDIL	-2.517	-1.502	1.255

Note: the critical values for the PP test with intercept, with trend and intercept, and none at the 1%, 5% and 10% significance levels are respectively: -3.479, -2.883, -2.578; -4.026, -3.443, -3.146; -2.582, -1.943, -1.615.

The result from unit root test in levels reported in Table 1 shows that for most tests we cannot reject the null hypothesis (non-stationary) at a 0.01 significant level. LRGDP is clearly growing over time (see Figure 4) so the appropriate test requires to include trend and intercept.[11] Thus, all the variables have a unit root and we continue to test the unit root of their first difference.

TABLE 2: PHILIPS-PERRON TEST (FIRST DIFFERENCES)

Variables	Intercept	Trend and Intercept	None
LRGDP	-8.798	-9.990	-5.886
LREXP	-10.544	-10.592	-9.787
LRIMP	-9.927	-9.923	-9.455
LRFDIL	-12.218	-12.718	-11.992

Note: the critical values for the PP test with intercept, with trend and intercept, and none at the 1%, 5% and 10% significance levels are respectively: -3.479, -2.883, -2.578; -4.027, -3.443, -3.146; -2.582, -1.943, -1.615.

Since their absolute values are higher than the absolute value of 5 percent critical values, we can reject the null hypothesis of non-stationary at a 0.05 level. Thus, we can conclude that the four series in levels are non-stationary with the root of order 1. Therefore we construct a four-variable VAR.

Now consider a four-variable standard VAR model of order p as (unstructured form) (Shin and Pesaran, 1998):

$$y_t = \sum_{i=1}^{p} \Box A_i y_{t-i} + B x_i + e_t \tag{1}$$

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[11] Elder and Kennedy (2001). p. 140-141.

Where y_t is n x 1 random vector. In our model, four-variable VAR, n = 4 and y_t = (*LRGDP, LREXP, LRIMP* and *LRFDIL*); the A_i is n x n fixed coefficient matrices; *p* is order of lags; B is a n x d coefficient matrix of exogenous variables; x_i is d x 1 vector of exogenous variables.

According to Shin and Pesaran (1998), the model satisfies the following conditions:

Assumption 1: $E(e_t) = 0$; $E(e_t e_t') = \Sigma e$ (nonsingular) ; $E(e_t e_s') = 0$ if s = t.
Assumption 2: No roots are inside the unit circle.
Assumption 3: There is not full colinearity among y_{t-1}, y_{t-2}... y_{t-p}, x_t.

To check whether the assumptions of our VAR model are met, the following tests should be implemented (Nguyen, 2011):

- Lag order selection;
- VAR residual serial correlation LM test;
- VAR residual normality.

We constructed the VAR system with four endogenous variables (LRGDP, LREXP, LRIMP and LRFDIL) and eight dummy variables to obtain normality in the residuals.[12] The result from the test for lag length criteria, based on the four-variable VAR system with the maximum lag number of 10, is reported in Table 3. The lag order chosen by FPE criterion is 5. In addition to this information we implemented the VAR residual correlation LM test and the residual normality test (Lutkepohl, 2005). An appropriate lag order needs to satisfy those tests.

Table 3. Test for lag length criteria.
VAR Lag Order Selection Criteria
Endogenous variables: LRGDP LREXP LRIMP LRFDIL
Exogenous variables:
Date: 10/21/15   Time: 21:20
Sample: 1981Q1 2015Q2
Included observations: 128

---

[12] D1:1981Q3=1, D2:1986Q1=1, D3:1988Q1=1, D4:1988Q2=1, D5:1997Q4=1, D6:1998Q1=1, D7:2008Q4, D8: 2009Q1.

Lag	LogL	LR	FPE	AIC	SC	HQ
1	840.2503	NA	3.00e-11	-12.87891	-12.52241*	-12.73406*
2	853.4992	24.84166	3.13e-11	-12.83593	-12.12292	-12.54623
3	869.4842	28.97275	3.14e-11	-12.83569	-11.76618	-12.40114
4	886.2499	29.34002	3.11e-11	-12.84765	-11.42164	-12.26826
5	906.5717	34.29300	2.92e-11*	-12.91518	-11.13266	-12.19094
6	922.7720	26.32550	2.93e-11	-12.91831*	-10.77929	-12.04922
7	929.3713	10.31137	3.44e-11	-12.77143	-10.27590	-11.75748
8	944.4515	22.62031	3.54e-11	-12.75705	-9.905024	-11.59826
9	963.4207	27.26827*	3.44e-11	-12.80345	-9.594914	-11.49980
10	980.9333	24.07990	3.44e-11	-12.82708	-9.262046	-11.37859

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Although the maximum lag length of the criteria differ among them, we choose Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQ), the selection we will use is 1 lag.[13]

Table 4: VAR MODEL WITH 1 LAGS AND 8 DUMMY VARIABLES

Vector Autoregression Estimates
Date: 10/22/15   Time: 22:27
Sample (adjusted): 1981Q2 2015Q2
Included observations: 137 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LRGDP	LREXP	LRIMP	LRFDIL

---

[13] According to Liew,Venus Khim-Sen, (2004) the Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQ) are the best test for sample sizes of 120 or greater.

R-squared	0.999733	0.996939	0.996550	0.987889
Adj. R-squared	0.999707	0.996642	0.996217	0.986717
Sum sq. resids	0.012784	0.262951	0.272418	2.660261
S.E. equation	0.010154	0.046050	0.046871	0.146471
F-statistic	38686.59	3365.113	2985.194	842.8774
Log likelihood	441.2557	234.1256	231.7028	75.60204
Akaike AIC	-6.251908	-3.228111	-3.192741	-0.913898
Schwarz SC	-5.974830	-2.951032	-2.915663	-0.636820
Mean dependent	13.37533	12.29705	12.25252	6.528055
S.D. dependent	0.593303	0.794718	0.762017	1.270869

Determinant residual covariance (dof adj.)	5.91E-12
Determinant residual covariance	3.97E-12
Log likelihood	1020.725
Akaike information criterion	-14.14197
Schwarz criterion	-13.03366

The results from the VAR residual normality test are reported in Table 5.

Table 5: VAR RESIDUAL NORMALITY TEST

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 10/22/15   Time: 22:15
Sample: 1981Q1 2015Q2
Included observations: 136

Component	Skewness	Chi-sq	df	Prob.
1	0.185916	0.783467	1	0.3761
2	-0.074621	0.126214	1	0.7224
3	0.182614	0.755888	1	0.3846
4	-0.147293	0.491761	1	0.4831
Joint		2.157331	4	0.7068

Component	Kurtosis	Chi-sq	df	Prob.
1	3.700625	2.781623	1	0.0954
2	3.035812	0.007268	1	0.9321
3	3.217673	0.268496	1	0.6043
4	3.728456	3.007004	1	0.0829
Joint		6.064391	4	0.1944

Component	Jarque-Bera	df	Prob.
1	3.565091	2	0.1682
2	0.133482	2	0.9354
3	1.024385	2	0.5992
4	3.498765	2	0.1739
Joint	8.221722	8	0.4121

With the data from Table 5, we cannot reject the hypothesis of normality properties, since all individual Chi-sq values for Skewness and Kurtosis are lower than the critical value $\chi^2_{.05,1} =$ 3.84. The joint values for Skewness and Kurtosis 2.16 and 8.0 are also lower than the critical value of $\chi^2_{.05,4} = 9.49$. The Jarque-Bera all individual Chi-sq values are lower than the critical value $\chi^2_{.05,2} = 5.99$ and the joint value of 11.30 is lower than the critical value $\chi^2_{.05,8} = 15.51$. This provides some support for the hypothesis that residuals from our VAR model have a normal distribution.

Table 6 shows that we cannot reject the null hypothesis of no autocorrelation up to lag 12, since the LM-Stat for the lag order of 1, 2, 3, 4, …12, all the values are lower than the critical value $\chi^2_{0.1,16} =$ 32 at 0.01 and 16 degrees of freedom.

Table 6: VAR RESIDUAL SERIAL CORRELATION LM TEST

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag
order h
Date: 10/22/15   Time: 22:19
Sample: 1981Q1 2015Q2
Included observations: 136

Lags	LM-Stat	Prob
1	26.40737	0.0486
2	26.33823	0.0495
3	19.08948	0.2641
4	31.43780	0.0118
5	18.78506	0.2800
6	15.37790	0.4972
7	12.40394	0.7157
8	20.29213	0.2074
9	9.520848	0.8904
10	15.71308	0.4732
11	16.27002	0.4343
12	11.40645	0.7837

Probs from chi-square with 16 df.

To test the long-run cointegration relationship between the four time series, we carried out the Johansen cointegration test (1995). The test results, reported in Table 7, indicate that the four series are cointegrated and that there is, at least, one cointegrating vector.

Table 7: JOHANSEN COINTEGRATION TEST WITH OPTIMAL LAG LENGTH OF 5

Date: 10/22/15   Time: 22:37
Sample (adjusted): 1981Q3 2015Q2
Included observations: 136 after adjustments
Trend assumption: No deterministic trend
Series: LRGDP LREXP LRIMP LRFDIL
Lags interval (in first differences): 1 to 1

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value

	Eigenvalue		5 Percent Critical Value	1 Percent Critical Value
None **	0.392127	94.31189	39.89	45.58
At most 1 *	0.098543	26.61245	24.31	29.75
At most 2	0.084280	12.50335	12.53	16.31
At most 3	0.003884	0.529279	3.84	6.51

Trace test indicates 2 cointegrating equation(s) at the 5% level
Trace test indicates 1 cointegrating equation(s) at the 1% level
*(**) denotes rejection of the hypothesis at the 5%(1%) level

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.392127	67.69944	23.80	28.82
At most 1	0.098543	14.10910	17.89	22.99
At most 2 *	0.084280	11.97407	11.44	15.69
At most 3	0.003884	0.529279	3.84	6.51

Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels
*(**) denotes rejection of the hypothesis at the 5%(1%) level

Since we can affirm the existence of cointegration within the four series, we continue to the next step, testing the causality relationships between them. In order to find the causality between those four time series, we should apply the Granger causality/Block exogeneity Wald test (GCBEW, Enders, 2003). This test detects whether the lags of one variable can Granger-cause any other variables in the VAR system. It tests bilaterally whether the lags of the excluded variable affect the endogenous variable. The null hypothesis: all the lagged coefficients of one variable can be excluded from each equation in the VAR system. In Table 8, "All" means: joint test that the lags of all other variables affect the endogenous variable.

The GCBEW process does not cause y if all coefficients in each equation in the VAR system (1) are not significantly different from zero (or a joint test of at all lags is rejected). This concept involves the effect of past values of the right side variables on the current value of y.

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So it answers the question whether past and current values of right side variables help predict the future value of *y*. For example, this test helps to answer whether or not all lags of FDI can be excluded from the equation of GDP. Rejection of the null hypothesis means that if all lags of FDI cannot be excluded from the GDP equation, then GDP is an endogenous variable and there is causality of FDI on GDP.

Table 8 reports the results from the GCBEW test. Table 8 includes four parts; the first part reports the result of testing whether we can exclude each variable out of the equation of *LRGDP*. Similarly, the next parts report the results of testing for the equation of *LREXP*, *LRIMP* and *LRFDIL* respectively. Each part of Table 8 includes four columns. The first column lists the variables which will be excluded from the equation. The next columns are the value of Chi-sq, degrees of freedom and P-value. The last row in each part of Table 8 reports the joint statistics of the three variables excluded from the equation.

Table 8: GRANGER CAUSALITY/BLOCK EXOGENEITY WALD TEST

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 10/22/15   Time: 22:40
Sample: 1981Q1 2015Q2
Included observations: 137

Dependent variable: LRGDP

Excluded	Chi-sq	df	Prob.
LREXP	0.250653	1	0.6166
LRIMP	2.916021	1	0.0877
LRFDIL	0.296152	1	0.5863
All	9.184378	3	0.0269

Dependent variable: LREXP

Excluded	Chi-sq	df	Prob.
LRGDP	1.608858	1	0.2047
LRIMP	6.395558	1	0.0114
LRFDIL	0.007434	1	0.9313
All	13.40715	3	0.0038

Dependent variable: LRIMP

Excluded	Chi-sq	df	Prob.
LRGDP	3.818757	1	0.0507
LREXP	0.036643	1	0.8482
LRFDIL	0.000783	1	0.9777
All	6.927378	3	0.0742

Dependent variable: LRFDIL

Excluded	Chi-sq	df	Prob.
LRGDP	4.655990	1	0.0309
LREXP	12.81776	1	0.0003
LRIMP	16.10630	1	0.0001
All	16.80374	3	0.0008

In the first part of Table 8, which corresponds to the LRGDP equation, the second column shows that the Chi-sq for LREXP, LRIMP and LRDFI are respectively 0.251, 2.916, 0.296152, only one of the Chi-sq is greater than $\chi^2_{0.1,1} = 2.706$, therefore we can only reject the null hypothesis in one case, and conclude that there is a causality of LRIMP on LRGDP. This is confirmed by the fact that the joint Chi-sq is 9.184 > $\chi^2_{0.1,3} = $ 6.251. This result supports the imports-compression hypothesis. The corresponding values for LREXP and LRFDIL are less than $\chi^2_{0.1,1} = 2.707$, and we cannot reject the null hypothesis in both cases, concluding that there is no causality of LREXP and LRFDIL on LRGDP.

In the second part of Table 8, which corresponds to the LREXP equation, the second column shows that the respective Chi-sq for LRGDP, LRIMP and LRDFIL are 1.609, 6.396, and 0.007. The corresponding value for LRIMP is greater than $\chi^2_{0.1,1} = 2.706$, and we can reject the null hypothesis in this case, and conclude that there is a causality of LRIMP on LREXP. These results reflect the import content of exports. The corresponding value for LRGDP and LRFDIL are less than the critical value which indicates that they do not causes LREXP. This is confirmed by the fact that the joint Chi-sq is 13.407 > $\chi^2_{0.1,3} = $ 6.251.

In the third part of Table 8, which corresponds to the LRIMP equation, the second column shows that the respective Chi-sq for LRGDP, LREXP and LRFDIL are 3.819, 0.0367, 0.0008. The corresponding value for LREXP and LRFDIL are less than the critical value $\chi^2_{0.1,1} = 2.706$ and we cannot reject the null hypothesis in those two cases, so we conclude that LRIMP is not caused by LREXP and LRFDIL. However the corresponding value for LRGDP is greater than the critical value $\chi^2_{0.1,1} = 2.706$, and therefore we conclude that LRGDP causes LRIMP. This is confirmed by the fact that the joint Chi-sq is 6.927 > $\chi^2_{0.1,3} = $ 6.251.

In the fourth part of Table 8, which corresponds to the LRFDIL equation, the second column shows that the respective Chi-sq for LRGDP, LREXP, LRIMP are 4.656, 12.818, 16.106 The corresponding value for RGDP and LRIMP is greater than the critical value of $\chi^2_{0.1,1} = 2.706$ and therefore we reject the null hypothesis that LRGDP and LRIMP doesn't cause LRFDIL, therefore we conclude that LRGDP and LRIMP causes LRFDIL, this result is confirmed by the joint Chi-sq is 16.804 > $\chi^2_{0.1,3} = 6.251$.

In summary:

1. We reject the null hypothesis of excluding LRIMP from LRGDP equation at a 0.10. It suggests that LRIMP do cause LRGDP.

2. We reject the null hypothesis of excluding LRIMP from *LREXP* equation at a 0.10. It suggests that LRIMP cause LREXP. However we reject the null hypothesis of excluding LRGDP and LRFDIL from LREXP equation at a 0.50, suggesting that they do not cause LREXP.

3. We fail to reject the null hypothesis of excluding LREXP and LRFDIL from LRIMP equation at a 0.10 significance level. It suggests that LREXP and LRFDIL do not cause LRIMP. However we reject the null hypothesis of excluding LRGDP from RIMP equation at a 0.10, suggesting that LRGDP does cause LRIMP.

4. We reject the null hypothesis of excluding LRGDP, LREXP and LRIMP from LRFDIL equation at a 0.10 significance level, suggesting that all three variable do cause LRFDIL.

This test provides some evidence to believe that there is one bidirectional causality, that between LRGDP and LRIMP; and three unidirectional causalities those between LRIMP and LREXP, that between LRIMP and LRDFIL and that between LRGDP and LRFDIL.

Diagram 1
Direction of Causalities According to the GCBEW Test
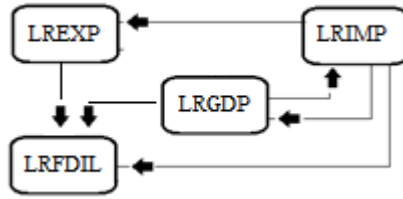
However, the GCBEW test does not provide information about the direction of the impact, nor the relative importance between variables that simultaneously influence each other. Based on this test, we do not know whether or not exports and imports have a positive effect on LRGDP. It is also unclear whether or not the impact of LREXP is stronger than that of LRGDP on LRFDIL. To answer these questions, we analyze the impulse-response function and the variance decomposition (Shin and Pesaran, 1998).

B. Impulse-Response Analysis

Impulse responses trace the response of current and future values of each of the variables to a one-unit increase (or to a one-standard deviation increase, when the scale matters) in the current value of one of the VAR errors, assuming that this error returns to zero in subsequent periods and that all other errors are equal to zero. Changing one error while retaining the others constant makes most sense when the errors are uncorrelated across equations, so impulse responses are typically calculated for recursive and structural VARs.

Figure 5 exhibits the generalized asymptotic impulse response function. It includes 16 small figures which are denoted Figure 5.1, Figure 5.2 . . . and so forth. Each small figure illustrates the dynamic response of each target variable (LRGDP, LREXP, LRIMP and LRFDIL) to a one-standard-deviation shock on itself and other variables. In each small figure, the horizontal axis presents ten quarters following the shock. The vertical axis measures the quarterly impact of the shock on each endogenous variable.

Figure 5.1 presents the long-run positive effect of a shock to LRGDP on LRGDP. This shock has a short- and long-run positive effect on LRGDP. Figure 5.2 show that a shock to LREXP has no significant effect on LRGDP. Figure 5.3 show that a shock on LRIMP has a

negative effect on LRGDP. Figure 5.4 show that a shock to LRFDIL has no significant effect on LRGDP. These effects do not conflict with the GCBEW test.

Figure 5.1   **Figure 5.2**

Response of LRGDP to LRGDP

Response of LRGDP to LREXP

Figure 5.3   **Figure 5.4**

Response of LRGDP to LRIMP

Response of LRGDP to LRFDIL
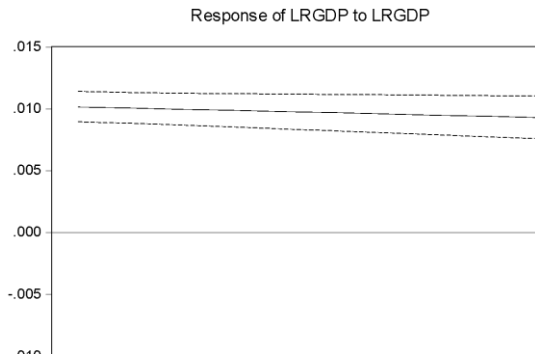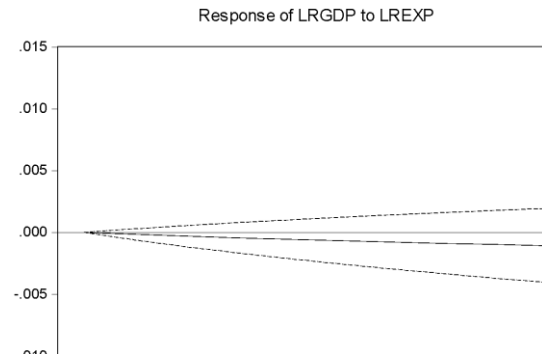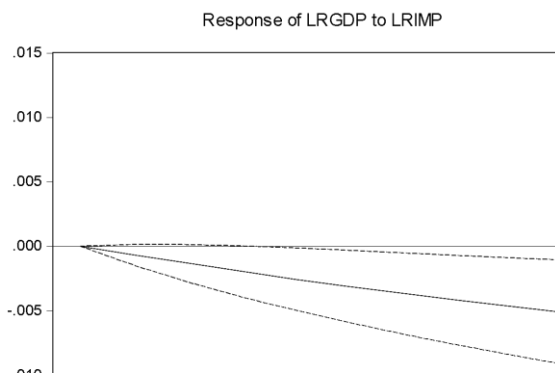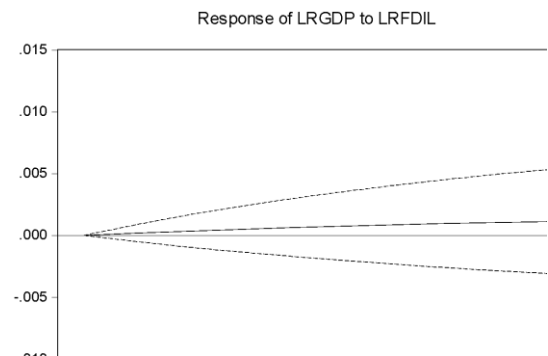
Figures 5.5 suggest that in the long run, a shock on *LRGDP* has a small significant positive effect on LREXP. Figure 5.6 suggests that LREXP has a positive effect on LREXP, as expected. Figure 5.7 shows a significant effect of LRIMP on LREXP and Figure 5.8 shows no significant effect of LRFDIL on LREXP. These results partly conflict with the GCBEW test, specifically with respect to the effect of LRGDP on LREXP.

Figure 5.6

Response of LREXP to LREXP

Figure 5.7   **igu**
                                                  re
                                                  5.8

Response of LREXP to LRIMP

Response of LREXP to LRFDIL
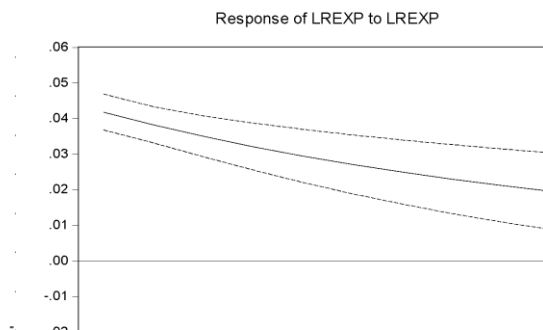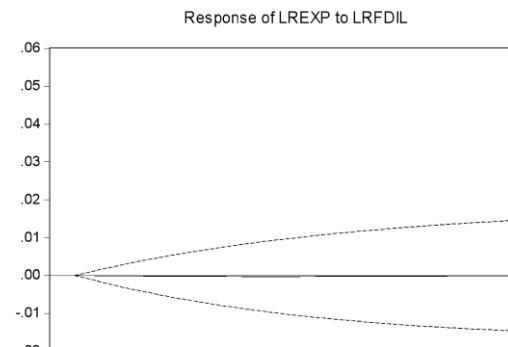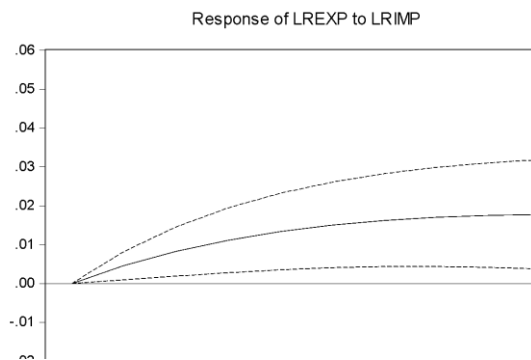
Figure 5.9 and 5.10 shows the responses of *LRIMP* to shocks in *LRGDP* and LREXP, the shocks have a positive permanent significant effect on LRIMP. Figure 5.11 suggest that LRIMP has a positive effect on LRIMP, as expected. Figure 5.12 shows no significant effect of a shock in RDFIL on LRIMP. These results conflict with the GCBEW test, specifically with respect of the effect of LREXP on LRIMP.

Figure 5.9   **Figure 5.10**

Response of LRIMP to LRGDP

Response of LRIMP to LREXP

Figure 5.11   **Figure 5.12**

Response of LRIMP to LRIMP
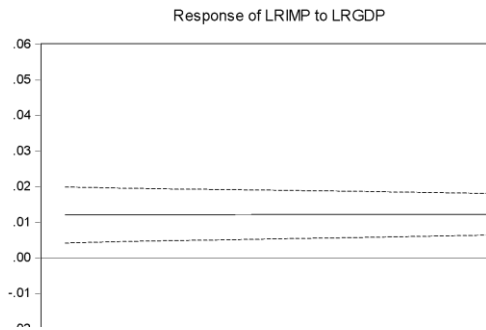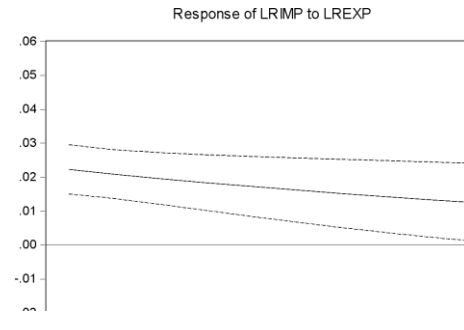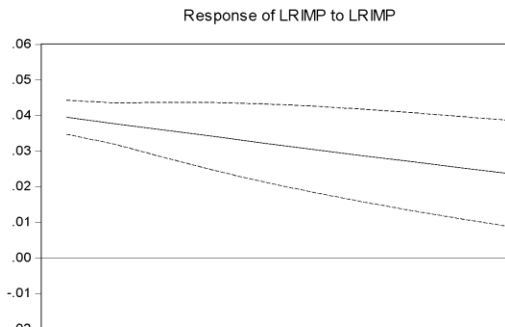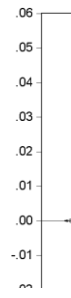
Finally looking at Figures 5.13 and 5.14 shows that a shock on *LRGDP* and LREXP has significant effect on RDFIL. The effect of shock on LRIMP has a negative effect on LRFDIL, as shown in Figure 5.15. Figure 5.16 suggests that LRFDIL has a positive effect on itself, as expected. These results do not conflict with the GCBEW test.

Figure 5.13   **Figure 5.14**

Response of LRFDIL to LRGDP

Figure 5.15

Response of LRFDIL to LREXP

Figure 5.16

Response of LRFDIL to LRIMP

Response of LRFDIL to LRFDIL

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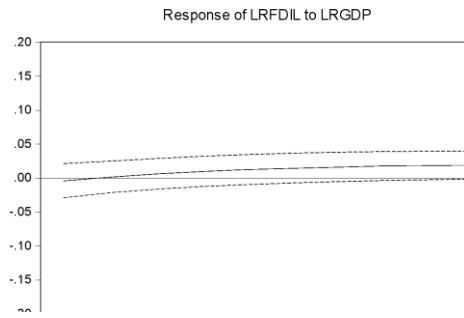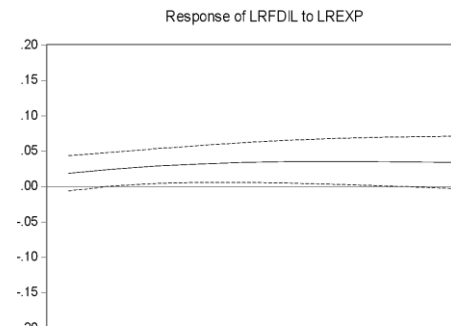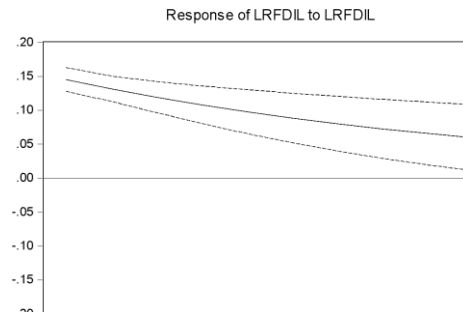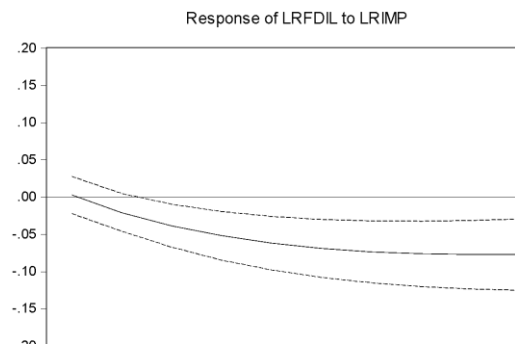
Diagram 2

Summary of the responses of current and future values of each of the variables to a one-unit
increase in the current value of one of the VAR errors
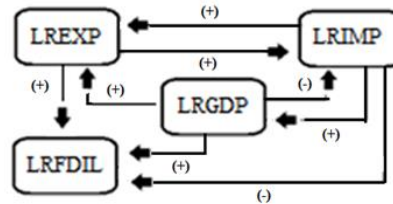
C. VARIANCE DECOMPOSITION

Variance decomposition (or forecast error variance decomposition) indicates the amount of information each variable contributes to the other variables in a VAR model. It tells us how much of a change in a variable is due to its own shock and how much due to shocks to other variables. In the short run most of the variation is due to a shock of its own, but as the lagged variables' effect starts kicking in, the percentage of the effect of other shocks increases over time. According to Enders (2003), variance decomposition tells us how much a given variable changes under the impact of a shock of its own and the shock of other variables. Therefore, the variance decomposition defines the relative importance of each random innovation in affecting the variables in the VAR. Figure 6 includes 16 small figures which are denoted Figure 6.1, Figure 6.2., [and] Figure 6.16. In each small figure, the horizontal axis presents ten quarters following the shock; the vertical axis measures the variance proportion of the shock to each variable.

Looking at Figures 6.1 to 6.4, the fluctuations of LRGDP in the short run are explained mainly by LRGDP shocks, whereas LRIMP has a small positive effect on LRGDP. LREXP and LRFDIL shocks have no significant effects on LRGDP. Therefore variations in LRIMP and shocks help to explain future variations in LRGDP. These results do not conflict with the GCBEW test
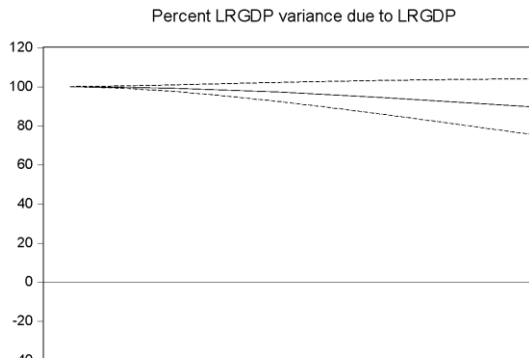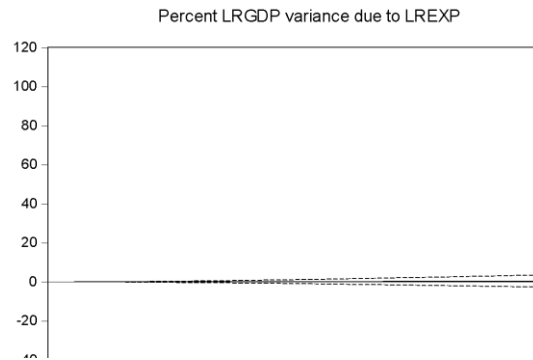
Figure 6.1

Percent LRGDP variance due to LRGDP

Figure 6.2

Percent LRGDP variance due to LREXP

Figure 6.3

Percent LRGDP variance due to LRIMP

Figure 6.4

Percent LRGDP variance due to LRFDIL
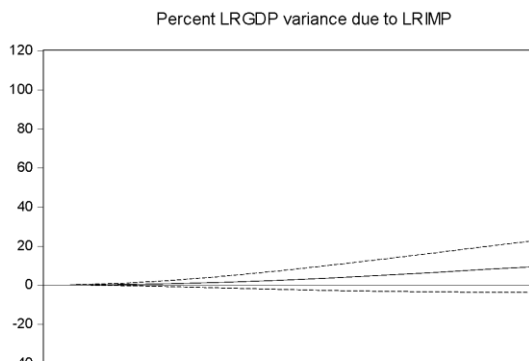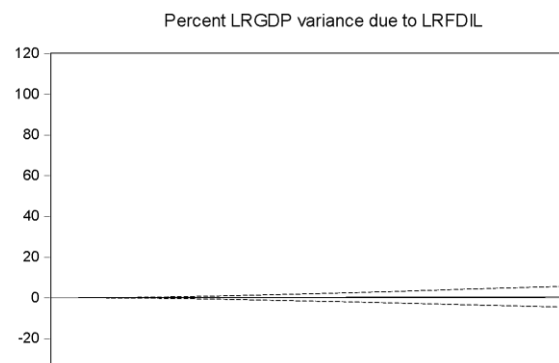
Looking at Figures 6.5 to 6.8, fluctuations of *LREXP* in the short run are explained mainly by its own shocks, and those on LRGDP and LRIMP. LRFDIL has no significant effect. These results conflict with the GCBEW test, specifically with respect the effect of LRGDP on LREXP.

Figure 6.5

Figure 6.6

Percent LREXP variance due to LRGDP

Percent LREXP variance due to LREXP

Figure 6.8

Figure 6.7

Percent LREXP variance due to LRIMP

Percent LREXP variance due to LRFDIL
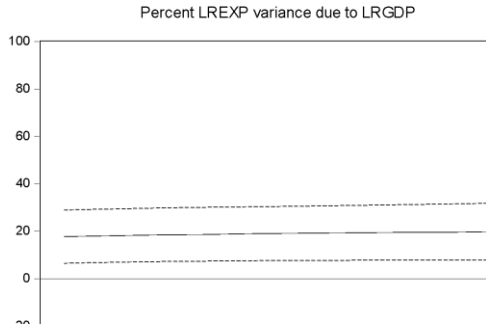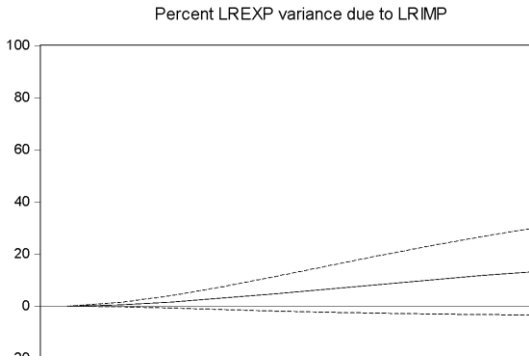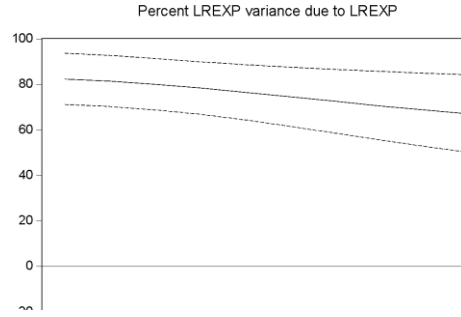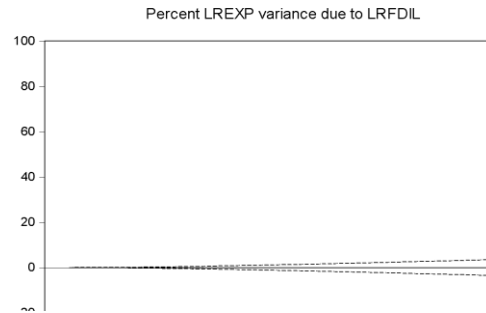
Figures 6.9 to 6.12 show that the fluctuations of *LRIMP* in the short and long run are explained by its own shock and shocks on LRGDP and LREXP. LRIMP is not affected by LRFDIL. These results conflict with the GCBEW test, specifically with respect the effect of LREXP on LRIMP.

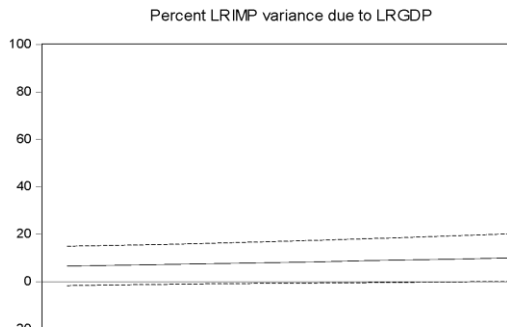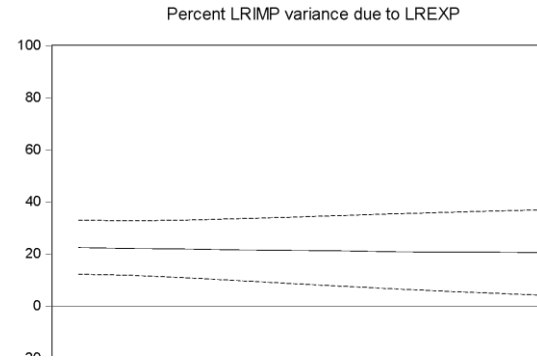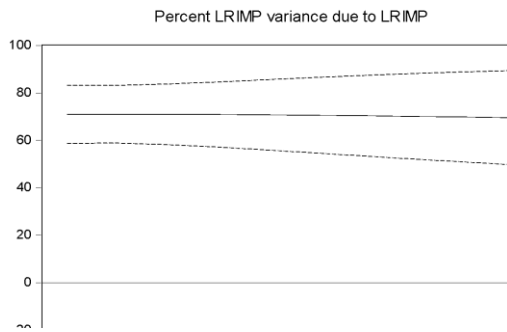**Figure 6.9**   **Figure 6.10**

36

Percent LRIMP variance due to LRGDP

Percent LRIMP variance due to LREXP

Figure 6.11

Figure 6.12

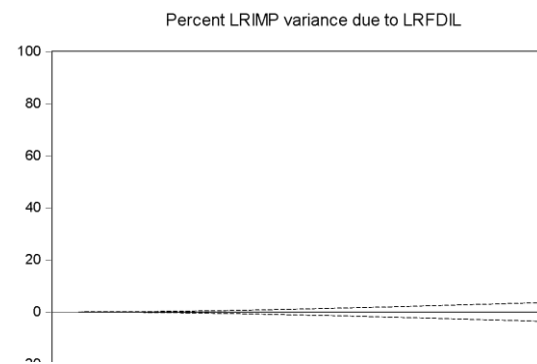Percent LRIMP variance due to LRIMP

Percent LRIMP variance due to LRFDIL

Figures 6.13 to 6.16 show the same analysis for the case of a shock in LRFDIL. The fluctuations of LRFDIL are explained mainly by its own shocks; the effects of changes in LRGDP and LREXP are negligible and changes and LRIMP have significant effects on LRFDIL. These results do not conflict with the GCBEW test.
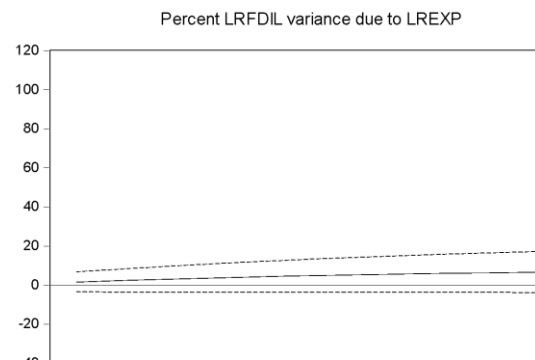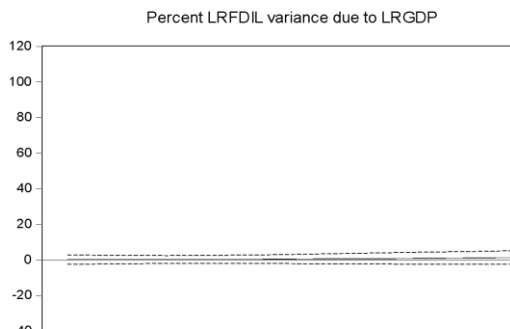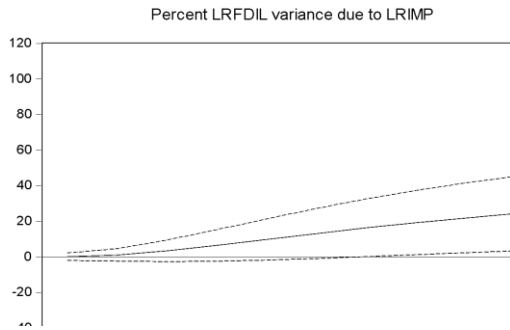
Figure 6.14

Figure 6.13

Percent LRFDIL variance due to LRGDP

Percent LRFDIL variance due to LREXP

Figure 6.15   **Figure 6.16**

Percent LRFDIL variance due to LRIMP

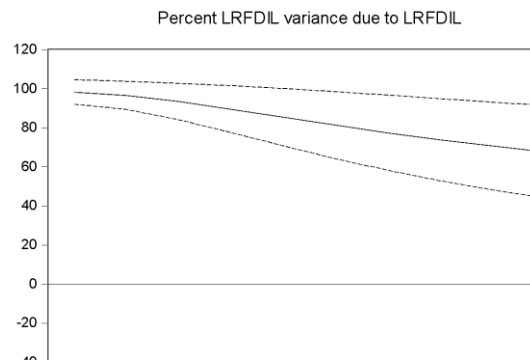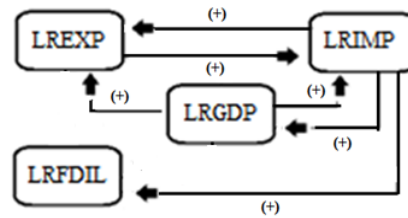Percent LRFDIL variance due to LRFDIL

Diagram 3
Summary of fluctuations of one variable, in the short and long run, explained by its own shock
and shocks on the other variables

VIII. CONCLUSIONS

In this paper, we have set up an empirical analysis of the economic growth in Korea between 1980 and 2015, in order to identify the potential relationships between relevant variables. In doing so, we have implemented a methodology similar to Nguyen (2011). Our econometric procedures include the unit root test of relevant series, lag structure, the VAR diagnostic, the Johansen cointegration test, the Granger causality/Block exogeneity Wald test (GCBEW), an analysis of impulse response and analysis of variance decomposition.

The lag selection criteria, the normality test and the serial correlation test were used to choose the appropriate lag length. The cointegration test confirms to us that our four variables are cointegrated. The inclusion of the four variables LRGDP, LREXP, LRIMP and LRFDIL, assures us that the model is not misspecified.

The causality test GCBEW shows that LRGDP does not cause LREXP or vice-versa, and this contradicts the export-led growth [hypothesis]. From the Impulse Response Function we found that the respond of LREXP to LRGDP and that of LREXP on LRGDP are both positive. That is, we found bilateral responses. This result supports the growth-driven exports hypothesis as well as the export led hypothesis. From the Variance Decomposition we found that the percent change in LRGDP due to LREXP and the percentage change in LREXP variance due to LRG|DP are both positive. This confirms the bilateral relation between those two variables. This result also supports the growth-driven exports hypothesis as well as the export led hypothesis. The important point here is that none of these tests denies the role of the GDP on exports, and only two of them support the export led hypothesis. Therefore the evolution of GDP has much to do with gaining word-class competitiveness, which explains exports.

The three tests confirm the bidirectional causality and relationship between GDP and exports. This means that the results confirm the imports-compression growth hypothesis and the import requirement of growth hypothesis.

The causality test GCBEW test shows that LRGDP, LREXP and LRIMP cause LRDFIL but not vice-versa. This means that FDI is attracted to Korea by the growth of GDP, exports and imports, but FDI do not have any impact in on the GDP, exports or imports. This result is confirmed by the Impulse Response Function and variance Decomposition, therefore we have strong results of the low power of explanation of FDI in the Korean miracle and lead us to wonder why developing countries are so interested in attracting FDI.

The causality test GCBEW shows that LRIMP cause LREXP and that there is no bidirectional causality between LRIMP and LREXP. From the Impulse Response Function we found that the response of LREXP to LRIMP and vice versa is positive and the same results came from the Variance Decomposition. This indicates a strong connection between exports and import requirement.

To conclude this paper we express some final comments. The advantages of trade liberalization for economic growth and development have been broadly debated in the relevant

literature. Up until the mid-1970s, import substitution policies prevailed in most developing countries, and since then the emphasis has shifted towards export promotion strategies in an effort to promote economic development. It was hoped that export expansion would lead to better resource allocation, creating economies of scale and production efficiency through technological development, capital formation, and employment generation. The shift also included an increasing reliance on FDI. The results of imposing and implementing those policies in Latin America, Africa and some East European countries have been disappointing.

The realities of Korea's successful growth case teaches us a lesson and suggests that we may have to unlearn some lessons that we have been taught, and that we need to reconsider the effectiveness of the traditional laissez-faire approach as a tool to boost economic development. As the Korean experience shows, exports and a liberal trade policy cannot be seen as the silver bullet that promotes development, but as a part of a complex mechanism that may well expand the benefits of a whole set of policies that push the industrialization and economic growth of a country. These are the benefits that have been denied to Latin America by multinational institutions and economic orthodoxy for more than three decades.

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