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Free Trade and Economic Growth of Egypt

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By

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To my dad, Hamed
With my love

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Abstract

Free trade relations have become an important issue in both trade and development literature since the 1950s. From this period, 1950-1959, until the end of the 1960s, the economy of Egypt was protected as a result of the adoption of import substitution policies and excessive government intervention in economic activities. Since 1970, when an open-door policy was adopted, Egypt has striven to liberalise its markets with the aim of enhancing economic growth, with rewarding results. This study has quantified the effect of changes in economic policy, particularly trade liberalisation, on economic growth for Egypt during the period 1970-2006, by addressing some challenges remaining in theoretical and empirical literature on free trade and economic growth. This period witnessed a strong shift in economic policy towards a more export growth oriented stance. It covered the reforms of 1974 and 1991, as well as the establishment of the WTO in 1995 and Egypt's accession to it. Two models were constructed: the first one attempted to deal with the causality problem by re-examining the causality between exports and economic growth based on the Vector Error Correction Model (VECM) in the context of the Egyptian economy. The second model, a Simultaneous Equation Model (SEM), was developed to deal with the endogeneity problem and investigate the impact of selected openness indicators on economic growth in Egypt. The most important finding is the strong positive and bi-directional relationship between Egyptian exports and its economic growth. This finding is in line with the theoretical argument of the ability of developing countries such as Egypt to benefit from the free trade movement, which not only helps them to benefit from knowledge spillover but also to raise their productivity. The role of human capital in growth and exports was also shown to be significant. Similar findings were obtained for countries at different stages of development (low-and middle- income). It is concluded that, like Egypt, all groups will benefit from trade openness, regardless of the degree of development, with respect to the positive role of human capital to enable them to absorb new technologies from the developed countries.

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(a) Terms

ADB……………………………………………………………Asian Development Bank
ADF…………………………………………………………Augmented Dickey-Fuller test
AMS……………………………………………………Aggregate Measurement of Support
CAPMS……...............................Central Agency for Public Mobilisation and Statistics
CIA…………………………………………………………..Central Intelligence Agency
COMESA…………………………………Common Market for East and South Africa
DCs……………………………………………………………….Developed Countries
ECT……………………………………………………………..Error-Correction Term
ELGH……………………………………………………Export-Led Growth Hypothesis
EU…………………………………………………………………….European Union
FAO………………………………………………..Food and Agriculture Organisation
FIML…………………………………………Full Information Maximum Likelihood
GAFTA…………………………………………………Greater Arab Free Trade Area
GATS……………………………………….......General Agreement on Trade in services
GATT……………………………………..General Agreement on Tariffs and Trade
GEP……………………………………………Globalisation and Economic Policy
GLEH……………………………………………………Growth-Led Export Hypothesis
GNP…………………………………………………………Gross National Product
GTAP………………………………………………...Global Trade Analysis Project
H-O………………………………………………………………...Heckscher-Ohlin
IBRD……………………………International Bank for Restruction and Development
ICSEAD……………... International Centre for the Study of East Asian Development
IMF……………………………………………………….International Monetary Fund
IS……………………………………………………………...Import Substitution
LDCs………………………………………………………..Less Developed Countries
MENA………………………………………………………Middle East/North Africa
NBER………………………………………National Bureau of Economic Research
OECD……….......................Organisation of Economic Cooperation and Development
OLS……………………………………………………………..Ordinary Least Square
R&D………………………………………………………Research and Development
RTAs…………………………………………………...Regional Trade Agreements
SEM…………………………………………………Simultaneous Equation Model
TRIPS…………………………...Trade-Related aspects of Intellectual Property rights
UNCTAD……………………United Nations Conference on Trade and Development
U.S.A……………………………………………………...United States of America
VAR……………………………………………………..Vector Autoregressive Model
VAT……………………………………………………………Value Added Tax
VECM…………………………………………………Vector Error Correction Model
WTO………………………………………………………...World Trade Organisation

(b) Variables

In causality test,
GDP_t……………………………………………………………………..real GDP
HC_t…………………………………………………………………...Human Capital
M_t……………………………………………………………………….real imports
X_t……………………………………………………………………….real exports

In simultaneous equation model,
${}_gEXP_t$…………………………………………………………………exports growth
FDI_t…………………………………………………foreign direct investment/GDP
gGDPt………………………………………………...growth rate of GDP per capita
${}_gLAB_t$………………………………………………………labour force growth
Sch_t……………………………………………………..secondary school enrolment
$TARIFF_t$……………………………………………………………..import duties
TOT_t…………………………………………………………….....terms of trade
$TPGDP_t$……………………………………………trade partners’ real GDP growth
$TPTAR_t$……………………………………………………..trading partners’ tariff rate
t…………………………………………………………..the period from 1970-2006
$Xduty_t$……………………………………………………………..export duties

Chapter 1
Introduction

"Policies toward foreign trade are among the more important factors promoting economic growth and convergence in developing countries" (IMF, 1997, 84)

This chapter highlights backgrounds necessary to begin our research. It begins by setting out the research objectives. Then it presents the growth experience of the East Asian countries, in particular, the successful gang of four economies, in brief. This helps to clarify questions the study tries to answer, to understand the importance of the study and for an overview for the economy of Egypt and its trade policy framework in proper context (the country's historical background, and its geographical location and some important geographical features are shown in appendix 1). A brief summary on the economy of Egypt from the time of Mohammed Ali (1805-1848) until Mubarak (1981-the present), concentrating on the turning points in the Egyptian economy, specifically the promotion of free trade as a policy of international trade follows from this. After that, the trade policy framework of Egypt is explained, focusing on the trends of exports, imports, preferential free trade agreements of Egypt with the countries, formation of free trade regions, customs protocols and the trade patterns and partners of Egypt with some attention on the main priorities of Egypt from the WTO. An outline of the whole thesis is given at the end of the chapter.

1.1. Research objectives:

Lack of exposure to international competition, especially since the 1980s, is one of the most important causes of the Egyptian economy's slow rate of economic growth (Page, 1998). We attempt to examine the validity of Export-led Growth (ELG) and Growth-led Export (GLE) hypotheses in the context of the Egyptian economy. The main objective of this thesis is that it attempts to quantify the role of free trade policy in the process of economic growth during the 1970 to 2006 period using different regression techniques for Egypt and to generalise the results obtained from the case study (Egypt), using panel data regression analysis for low- and middle-income countries which are comparable to the income standards of Egypt.

This study aims to invesitgate a number of concerns raised in this regard:

(1) It aims to investigate if Egypt, low-income, and middle-income countries will benefit or not from trade liberalisation. We use, unlike earlier studies, different regression techniques for Egypt and different sample countries divided based on their per capita income to test the impact of free trade on economic growth (see appendix 10 for details about sample countries).

(2) It highlights on what determines the ability of any country, through free trade, to adopt and implement new technologies advanced countries developed.

(3) Within a theoretical framework of an endogenous growth model, it examines the direct impact of human capital on economic growth. The human capital represented by schooling (secondary school enrolment) is included in our regressions. By including the human capital we can capture whether trade openness is a sufficient condition for any country to achieve higher growth rates or this openness should accompanied with high stock of human capital enables this country to absorb and adopt new technology of the advanced countries.

(4) The study aims to find out impacts of reforms and impacts of joining the WTO. The period (1970-2006) will cover both the reforms in 1974 and 1991. In addition, it will cover the establishment of the WTO in 1995 and Egypt's membership. Egypt gives a useful case study as it changed itself from a public-sector led growth strategy in the 1950s to export-led growth in recent years (Subramanian, 1997). The period from 1970 to 2006 represents the most important period of free trade in Egypt, in contrast to the 1950s, which were marked by public sector on control of all the economic activities. How do the policies of developed countries and the international economic organisations such as the WTO affect on this is discussed later on.

As it will be noted later, the developed countries, especially advanced industrial countries, dominate world trade. Therefore, the globalisation in trade or, we can say, global free trade does not benefit all countries similarly or to the same degree. Most trade indicators from the United Nations reports or WTO reports show that there is an increase in global free trade but most of it is between advanced industrial countries, while less developed and developing countries which rely on export of primary goods have benefited less from free trade.

(5) The logic of free trade is based on the concept of comparative advantage, whereby each country can derive benefit from what other countries can offer. However, Fieldhouse (1999) took a pessimistic view of free trade, arguing that the weaker economies or less developed countries will lose out from free trade and that there must be some form of institutions to regulate foreign trade. There has been an increase in the volume of trade over years. For example, the real value of world imports and exports has trebled and this can be seen through the tables of world trade in the United Nations. However, this increase is not so much trade between countries as trade between multinational companies and trade blocs.

Here we should consider the function of the WTO which was set up in 1994 to regulate and set rules for this international trade and to examine any claims or complaints about violation of trade rules. The developing countries need the sort of economic policies and institutions the developed countries used before, to develop their trade liberalisation or free trade. The developing countries are suffering from pressure from the developed countries to adopt what the latter see as good policies for developing countries. As a result, poverty has increased and income inequality is growing in many of the developing countries. In the period from 1960 (the year when the arguments about free trade appeared) to 2000, the countries of Latin America stopped growing and sub-Saharan Africa experienced a fall in absolute income.

As we know, the WTO promotes liberalisation by encouraging nations to lower trade barriers and to keep them down. The WTO deals with the special needs of developing countries in three ways:

1- The WTO agreements contain special provisions on developing countries.
2- The Committee on Trade and Development is the main body focusing on work in this area in the WTO, with some others dealing with specific topics such as trade and debt, and technology transfer.
3- The WTO Secretariat provides technical assistance for developing countries.

The emergence of trade coincided with the competition and the desire to benefit from the relative advantage alongside with a claim for freeing trade. Facing this trade, freedom led to the evolution of commercial boundaries and the inflation of the effects of these boundaries upon quality, prices, and international co-operation manifested the importance of freeing trade.

According to Michie and Sheehan (2003, pp 392-393) the average annual per capita income growth rate of the developing countries decreased from 3 percent to 1.5 percent between the 1960-80 period and the 1980-2000 period. The developing countries have moved towards trade liberalisation over the last several decades. This movement may be voluntary or a policy conditioned under agencies like WTO.

(6) The economies of the entire world are increasingly connected, depending on international trade. This raises the question, what are the effects on the developing countries from free trade? Are there any gains or losses? The developing countries import and export from each other and from the developed countries. That makes free trade the most important issue today, where globalisation is one of the most important words when we come to discuss development and trade.

(7) The advantages that poor countries or less developed and developing countries seem to acquire include cultural, social, scientific and technological benefits from developed countries. In addition, through integration, the developing and less developed countries will find a large market for their trade and so can make great gains from trade. This leads to a division of labour and a strong drive for innovation, as the possible returns are much greater. However, globalisation may raise some problems concerned with the

inequality across and within the countries when there is an increase in the international dominance of developed countries.

(8) The harms of globalisation are greater for less developed countries. They are dependent on developed countries and may be left in poverty. Another harmful effect is the drop in international investment received by poor countries. Moreover, it is noticed that despite the openness of the developed economies, most of them practise protection of basic goods in which the less developed countries have competitive power, for example, agriculture and textiles. Trade liberalisation, which means a removal of tariff and non tariff barriers, encourages globalisation to some extent. There have been several rounds of trade negotiations (e.g. The Kennedy in the 1960s, Tokyo in the 1970s and Uruguay in the 1990s) through GATT since the end of Second World War, but it must be said that there is unfair treatment of the developing countries in GATT/WTO negotiations.

(9) The developing countries were misused in hands of the Americans and the Europeans. The U.S used developing countries in propagation of the idea of liberalisation of trade in agricultural products, while the European group used them in making the idea of establishing WTO. However both ignore the developing countries concerning the liberalisation of services, Intellectual Property and copyright protection, where there is unequal competition with the developed countries. Under the conflicts between U.S and European group, the developing countries were coerced to enter the WTO, which requires them to change their development strategies, hence their economic policies; especially their financial policies (see Abou Doh, 2003, for details).

In 1968, the developing countries achieved a great victory when the developed countries agreed to introduce a Generalized System of Preferences (GSP) for manufactured goods export from developing countries. However the trade barriers which are imposed by developed countries harm developing countries and that may be why many developing countries did not join GATT until the 1980s.The developing countries, including Egypt, represent about two thirds of the WTO's members (around 152). They play an increasingly important and active role in the WTO because of their number and they are becoming more important in the global economy, and because they increasingly look to trade as a vital part in their development efforts.

1.2 Research Motivation: The experience of the gang of four

The experience of the gang of four can be considered when investigating the relationship between outward orientation of international trade and economic growth in developing economies. Over the 1960s, 70s, and 80s, South Korea, Taiwan, Singapore, and Hong Kong have transformed themselves from technologically backward and poor countries, to relatively modern and affluent economies. Each has experienced more than a fourfold increase of per capita (Nelson and Pack, 1999). It took the UK, the USA, France, and Germany eighty years or more, beginning in the 19th century, to achieve such growth, although the Japanese did it even more quickly, between 1952 and 1973. Each now has a large number of firms producing technologically complex products competing effectively against rival firms based in the US, Japan, and Europe. The growth performance of these countries has vastly exceeded those of virtually all other economies that had comparable productivity and income levels in 1960. Indeed, Barro (1991) highlights the unprecedented growth rate of the East Asian economies as one of the most interesting facts of the post war international growth experience. A brief note to each country experience is in order.

1.2.1 Hong Kong:

In the period from 1960 to 1982, Hong Kong's real average annual growth rate was 10 percent of total GDP and 7 percent in per capita GDP. In 1982, the annual income per capita was 5, 340 U.S. dollars. These growth rates are high, by any standards. According to the 1984 world development report, Hong Kong was among the highest income countries in the upper middle-income group (World Bank, 1994). Table 1.1 shows the growth rates in percentage terms:

Table 1.1
Growth rates (percent) for Hong Kong (1966-1991)

	N	D	N-D
GDP per capita	7.3	1.6	5.7
GDP per worker	7.3	2.6	4.7
Excluding			
Agriculture	N.A	2.8	N.A
Manufacturing	N.A	1.3	N.A
Δ Participation rate		0.38----------------------→0.49	

Source: Young (1995)
N= Numerator; D=Denominator **N.A=Not Available**

Figure (1): GDP per capita in Hong Kong

This small city has practically no valuable natural resources, depending on outside sources for most of its food and raw materials. Prior to World War 2, Hong Kong was primarily an entrepot for trade with China. With the outbreak of the Korean War and embargo on the exports to China, Hong Kong was forced to seek other sources of income and embarked on industrialisation. This depended on light manufacturing, due to the lack of large land sites for heavy industries. With its limited domestic market, Hong Kong could not depend on import-substitution industrialisation; however, the main industry that has become the major contributor to the economic growth of Hong Kong is exports. The major domestic exports are (1) clothing, (2) electronics, (3) watches and clocks, (4) toys and dolls and (5) textiles (Yue-Ping, 1985). The nominal value of exports per head of population rose from HK$ 1,147 in 1959 to HK$ 9,482 in 1976: a more than seven-fold increase. The principal factor for Hong Kong's economic growth until the late 1970s was the expansion of light manufacturing (Lin et al., 1980). Since 1980, the financial sector has become a slightly more important contributor to the total GDP. However, the manufacturing sector remains the most important one in the Hong Kong economy.

1.2.2 South Korea:

South Korea has attracted much attention, due to its astonishing economic growth. In the 1950s and 60s, agriculture accounted for about a third of GDP and exports were negligible. By 1993, agriculture accounted for less than 10 percent of GDP. Meanwhile, exports grew steadily and the large balance of payments deficits of the 1960s was reduced to 10% by the 1980s, and converted into a surplus by the mid 1990s. In particular, the share of manufactured goods in total exports, which was negligible in 1959, grew at an average rate of 60% during 1961-1972 and by 1980 had reached 75 percent (Kim, 1991). Savings and investments both grew: savings reached 25 percent of income in 1980 and 35 percent in 1993. Investment rates, which were around 5% in the early 1950s, exploded to 20 percent in the late 1960s, reached almost a third of GDP in 1980, and approached 40 percent by 1990. The following table demonstrates the growth rates of Korea.

Table 1.2
Growth rates (percent) of South Korea (1966-1990)

	N	D	N-D
GDP per capita	8.5	1.7	6.8
GDP per worker	8.5	2.8	5.6
Excluding			
Agriculture	10.3	5.4	4.9
Manufacturing	14.1	6.3	7.8
Δ participation rate		0.27--------------→0.36	

Source: Young (1995)
N=Numerator; D=Denominator
N.A=Not Available

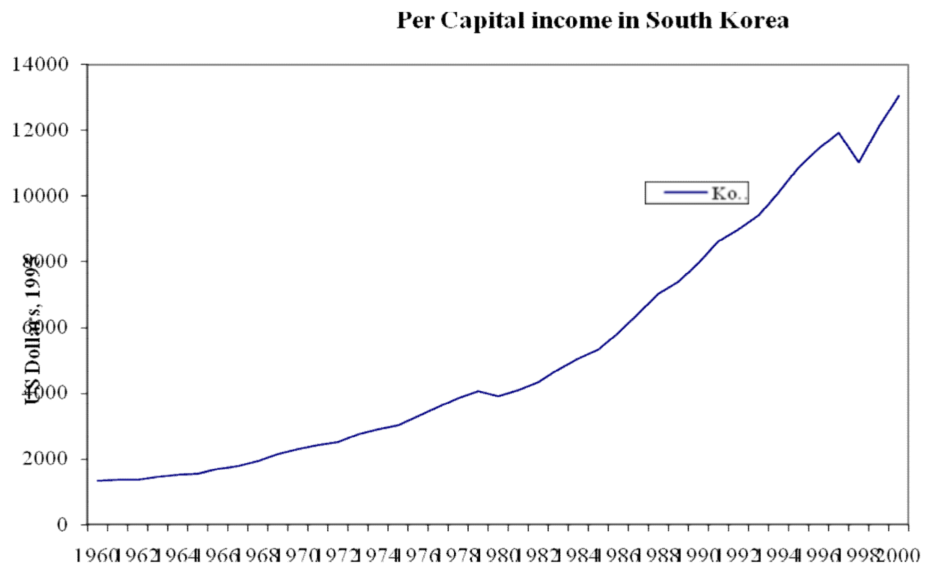

Figure (2): Per Capita Income in South Korea

According to Charles et al., (1989), the main incentive behind the expansion of major industries was producing for exports. S.Korea has not always been an open economy. In the period 1950-63, the external sector of S.Korea was highly distorted. Most imports were subject to licencing, and tariff rates were high (exceeding 50% in 1959-60). A major policy change occurred in 1964, when exchange rates were fixed, a major devaluation was implemented, and a systematic process of trade liberalisation began. Import tariffs were gradually reduced, the coverage of import licences was eased, and import prohibitions were eliminated. Export promotion was introduced by many measures such as tariff exemptions in intermediate inputs for export production and export sales, direct tax reduction on export income, preferential loans and direct subsidies for exporters. Further reform occurred in the 1970s, with selective liberalisation (Dornbusch, 1992) of some sectors. By the end of the 1980s, average import tariffs had been reduced to approximately 10 percent, and import licences had been eliminated.

Amsden (1993) comments that the major incentives to promote exports in S.Korea under an import substitution regime were based on heavy protection by quotas and to a certain degree on tariffs and investment licencing, which protected the infant industries. The strategy of import substitution based on scale economies and large-scale projects, and the long run objective of producing for domestic and foreign markets, created an export supply that was highly elastic to export incentives. By the 1980s, the exports of import substitution industries, such as telecommunications equipment, computer related products and passenger cars, were growing quickly.

With regard to investment licencing, the controls of investment were maintained on domestic production of either luxury or consumer goods as the government restricted or even prohibited import (Elshinawy, 1998). Evaluation of new investment was based on the profitability of a new projects resulting from the share of its output which would be exported when it was be provided with standard export incentives. Consequently, export targets became an important tool to regulate performance and introduced the principle of competition between firms for investment either in new plants or for expansion. For newly established firms, the government set simple targets, letting them distinguish between the markets abroad and home markets by selling at higher prices in the domestic markets. After a period, the government put pressure on these firms by both allowing competing firms to produce the same product line and increasing export targets and so, there was increase in domestic capacity that meant that to utilise existing capacities, firms needed to export. Protection was reduced gradually.

Even though S.Korea liberalised only selectively, liberalisation did take place. S.Korea's non-oil import/GDP ratio in 1960 was less than 10 percent but since 1975, it has been in excess of 25 percent. With the help of a selectively liberal import strategy, S.Korea has been able to develop a highly competitive manufacturing sector that offers its own brand-name manufactures of increasing sophistication, ranking from cars to TV and now high technology goods.

1.2.3 Taiwan:

Taiwan, like S.Korea, also underwent rapid industrialisation. Agriculture accounted for about a third of the economy in 1960 but 18 percent in 1970 while industry's share grew from 25 percent to 35 percent. By 1980, agriculture accounted for less than 10 percent of the economy, and industry for 45 percent. Exports were initially quite low, at eight percent of GDP, and much less than imports, generating a payments deficit exceeding five percent of GDP until the 1960s; exports grew quite rapidly to 26 percent of GDP in 1970 when the deficit was eliminated, and during the 1980s grew faster than imports to generate a significant surplus. The share of industrial production in exports increased from 8.1% in 1952 to 78.6% in 1970 and to 90.8% in 1980. Inflation rates had been brought under control by the 1960s. Investment rates, which began relatively high at about 14 percent in the 1950s, rose steadily to 31 percent in 1980; savings rates remained slightly higher. By 1988, savings reached 36 percent of GDP, although less encouraging was the fall in investments to 20 percent. Rapid growth was sustained with real income rising by 68 percent over the 1980s; the budget deficit did increase slightly to three percent of GDP in 1987 (despite a reduction in government spending it appears that non-tax revenue fell by even more), but inflation was under control. Young (1995) summarises the growth rates of Taiwan as follows:

Table 1.3
Growth rates (percent) of Taiwan (1966-1990)

	N	D	N-D
GDP per capita	8.5	1.8	6.7
GDP per worker	8.5	3.1	5.4
Excluding			
Agriculture	9.4	4.6	4.8
Manufacturing	10.8	5.9	4.9
Δ participation rate	0.28----------------→0.37		

Source: Young (1995)
N=Numerator; D=Denominator
N.A=Not Available

But what about the trade policy followed to achieve all of this? When scrutinising this policy we find that Taiwan's export oriented strategy is based on import liberalisation coupled with devaluation to maintain the balance of payments in equilibrium. In the late 1950's, to encourage import substitution, a policy of maintaining an overvalued exchange rate through quantitative restrictions on import was applied for all imports except luxury goods, although there was insistence on high tariff barriers (Tsiang,1985). Moreover, the government introduced a system of custom and commodity taxes to offset the effect of high tariffs for exporters (Chou, 1995). Investment subsidies were basically in the form of tax incentives. In 1960, the government reduced the maximum Business Income Tax from 32.5% to 18% of annual income. New investment enjoyed a five-year tax holiday. Real estate for new productive investment was taxed at lower rates or exempt from stamp and deed taxes. Moreover, enterprises were allowed to make instalment payments of tariffs on imports of capital goods (Rodrik, 1994).

According to Wu (1991), the introduction of export processing zones to benefit small and medium scale enterprise compensated for a complex institutional and economic environment and unsophisticated financial sector. These zones have accounted for three quarters of the trade surplus of Taiwan (Wu, 1991).

Although small-scale enterprises predominated, growth in exports was facilitated by marketing by internationally specialised trading companies (Chou, 1995). Moreover, as Wu (1991) stated, firms became more competitive in facing the rapid changes in consumer demand and tastes or comparative advantage, aided by the simple production technology and the advantage of flexibility. The share of industrial production in exports increased from 8.1% in 1952 to 78.6% in 1970 and to 90.8% in 1980. Therefore, Taiwan suggests evidence for savings-led investment, and industrialisation leading export-led growth; as investment expanded production, exports were necessary to provide a market for the output. Although budget deficit was kept under control, the level of government spending was relatively high.

1.2.4. Singapore:

Singapore, although resource-poor, provides another successful example of an export-oriented industrialisation. The following table summarises the growth rates of Singapore.

Table 1.4
Growth rates (percent) for Singapore (1966-1990)

	N	D	N-D
GDP per capita	8.7	1.9	6.8
GDP per worker	8.7	4.5	4.2
Excluding			
Agriculture	8.8	4.6	4.2
Manufacturing	10.2	6.2	4.0
Δ participation rate		0.27-----------------------→0.51	

Source: Young (1995)
N=Numerator; D=Denominator
N.A= Not Available

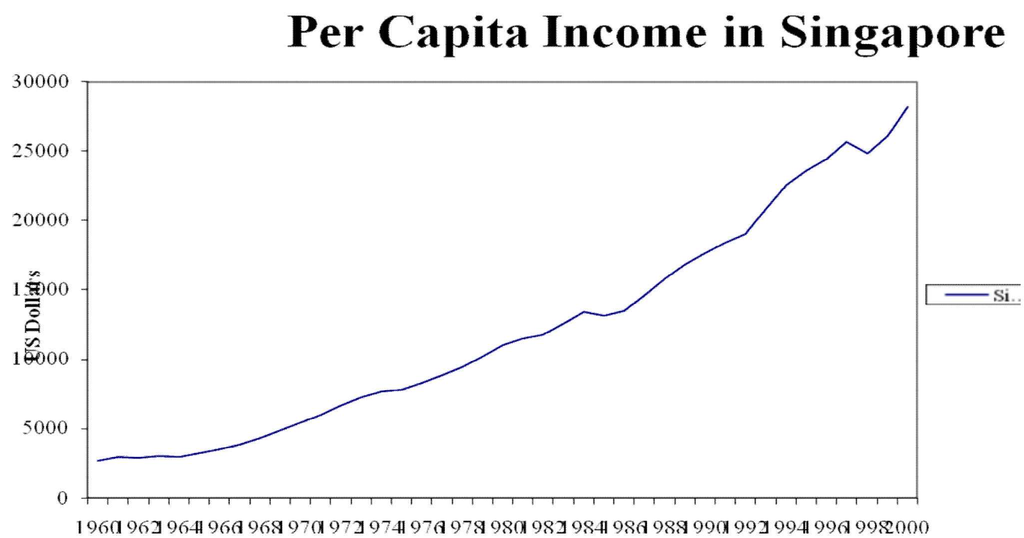

Figure (3): Per Capita Income in Singapore

To a certain degree like Taiwan but in contrast to S.Korea, its export promotion has been achieved within an open trade regime through fiscal incentives rather than trade incentives.

According to Aw (1991), these fiscal incentives included the benefit, for companies, of tax exemptions on interest payments on foreign loans, royalties, expenses related to technical expertise, technical assistants and market development. Tax exemptions were subject in general to two conditions (El Shinaway, 1998): First, free on board export sales must be at least $100,000 in the year in which the exemption was received and cancelled if sales fell below this limit. Second, export sales must contribute at least 20% of the value of total sales of the company. These benefits would apply for 15 years (later reduced to 5 in response to improved economic conditions) for non-pioneer industries and for 10 years (reduced to 8 years as a result of improved economic conditions) for pioneer industries (AW, 1991).

The targets of these measures changed over time according to the changing pattern of comparative advantage from labour intensive industries in the mid sixties to skill intensive and capital goods industries. Support was withdrawn from certain industries when they could survive on their own. Meanwhile, the discipline of competition on world markets reduced any possible inefficiency associated with the targeting scheme. Therefore, not only was protection temporary but also fiscal incentives were gradually decreased as appropriate. The incentives most valued by Singaporean firms were those related to the provision of high quality public support services and infrastructure and access to cheap industrial estate (Aw, 1991).

Aw's observation has significant implications, in the face of increasingly globalised and integrated international and financial markets, for the effectiveness of trade policy. Since foreign direct investment has come to be associated with multinational producers of export goods, economies that adopt more export-oriented policies will be better able to attract foreign direct investment (Elshinawy, 1998). A new form of competition, called location competition, is emerging, since multinationals that produce for export to locate their production in different countries. The attractiveness of a location to multinationals depends on the quality of its public utilities and other incentives, as well as institutional arrangements. In other words, sources of comparative advantage that explain the pattern of trade and investment flows are no longer confined to natural endowments, but are increasingly man-made (Agosin, 1993). In Singapore the constant price investment to GDP ratio, at 10 percent in 1960 had reached 39 percent by 1980 and climbed dramatically to 47 percent by 1984. There followed a significant drop, but another rise occurred in the late 1980s.

To sum up, the success of the East Asian countries, particularly the gang of four, resulted from export promotion strategies based on export incentives. These incentives, mainly uniform across industries, were temporary in nature and their long run objective was economic growth through trade liberalisation.

1.3. The Questions the Study Tries to Answer:

This study tries to explain how trade can contribute to higher rate of economic growth in Egyptian, as one of developing economies. Egypt moved away from the socialist economy adopted in 1950s and 1960s to an open economy, making it a useful reference point for transitional developing economies. Moreover, it enjoys political stability and a sufficiently long series of macroeconomic data is available. In the context of the economy of Egypt which represents an ideal case to examine the relationship between trade liberalisation and economic growth, many important questions arise.

1- Does Egypt's economic development benefit from trade liberalisation? To answer this question we have to answer the following subsidiary questions:

2- Does trade liberalisation (represented by exports) resulting in economic growth? What is the validity of the export led growth (ELG) and/or growth led export (GLE) hypothesis for the Egyptian economy? This question will be answered by a causality test using cointegration and error correction mechanism approaches.

3- Is there empirical evidence, on the basis of theoretical framework of endogenous growth model with human capital, that exports and economic growth have a common trend in the long run? If so, what is the direction of this trend? This question is concerned with the existence of cointegration which is equivalent to steady state equilibrium. A further contribution to answering the fundamental question is to take the endogeneity of some variables in economic growth equation into consideration. It raises another question

4- How can we investigate the relationship between trade liberalisation and economic growth, overcoming the limitations of the studies, which will be reviewed later?

5-What is the effect of some traditional and non traditional trade liberalisation indicators (included in our Simultaneous Equation Model) on growth? Here, we examine the effect of tariff and export duties (as trade policy instruments for openness) and trading partners' GDP and trading partners' tariff which both affect the demand for Egyptian exports.

6-What is the direct impact of human capital on economic growth and its role, accompanied with trade liberalisation, to enable any country to absorb and adopt new technology from the developed countries? The same question arises for selected countries (low-middle income, low- and middle-income). However, the question is, does the impact of trade liberalisation on economic growth differ with level of development? Or in other words, do low-and middle-income countries benefit from trade liberalisation irrespective of their development level? Or does trade liberalisation have the same effect on economic growth regardless of the degree of development?

1.4. The Importance of the Study:

There is an urgent need to concentrate on the developing countries, especially Egypt, which is a small open economy and gives an excellent chance for studying the free trade issue resulting from various reforms in the Egyptian trade policies and its effect on its economy. This study hopes to fill the gap in the literature concerning developing countries and especially the Egyptian economy and to contribute to knowledge by investigating the relationship between the free trade and economic development in Egypt. Therefore, this study will contribute to understanding of the effects of free trade on economic growth as one of the current issues in relation to international trade in general, and of the way these effects impact on the developing countries, especially Egypt, in particular.

The importance of this study is based firstly on the fact that there is a division of plunder or gains between the conflicting poles (USA and the European economic group) and there is unfair treatment, especially connected to the agriculture agreement, facing the developing countries, represented in the following concerning the principles of free trade:

1- The announcement to free the international trade started from Havana declaration in 1947 passing to GATT and completed with the establishment of the World Trade Organization (WTO) in 1995. This mainly focused on issue of the developed countries. The U.S tried to persuade some countries, particularly those in EU, to depart from the stringently protective policies. However, talk about the developing countries as participants in international trade did not start in a serious way until the Tokyo round (1973-1979).

2- The developed countries like the U.S apply the principles of free trade to the extent that they see it as suitable for them and to products in which they have advantages in production and exporting. However, they apply the principle of protection to products in which the developing countries have an advantage.

3- The U.S in the 1960s distorted world prices by a spending policy of keeping back the supply of its products, especially wheat, to achieve a strategic stock to feed the nations, giving the U.S an advantage. So, at the start of the 1960s, in an attempt to challenge the American predominance on food, the European countries with the leadership of France refused and followed the opposite to what is applied in the GATT/WTO to create an export surplus floating the world market depending on the tools of financial and price policy, not on economic efficiency. In addition, at the Uruguay round, when freeing the trade in agricultural products was discussed, the agreements made liberalisation partial and periodic and also included exceptions for the US and European Union countries which continued to protect their agricultural products.

4- Carrying too far their protection policy and exploring the weak exporting ability of the developing countries, the European group switched from global ceiling, boundaries and quotas, to individual levels for every product, and from applying them to every developing country to targeting countries which have lower production and quality. This system included the lowering of imports from countries which had a comparative advantage. The aim was to prevent the developing countries that had competitive ability from obtaining a greater share of favoured imports of the economic European group.

5- According to the result of the Uruguay around, national laws giving tax advantages to investment which used a specific percentage of national input in manufacturing inputs were considered a departure from the principles of the GATT/WTO. This meant that the developed countries did not allow the developing countries to export, except for raw materials. Consequently, the ability of developing countries to export and to manufacture their needs was limited.

From the previous points it can be seen that the basic impact of the free trade rules is to limit the products of developing countries from transmission to the American and European group markets and to crush the share of the developing countries in the world markets. For example the U.S sought to export its agricultural surplus at lower prices than the developing countries would sustain, despite the efficiency and comparative advantages which the developing countries enjoyed. This has affected Egypt.

Another danger is the invasion or inrush to the markets of developing countries themselves. Some of the governments of these countries prefer imports and getting financial support and help from the U.S and the European group after these two have succeeded in causing confusion in the world markets and a deviation from competitive prices which depend on the considerations of efficiency. All of this will result in economic and political subservience to the donor countries and increase the disadvantage which the developing countries suffer. The continued support to the developing countries, especially from the U.S; means it continues to attract the developing countries to its political axis, which supports its desire for world predominance. Now, the European group wants to compete with the U.S, and even share this predominance.

All above considerations drove the researcher to ask, is it reasonable for the developing countries to adopt a free trade policy and not to take any steps to help to secure their trade? Does the free trade policy adopted by developing countries have any impact on the economic growth of these countries taking Egypt as an empirical case?

1.5. The Economy and Trade Policy of Egypt: An Overview

The Egyptian economy is the second largest economy in the Arab world. It is dominated by services which account for about one-half of Gross Domestic Product (GDP). Tourism and the Suez Canal are the most important service sectors.

This section introduces the Egyptian economy including major economic indicators, trade policy framework and trade partners. Concerning the most important economic sectors in Egypt, we find that besides tourism and the Suez Canal as service sectors, Agriculture is important activity, accounting for 16.4% of GDP in the fiscal year 2002/2003 and 28% of total employment in 2000/01, although only 3% of the total land area is arable land. Manufacturing is considered one of the most important sectors, accounting for 19.7% of GDP in 2002/2003. It is concentrated in Cairo and the Nile delta. Industry and mining accounted for nearly 14% of total employment in 2000/01. Petroleum and natural gas contribute significantly to the economy as well, accounting for 8% of GDP in 2002/03 and nearly 40% of merchandise of exports, despite the decrease in crude oil production. Regarding the distribution of the GDP as expenditure, consumption represents the major expenditure component of GDP, accounting for 85% of the total in 2001/02, compared with 18% for gross fixed investment. The following table demonstrates some of the major economic indicators of Egypt in selected years.

Table 1.5
Major Economic Indicators of Egypt (1970-2006) (selected years)

	1970	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006
Population(million)	33.1	37.1	40.9	47.7	53.6	59.3	63.9	64.6	66.0	67.3	68.6	77.5	78.7
GDP(US$ billion)	7.68	13.4	22.9	35.9	43.1	67.7	98.7	102.2	82.4	82.9	90.6	93.0	109.5
Real GDP growth (%)	3.0	14.6	10.0	2.6	5.7	5	5.1	3.5	3.2	3.1	4.1	5.0	5.2
Inflation (annual rates)	3.7	10.3	20.6	23.8	16.7	7.18	2.7*	2.3*	2.4	6.5	11.3*	8.8*	15.4
Export/GDP	14.2	20.2	30.5	19.9	20.1	22.5	16.1	12.5	15.7	24.2	14.23	21.4	14.5
Import/GDP	18.8	41.3	42.9	32.0	32.7	27.5	22.7	30.1	37.3	40.6	41.51	39.5	40.6
Exchange rate(US$1=E£)	0.44	0.39	0.70	0.70	1.55	3.39	3.47	4.35	4.92	5.87	6.13	5.8	5.7

Source: own calculation based on the data from 1970-2000 from World Development Indicators 2002, World Bank and Economist Intelligence Unit, Country Data, except elements with * are from Euro monitor plc 2006

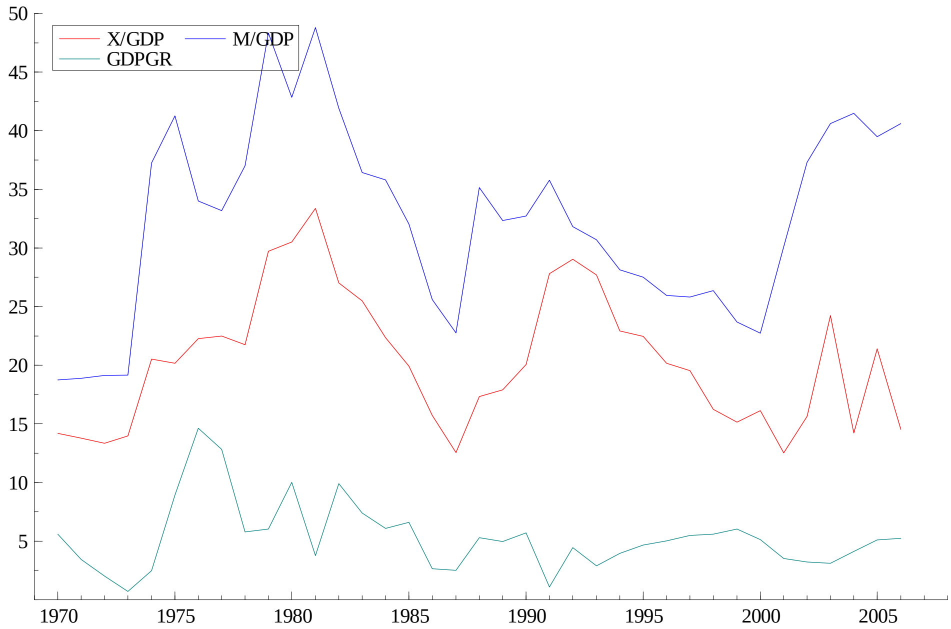

Figure 4:Growth rate against the ratios of imports and exports to GDP in Egypt

Note: Top curve is M/GDP, middle curve is X/GDP, and bottom curve is GDP growth rate.

Currently, Egypt is in the process of developing a long term strategic vision that goes beyond the normal five year plan and looks all the way to the year 2017. The strategy is based on a significantly reformed institutional framework that optimises the use of human, capital and natural resources while preserving Egypt's cultural heritage and the environment. There are three major shifts in strategy for growth.

1- Restructuring of national priorities to reallocate government resources in favour of basic services rather than tertiary social services which benefit the few.

2- Encouraging the private sector to invest in, own and operate a substantial portion of the utilities and infrastructure so as to release government resources for the provision of public goods.

3- Moving welfare programmes away from the provision of universal subsidies and towards well-targeted programmes to reach the truly needy.

1.5.1. A short History of Economic Policy Reforms in Egypt:

It was in the period of Mohammed Ali, the governor of Egypt from 1820-1840, that the first real economic development attempts were made. Cotton exports stimulated development of infrastructure and facilities like roads, railway and ports. Also, Mohammed Ali established a modern and diversified industrial sector, although, for a variety of reasons, industrial development failed to achieve significant progress. For more details see Mabro and Radwan (1976).

Under Mohammed Ali's successors, especially Ismael, foreign dominance incurred and increased rapidly, resulting in the sale of the Egyptian share in the Suez Canal Company to Britain in 1875. This led in turn to the British occupation in 1882, under which emphasis was given to financial consolidation, infrastructural improvements and administrative reforms (Ikram, 1980). However, the economy was transformed into an agricultural economy where only raw cotton was produced and exported to be manufactured (El-Din, 1986).

In the 1900s, Egypt gained autonomy over its financial affairs, and used its acquired freedom to establish a tariff structure to protect infant industries and raising government revenue (Ikram, 1980). Egypt's economy was heavily dominated by the government, especially in the period of Nasser, following the revolution of 1952, when Egypt formally adopted a socialist model (Wichterman, 1994). Much of the private sector was nationalised, and for the last several decades, the public sector has generated about two-thirds of non agricultural GDP (Wichterman, 1994).

During Nasser's time, self-sufficiency with respect to consumer goods was emphasised and heavy industry ignored; import substitution came to dominate both agriculture and industry, and export promotion was limited to petroleum, the Suez Canal and tourism (Ates, 2005). According to the World Bank (1991), the dominance of the government on the Egyptian economy resulted in massive resource misallocation, economic inefficiencies and slow, unsustainable growth.

The Nasser regime introduced a Land Reform Law to increase the productivity of the agriculture sector. International concerns such as the financing of the Aswan Dam, the nationalisation of the Suez Canal and the Suez war of 1965 drove Nasser to impose state corporatism, which benefited and controlled the labour force, while at the same time promoting the military- technocratic elite (Ates, 2005). However, many people consider the early 1960s as the real turning point in the Egyptian economy. Under central planning, high priority was given to the industrial sector. The existing industries like textiles, food, beverages, tobacco and leather were expanded. New iron and steel, automobile, fertilizers and rubber industries were established (Girigis, 1977). It should be noted that by 1954, Egypt was a significant exporter among developing countries, exporting more ($ 80.892E+ 07) than South Korea ($ 12.255E+ 07).

From the 1970s, the time of Sadat, Egypt attempted to move away from a highly centrally planned and controlled economy, towards one based on market principles and openness (Morley and Perdikis, 2000). The modernisation process, initiated in 1974 was an attempt to address the obstacles facing industrial development in Egypt, such as the limited capacity for import due to foreign exchange shortage, the poor productivity of labour and capital as a result of inefficiency of industrial management, scarcity of skills and qualified manpower and infrastructural bottlenecks (El Din, 1986). In addition, there was strong emphasis on the absence of competitive market practices and the way this undermined the efficiency of public sector companies, which had a monopolistic position in the domestic market in the period 1960-1970.

The reforms of 1974 introduced incentives for domestic and foreign investment promotion, opening up the foreign sector to private companies, allowing worker emigration and reducing government controls over the agricultural and industrial sectors (Morley& Perdikis, 2000). In this period of "*El Infitah*", which means openness, increasingly, liberal foreign trade and cooperation with international economic institutions attracted private and foreign capital and foreign military and economic aid, as well as rising tourism revenues and an inflow of workers' remittances, making the 1970s a period of unprecedented growth. Sadat's October 1971 paper had recognised that a higher growth rate was required (Ates, 2005). This required both financial and technological assistance from abroad. U.S. Patronage of Egypt's economic liberalisation was followed by investment from Arab oil patrons in the late 1970s.

Moreover, the World Bank, Japan and Germany, along with the U.S., contributed to development projects, increasing direct foreign investment to the country (Weinbaum, 1985). Foreign investments focused on the automotive, electronics and pharmaceutical industries. Moreover, the government encouraged international oil companies to expand exploration in Egypt. The exploitation of natural gas made it possible to release more oil for export.

During this time, the time of Sadat, the public sector was seen as suffering from the excesses of bureaucracy and heavy expansion into areas better left to the private sector. Consequently, under Sadat, the bureaucratic empire was dismantled. Basic projects that could not be taken up by the private sector were, however, adopted by the public sector. Priority was given to modernising industry and high-value agriculture as well as to developing the energy sector and tourism. Moreover, subsidies were limited to the basic needs of the poor.

After liberalisation, private investment began to increase, reaching 24 percent of GDP in 1986-87, in contrast to 8 percent of GDP in the mid-1970s (Hansen, 1991). Investments, which had been strictly controlled by the public sector, were encouraged; foreign investments reached 2.5 percent of total investment in 1982-83. Oil companies dominated foreign investment. The private sector dealt mainly with trade, construction, manufacturing, industry and mining-except for petroleum-and services (Hansen, 1991).

Another impact of these reforms was that between two or four million Egyptians were working abroad, especially in the Arabic countries possessing petroleum, by the end of the 1980s (Economist Intelligence Unit, 1990).

To some extent, these reforms were successful in achieving Egypt's economic objectives, as shown by some principal macroeconomic indicators. According to Subramanian (1997), the annual rate of inflation had decreased from 20 percent to seven percent by 1992; the current account was in surplus, and the international reserves grew from three billion dollars in 1990 to $17 billion in 1996 and to $ 20 billion in 1997. GDP growth was also up from three percent per annum in 1970 to five percent in 1996.

Nevertheless, many great problems still faced the Egyptian economy. Besides the lower rate of income per capita, investment as a proportion of GDP (17 percent) was lower than the average for all developing countries (26 percent) and significantly lower than that achieved by the East Asian Countries (31 percent). Egypt's foreign debt had risen from 31 percent of GNP in 1973 to 82 percent in 1985. However, Egypt possessed bargaining power with its creditors, due to strategic political considerations (Hansen, 1991) arising from its geographical location, vital to the international calculations of dominant powers.

Another important turning point was the reform of 1991. Despite the efforts made during the 1970s and 1980s to reduce the barriers to the private sector and to pursue an "open door" for investment (e.g., tax holidays, repatriation of profits), such barriers as late as 1991 were so extensive that improvements clearly were only at the margin. During the 1990s, however, the Egyptian government appeared to be more willing to implement IMF recommendations (Lofgren, 1993), and showed its intent to liberalise the economy through its rearrangement of the foreign-exchange system, interest rates, the budget deficit and reduced subsidies. However, despite these measures, the World Bank (1992) found a formidable array of disincentives to private investment and operations, including complex administrative processes and procedures.
The following table (1.6) and figure (5) demonstrate investment trends of Egypt.

Table 1.6
Investment trends, 1980-2004
Direct Foreign Investment (1987 US $ million)

	Total DFI inflow	DFI (fraction of 1987 GDP	U.S FI net inflow*	FI (fraction of 1987 GDP)
1980/81	755	0.019	-10	-0.0002
1981/82	947	0.023	54	0.0013
1982/83	1,056	0.026	166	0.0041
1983/84	1,108	0.027	227	0.0056
1984/85	1,401	0.035	138	0.0034
1985/86	1,365	0.034	399	0.0098
1986/87	1,316	0.033	-103	-0.0025
1987/88	869	0.021	-151	-0.0037
1988/89	936	0.023	-82	-0.0020
1989/90	114	0.002	39	0.0009
1990/91	120	0.003	-262	-0.0065
1991/92	120	0.003	-8	-0.0001
1992/93	453	0.011	-270	-0.0067
1993/94	1,285	0.032	-65	-0.0016
1994/95	734	0.018	43	0.0011
1995/96	598	0.015	32	0.0008
1996/97	636	0.016	98	0.0024
1997/98	691	0.017	94	0.0023
1998/99	711	0.018	154	0.0038
1999/00	1,656	0.041	459.7	0.0113
2000/01	509	0.013	196.2	0.0048
2001/02	428	0.011	159	0.0039
2002/03	701	0.017	277.5	0.0069
2003/04	407	0.010	229.4	0.0057

***Total U.S. Capital Outflows to U.S. Affiliates in Egypt. Source: Own calculation for DFI and FI inflows as a fraction of 1987 nominal GDP based on 1987 nominal GDP, which is 40.508E+9 (US$40508 million), data from WDI, World Bank and IBRD Stars and U.S. Department of Commerce, From 1998/99-2003/04, WTO (2005)**

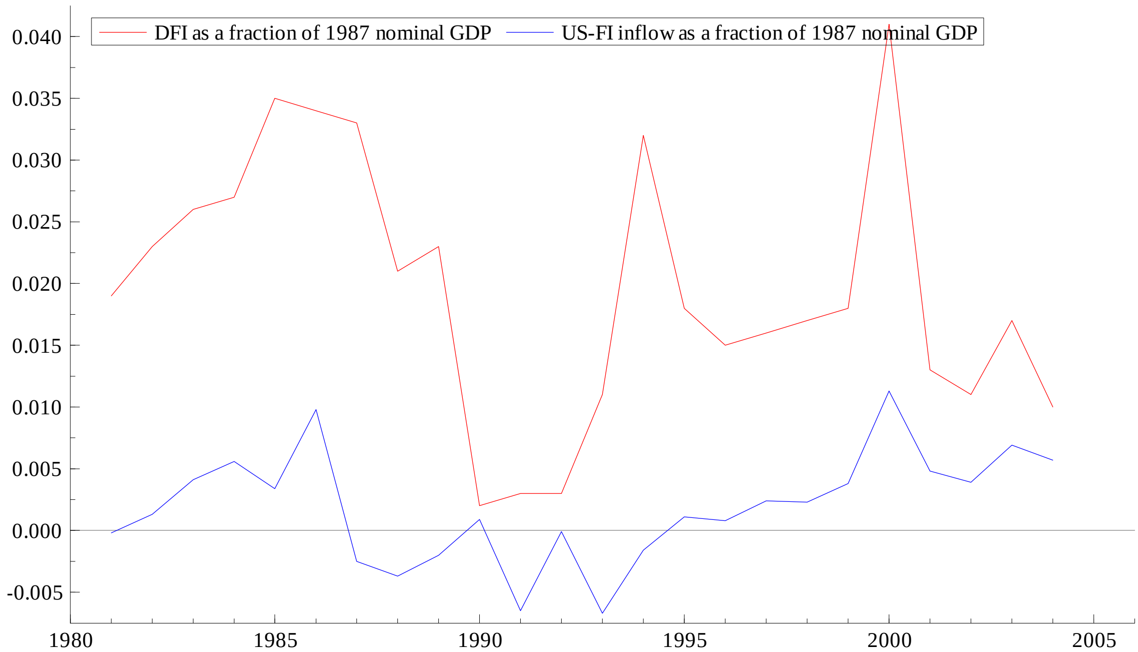

Figure 5: Fraction of FDI inflows to GDP in Egypt
Note: top curve is DFI and bottom curve is US-FI inflow.

It is worth notable that direct investment inflows from all countries to Egypt declined sharply in the late 1980s from high levels in the early years of the decade. In addition, the decline in U.S. investment inflows was much sharper in the 1990s, with net outflows from Egypt in every year but one between 1986 and 1992.

From 1981 until now, Mubarak has tried to achieve a balance between the socialist economic rigidity of Nasser and the free economy of Sadat. Therefore, the *infitah* policies initiated under Sadat have been to a certain extent halted, and the expected progress toward reaching a free economy has been delayed (Ates, 2005). Mubarak's government has stated that economic reforms may be realised gradually (Sullivan, 1990). Since the early 1990s, economic liberalisation policies have gained momentum in the form of privatisation and the provision of a more liberal arena for free entrepreneurship, following the imposition of conditions set by the IMF and other international financial institutions (Hopwood, 1991).

A business sector law was passed in June 1991 to transform public-sector companies into independent companies run along commercial lines and competing on equal terms with the private sector (Martin, 1993). By the end of 1994, 314 state-owned companies had been privatised, creating new job opportunities for 450,000 people. The privatisation programme has attracted foreign inflow. By 1995, 400 transnational corporations were operating in Egypt with investments at $ 8 billion (Egypt economic profile, 1996). Moreover, the economic assistance provided by international financial institutions and patrons in the Arab oil countries has removed the negative effects of the Gulf war on the Egyptian economy and provided an opportunity to enhance liberalisation policies.

However, the positive external situation of Egypt is coupled with a more problematic domestic economic situation. Steady growth in government expenditures (28 to 29 percent of GDP), tourism, and the oil/gas sector has been coupled with little or no growth for most of the private sector. Lack of private business access to credit, weak consumer demand, foreign exchange shortages, and excessive government bureaucracy are frequently cited problems.

The Economic Reform Programme of 1991 has yielded positive growth rates (averaging 4 to 5 percent in recent years, with officially reported growth of 5.1 percent in the fiscal year ending June 2000 and projection of 4.9 percent growth for fiscal year 2000/01 ending July 2001), low inflation (officially 2.5 percent for the year 1999), and substantial foreign currency reserves (officially $14.27 billion, or about 9 months of imports, in April 2001). Foreign debt fell steadily from a high of $33 billion in 1995 to $26.1 billion in March 2001. Debt service as a percentage of current account receipts has fallen steadily over the past decade, approximately 8.3 percent.

In 2004, Egypt implemented several measures to boost foreign direct investment. In September 2004, Egypt pushed through custom reforms, proposed income and corporate tax reforms, and privatised several enterprises. As a result, the budget deficit rose to an estimated 8% of GDP in 2004, compared to 6.1% of GDP of the previous year. Monetary pressures on an overvalued Egyptian pound led the government to float the currency in January 2003, leading to a sharp drop in its value and consequent inflationary pressure. Value against the US$ 1 fell from $1=4.92 Egyptian pounds in 2002 to $=5.87 Egyptian pounds in 2003 and $1=6.13 Egyptian pounds in 2004. The Central Bank implemented measures to improve currency liquidity.

1.5.2. Trade policy framework of Egypt:

Egyptian trade policy was characterised in the period 1952 to 1970 by heavy state involvement. The exchange rate was frequently overvalued, so import licensing was used as the main device to control import levels. Exports of goods have played a small role in Egyptian development except in the 1950s relative to the domestic Egyptian economy. According to Wichterman (1994), Egyptian exports gradually declined during the 1990s. Because developing country exports rose steadily between 1960 and 1990, Egypt became a progressively smaller factor in world trade during most of the period.

As noted previously, in 1954, Egypt was a significant exporter among developing countries, exporting more than South Korea, Taiwan, and Thailand. However, by 1990, each of these countries was exporting 10 to 30 times more than Egypt. Despite the attempts from the 1970s to reduce restrictions on trade, in the early 1990s, Egypt seriously dismantled restrictions on trade when the Egyptian government adjusted the exchange rate to reflect market forces and broadened access to foreign exchange.

Egypt has gradually moved towards a more liberal trade regime. It began to adopt the harmonised code system in February 1994. Under Egypt's trade liberalisation programme and in accordance with its World Trade Organisation (WTO) obligations, Egypt has made progress in reducing tariffs. The Egyptian customs started to implement the invoice-based system for the assessment of import duties on 1^{st} July 2001. On this date the government of Egypt began implementing phases two and three of General Sales Tax Law 11 of 1991, extending value added tax (VAT) to the wholesale and retail levels. The government collects sales tax from merchants either monthly or quarterly, depending upon turnover. The only industries exempted from full immediate implementation are the gold, woodworking, and spinning & weaving industries.

The taxes on these industries, which were also treated separately under the previous tax regime, will be phased in over 6-12 months. Egypt has lowered its import tariff rates. In 1998, it reduced the maximum tariff rate for most imports by 50% to 40%. However, Egypt's tariff rates are still relatively high by international standards, with average weighted tariff rates of 27.5%. Most tariff rates are within the range of 10-40 %; toys, watches, and clocks have the highest (40%).

The Egyptian government applies high import tariff rates on products which compete with domestic products and threaten related industries. For example, imported vehicles with engines larger than 1,600cc are subject to a 135% tariff rate. Also, for protection of Egypt's clothing industries, specific duties are levied. For example, the import duty for a man's suit is about 1,000 Egyptian pounds. A sales tax ranging from 5% to 25% is imposed on the final customs value of the imported items, besides customs tariffs. On most imports, a service fee is levied based on the value of imported items in return for inspecting, listing, classifying and re-examining these items. The rate charged is 3% for commodities liable for customs duties of 5-30% and 6% for those liable for duties over 30%.

Concerning exports, Egypt is an exporter of agricultural products, light manufactures (including textiles) and petroleum. Egypt is also developing an export capacity of natural gas. The natural gas sector is expanding rapidly due to the major recent discoveries. The production in this sector increased over 30 percent between 1999 and 2007. In 2006, 1.9 trillion cubic feet was produced (Ministry of Petroleum of Egypt, 2007). This production is sourced in the Nile delta region and in Western desert. According to the *Journal of the Oil and Gas*, Egypt's estimated proven gas reserves stand at 58.5 trillion cubic feet, which represents 1 percent of world reserves. As a result, natural gas has become the primary growth engine of Egypt's energy sector for the foreseeable future and Egypt has become a leading supplier of natural gas through the Meditrranean region, where it increased its exports from 8 billion cubic feet in 2003 to 68 billion cubic feet in 2006 (Ministry of Petroleum of Egypt, 2007).

Regarding the most expansive export project, we can say that it is the Arab Gas Pipeline that currently connects Egypt to Syria and Jordan. Egypt exported 32.2 billion cubic feet in 2008 and it is expected to rise to 77.3 billion cubic feet in 2013. An agreement between Turkey, which is described as an ideal market for Egypt's gas exports, and Syria to connect this pipeline to the Turkish grid for use in 2011 was signed in 2008, extending the pipeline into Europe for export to Austria, via Bulgaria, Romania, and Hungary. Recently, Libya agreed to build a natural gas pipeline between Alexandria and the Eastern Libyan city Tobruk, to import gas from the Nile Delta region.

It is worth mentioning that, economically, the Egyptian government made a great mistake when signing an agreement in 2005 to export natural gas to Israel for 20 years (60 bcf per year) for a price less than the average price now, wasting this vital source of energy without the approval of parliament. There is some talks of the price of gas sold to

Israel, Egypt's most controversial customer, being revised. Also, Egypt's government is renegotiating the price that France and Spain pay. As a result, no new contracts to export natural gas will be signed until the end of 2010 or until the Egyptian government thinks that world prices have stabilized. However, there is a debate about the effect of this ban on the share of Egyptian natural gas due to foreign companies working in Egypt.

Currently, Egypt has no direct export subsidies. Under its commitments to the World Bank, the Egyptian government has increased energy and cotton procurement prices and reduced indirect subsidisation of exports like subsidised inputs, credit facilities, and customs rates. The development of exports during recent years is demonstrated in a report on foreign trade prepared by Egypt's Ministry of Foreign Trade and Industry (2005).

This report indicates that in January 2005, Egyptian exports rose by 19% to reach $ 666 million, while imports rose by 80% to reach $ 1439 million, compared with $798 million during January 2004. As a result, the trade deficit rose in this period by 228% to reach $ 773 million, compared with $ 236 million during January 2004. Non-petroleum exports rose by 38% to reach $ 421 million because of the rise in the exports of both completed and semi- manufactured goods by 57% to reach $ 213 million and 73% to reach $ 107 million respectively.

Petroleum exports fell by 5% to reach $ 245 million. Since the start of the fiscal year 2004/2005, the trade balance has not improved; the deficit rose by 41% to reach $ 4028 million compared with the formerly fiscal year. Exports rose by 29% to reach $ 4589 million because of the increase in petroleum exports by 23% to reach $ 1877 million. In addition, non-petroleum exports achieved a rise of 33% to reach $ 2709 million. At the same time, imports rose by 34% to reach $ 861 million.

Concerning the movement of exports according to the manufacturing degree during January 2005, we find that the total exports fell by 3% compared with the same period of the previous year, to reach $ 547 million. This is because of the fall in petroleum exports, which represents 40% of the total exports, by 25% to reach $ 3077 million and the increase in non-petroleum exports, which represents 60% of total exports, by 24% to reach $ 4565 million. This rise in exports of non-petroleum products resulted from the rise in both the export of completed manufacturing goods by 36% to reach $2095 million and the exports of raw materials by 58% to reach $495 million. Also, the exports of semi-manufactured goods rose by 1% to reach $ 1088 million while the exports of raw cotton rose by 29% to reach $ 483 million.

As regards the distribution of Egyptian exports by countries and geographical regions as shown in table 1.7 during January- December 2004, we find that exports to the European Union, which represents 41% of total exports, rose as a result of the increase in exports to Italy and Spain by 28% and, respectively. Italy is the largest market for Egyptian exports, representing 14% of the total exports. In contrast, exports to France fell during January-November 2004 by 6%. At the same time, exports to North America, which represents 10% of the total exports, achieved an increase of 19%. This was a result of the increase in exports to the U.S. by 11% compared with January 2004. Egyptian exports to Asia (without the Arab countries), which represented 18%, rose by 8%. This occurred despite the fall of exports to India, Japan and Israel by 19%, 42%, and 18% respectively. On the other hand, the exports to both Arabic countries and Eastern Europe rose by 35% and 52%, respectively. Finally, the exports to Africa (without the Arab countries) fell by 2%.

Table 1.7
The exports of Egypt by the regions ($million)

	1999	2000	2001	2002	2003	January-December 2004
European Union	*1236 (4)*	*1900 (54)*	*1311 -(31)*	*1304 -(1)*	*2026 (55)*	*2548 (26)*
Italy	352 (10)	772 (119)	379 -(51)	499 (32)	759 (52)	982 (29)
France	134 (8)	281 (109)	165 -(41)	117 -(29)	168 (44)	163 -(4)
Spain	119 (94)	149 (25)	156 (5)	152 -(2)	288 (89)	432 (50)
Asia(without Arabic countries)	*602 (41)*	*821 (36)*	*696 -(15)*	*990 (42)*	*1034 (4)*	*1112 (8)*
Israel	187 (40)	269 (44)	192 -(29)	46 -(76)	12 -(74)	11 -(18)
India	134 (222)	158 (18)	254 (61)	412 (62)	467 (13)	381 -(19)
Japan	44 -(20)	96 (118)	65 -(33)	71 (9)	98 (39)	58 -(42)
Arabic countries	*469 -(15)*	*605 (29)*	*586 -(3)*	*786 (34)*	*1032 (31)*	*1395 (35)*
North America	*445 (11)*	*416 -(7)*	*356 -(14)*	*397 (12)*	*537 (35)*	*639 (19)*
Eastern Europe	*153 -(27)*	*125 -(18)*	*135 (8)*	*141 (4)*	*251 (78)*	*382 (52)*
Africa (without Arabic countries)	*38 (12)*	*49 (29)*	*75 (53)*	*77 (3)*	*163 (112)*	*159 -(2)*

Source: Central Agency for Public Mobilization and Statistics of Egypt (CAPMS).
( ) Percentage change compared with the same period in the previous year.

In the following table, (Table 1.8), the export shares of individual sectors during January-December 2004 are shown. We find that the agriculture exports rose by 41% and as a result of the rise in raw cotton by 29%. Exports of textile products fell by 55% compared with January-December 2003. Exports of building materials rose by 55%. Exports of chemicals, medicine and clinical requirements fell by 8% and finally, exports of food products rose by 17%.

Table 1.8
The exports of Egypt by the sectors (US $million)

	1999	2000	2001	2002	2003	Jan.-Dec. 2004
Agricultural products	530 (3)	506 -(5)	529 (5)	660 (25)	776 (27)	1094 (41)
Textiles products	743 -(11)	911 (23)	801 -(12)	794 -(1)	884 (11)	395 -(55)
Food products	87 (57)	98 (12)	101 (3)	110 (9)	158 (44)	185 (17)
Chemical and clinical necessities	363 (14)	400 (10)	425 (6)	379 -(11)	521 (37)	479 -(8)
Building and structural materials	302 -(5)	665 (120)	361 -(46)	596 (65)	590 -(1)	912 (55)
Other products	1548 (27)	2116 (37)	1906 -(10)	2154 (13)	3218 (46)	4584 (42)

Source: Central Agency for Public Mobilization and Statistics of Egypt (CAPMS) and the Textiles &Spinning subsidy agency. ( ) Percentage change compared with the same period in the previous year.

These are the recent developments of exports, but what about the imports? See the following table which indicates the growth rates of imports in recent years.

Table 1.9
The import of Egypt (US$ million)
(Jan. 2003-Jan. 2005)

	January 2003	January 2005	Growth rate of imports (%)
Total import	10906	12869	18
-consumer goods	1866	2165	16
-intermediate goods	4218	5062	20
-investment goods	1277	1494	17
-raw materials	1444	1646	14

Own calculation based on CAPMS of Egypt

During the period July-December 2004/2005, the deficit of trade balance rose by 25% to reach $3255 million compared with $2623 million during the same period in the previous year. This resulted from the increase in the total petroleum exports by 29% to reach $1632 million compared with $1267 million during January-December 2003/2004. Also, non petroleum exports rose by 32% to reach $2288 million compared with $1728 million during the same period in the previous year, while petroleum and non petroleum imports rose by 28% to reach $7177 million. This resulted from the increase in non petroleum imports by 22% to reach $6575 million compared with $5392 million in the previous year. Also, petroleum imports rose greatly by 165% to reach $602 million compared with $227 million during July-November 2003/2004. Imports rose by 427% to reach $585 million compared with an average of $4056 million during the previous five years. The behaviour of exports, imports, and GDP per capita of Egypt is depicted for selected years starting from 1970 in the following table.

Table 1.10
Trade indicators and GDP per capita of Egypt.

	GDP per capita (US$.)	Exports of G&S* (billion U.S$)	Exports of G&S(%of GDP)	Exports of G&S(annual% growth)	Imports of G&S(billion U.S$)	Imports of G&S(% of GDP)	Imports of G&S (annual %growth)
1970	1,240	1.09	14.2	9.89	1.44	18.8	14.3
1973	1,260	1.34	14.0	-5.02	1.84	19.2	5.02
(1974)	1,250	1.85	20.5	**3.97**	3.36	37.2	**37.2**
1975	1,340	2.31	20.2	**23.3**	4.72	41.3	**20.7**
1978	1,710	2.23	21.7	24.5	5.50	37.0	3.42
1980	1,890	6.99	30.5	17.0	9.82	42.9	8.13
1983	2,150	7.17	25.5	10.7	10.3	36.4	1.04
1985	2,300	6.91	19.9	4.1	11.1	32.0	2.98
1988	2,340	6.07	17.3	11.2	12.3	35.2	3.07
1990	2,510	8.65	20.0	7.14	14.1	32.7	3.66
(1991)	2,480	10.3	27.8	**3.33**	13.2	35.8	**1.18**
1992	2,540	12.2	29.0	**12.9**	13.3	31.8	**-4.65**
1993	2,730	13.1	27.7	7.24	14.5	30.7	7.94
1996	3,060	13.7	20.2	1.57	17.6	26.0	1.56
the2000s	3,640	15.9	16.1	10.3	22.4	22.7	2.48

Source: Own estimation based on World development indicators 2002, World Bank.
*** G&S is goods and services**
Note: Numbers in bold indicate the years of trade reforms in Egypt and one year later

We concentrate on the years after the 1974 and 1991 reforms. It is worth noting that the reforms had positive effects on trade terms in the year following the reforms, represented in increase in the export growth rate, but not continuous, and decrease in import rate. Export growth rate rose from 3.97 in 1974 to 23.3 in 1975, and from 3.33 in 1991 to 12.9 in 1992. Imports growth rate fell from 37.2 in 1974 to 20.7 in 1975, and from 1.18 in 1991 to -4.65 in 1992. It seems that the reforms of 1974 and 1991 had more effect on imports than on exports. In developing a model of the growth of Egypt, more details will be given about the behaviour of these variables, which will be used to indicate the relationship between free trade and economic development in Egypt, besides the other variables.

Concerning the foreign trade of Egypt with countries having free and preferential agreements, see the following table.

Table 1.11
Foreign trade of Egypt with free and preferential agreement countries (US$million)

	1999	2000	2001	2002	2003	2004
Trade Balance	128	-29	-29	28	274	523
Total exports	268 -(2)	345 (29)	379 (10)	480 (27)	658 (37)	899 (37)
Total imports	140 -(53)	374 (167	408 (9)	452 (11)	348 -(15)	375 -(2)
COMESA countries*	-92	-140	-175	-236	-69	2
exports	48 (54)	46 -(4)	63 (36)	64 (3)	121 (88)	157 (30)
imports	140 (13)	186 (33)	238 (28)	300 (26)	190 -(37)	155 -(18)
The total free trade with Arabic countries	220	111	146	264	343	521
exports	220 -(9)	299 (36)	316 (6)	416 (32)	537 (29)	742 (38)
imports	- -(100)	188 -	170 -(9)	152 -(11)	194 (27)	220 (14)
Libya agreement	-15	10	5	27	69	27
exports	42 -(44)	63 (50)	45 -(29)	70 (56)	109 (57)	71 -(35)
imports	57 -(37)	53 -(7)	40 -(25)	43 (9)	40 -(6)	44 (9)
Syria agreement	16	1	7	23	-1	96
exports	41 -(9)	48 (17)	56 (16)	60 (8)	74 (22)	197 (167)
imports	25 -(17)	47 (88)	49 (4)	38 -(23)	74 (98)	101 (36)
Lebanon agreement	6	23	29	50	73	171
exports	23 -(12)	59 (157)	53 -(11)	74 (40)	104 (41)	203 (95)
imports	17 (0)	36 (112)	23 -(35)	24 (1)	30 (28)	31 (4)
Tunisia agreement	4	-2	6	5	9	12
exports	21 (9)	15 -(29)	22 (46)	18 -(20)	19 (8)	19 (0)
imports	17 (55)	17 (0)	16 -(9)	12 -(22)	10 -(19)	7 -(31)
Morocco agreement	6	24	5	23	74	35
exports	13 (3)	30 (131)	26 -(14)	31 (19)	83 (170)	43 -(49)
imports	7 (0)	6 -(14)	21 (245)	8 -(61)	9 (15)	8 -(14)
Jordan agreement	-3	-7	4	70	65	129
exports	21 -(19)	20 -(5)	25 (25)	97 (285)	95 -(2)	157 (65)
imports	24 (33)	27 (13)	21 -(21)	27 (26)	30 (12)	28 -(6)

Iraq agreement	59	62	89	66	53	52
exports	59 (51)	64 (8)	90 (40)	67 -(25)	53 -(21)	53 (0)
Imports	-	2	1	1	0	1

Source: Central Agency for Public Mobilization and Statistics of Egypt (CAPMS)
( ) Percentage change compared with the same period in the previous year.
*** Common Market for Eastern and Southern Africa: Kenya, Ethiopia, Uganda, Zimbabwe, Sudan, Djibouti, Zambia, Lusaka and the other countries.**

The above table demonstrates that Egyptian exports with these countries rose by 37% during January-December 2004. However, the imports from those countries declined by 2% (the Accumulative Report of Foreign Trade, 2005). These developments contributed in achieving a surplus in the trade balance with these countries adding up to $ 523 million, compared to a surplus of $ 274 million during January-December 2003. From the table also we find that the surplus in the trade balance with free trade agreement Arab countries (Libya, Syria, Lebanon, Tunisia, Morocco, Jordan, and Iraq) rose to $ 521 million corresponding to a surplus of $ 34 million during the same period in the previous year. This was due to the rise in exports to this group by 38%, while the imports rose by 14%.

The importance of trade balance, more accurately its surplus for growth, due to export surplus can finance import of inputs that are essential for growth such as intermediate goods, machinery and human capital. Lebanon occupied the first position as an importer of Egyptian exports. These exports added up to $ 203 million compared with $ 104 million in the previous year, a rise of 95%. Also, Egyptian exports to Jordan rose by about 65% (the Accumulative Report of Foreign Trade, 2005). At the same time, exports to Syria added up to $ 197 million, an increase of 167% over the same period in the previous year. Syria and Libya represented the greatest exporters to Egypt. Egyptian exports from them added up to $ 145 million, representing 66% of the total Egyptian imports from Arab countries that have free trade agreements with Egypt. On the other hand, exports to African countries, according to the trade agreement of Common Market for East and South Africa (COMESA), rose by 30%, while imports from this region declined by 18% and hence, the trade balance achieved with those countries was $2 million compared with a deficit of $69 million in the previous year.

Concerning the trade of free regions, we find that during January 2005 the exports of free regions rose by 340% to $1069 million compared with $ 243 million during January 2004. This rise in exports is divided into two parts: $ 284 million were exported to the domestic market (Egypt) and the rest to the foreign markets. These exports of free regions rose by 339.4% compared with the exports achieved during January 2004. Also, the imports of free regions from the countries of the world (without Egypt) rose by 233% over the same period of the previous year. The trade deficit for these regions with the other world countries decreased by 3124%, achieving a surplus of $ 170.5 million compared with a deficit of $ 5.6 million during January 2004. At the same time, the imports to these regions added up to $ 632.6 million: $ 39.25 million from the domestic market and the rest from abroad. The following table illustrates this.

Table 1.12
The trade of free regions in Egypt ($million)

	2002	2003	2004	January 2004	January 2005
Total exports	2465	3067	4129.8	242.8	1068.7
	(37)	(24)	(35)		(340)
-To domestic market	1235	1526	1466.7	64.1	283.8
-To the rest of the world	1230	1541	2663.1	178.6	785
	(31)	(25)	(73)		(339.4)
Total imports	1866	2570	3252.3	222.4	653.6
	-(0.3)	(38)	(27)		(193.9)
-from domestic market	432	387	455	38.1	39.2
-from the rest of the world	1434	2183	2797.3	184.3	614.5
	-(9)	(52)	(38)		(233.4)

Source: Central Agency for Public Mobilization and Statistics of Egypt (CAPMS)
( ) Percentage change compared with the same period in the previous year.

Concerning the trade of particular custom protocols, see the following table

Table 1.13
Exports and imports of the particular custom protocols (US $ million)

	2002	2003	2004	January 2004	January 2005
The exports	390	126	218	8	35
-Temporary allowance	320	60	174.8	5.7	32.3
-drawback	71	66	42.8	2.6	3
The imports	1063	1477	1780	143	314
-Temporary allowance	185	124	294.7	32.7	93.3
-drawback*	879	1353	1485	110.6	221.1

Source: Central Agency for Public Mobilization and Statistics of Egypt (CAPMS)
***Drawback means paying back a duty previously paid on exporting excisable articles or on re-exporting foreign goods (see appendix 2 for details).**

From this table: 1- the total exports scheduled under the particular custom protocols added up to $35 million during January 2005: $ 32.6 million temporary allowance exports and the rest by drawback.
2-at the same time the imports by these protocols added up to $314 million: $ 93.3 million by temporary allowance and the rest by drawback (see the Accumulative Report of Foreign Trade, 2005).

1.5.3. Trade partners of Egypt:

Concerning the trade partners of Egypt, we can say that prior to 1952, Egypt's major trading partner was Britain and the main trading partners under Nasser were the Eastern Bloc countries. Transactions were conducted through bilateral agreements with public-sector enterprises. After 1952, Egypt was shifted politically and economically toward the Soviet Union and Eastern Europe by the revolutionary regime of 1952 under Gamal Abdel Nasser. Between 1952 and 1970, the share of Egypt's exports to these regions increased to reach about 60 percent of the total, compared to about 20 percent in 1955. During the same period, the share of imports from the Soviet Union and Eastern Europe also increased, from 7 percent to about 33 percent. In spite of this, Western industrialised countries were considered the major source of imports, especially of food, which the Soviet Union and Eastern Europe could not furnish. Generally, trade with the Soviet Union and Eastern Europe showed a balance of payments in favour of Egypt.

However, it seems that the politically motivated subsidies were partly responsible for this surplus. However, after the initiation of *infitah*, in the period of Sadat, the concentration of trade with the Soviet Union and Eastern Europe was ended due to the new Westward reorientation of the country. Trade shifted dramatically towards the West, particularly the U.S., managed by private firms and individuals. Part of the explanation for this shift is that after the mid-1970s, Egypt began to export oil to the Western market, and petroleum determined the trade pattern. The rising export capacity of Egypt, apart from natural gas and crude oil, and an inflow of foreign direct investments encouraged integration with the world economy in the late 1970s.

Moreover, Western donors and financiers and the U.S. government after Camp David shifted the attention of the Egyptian planners towards efficiency or export-promotion policies. After 1974, there was an influx of foreign capital from Arab aid institutions (investments, grants and loans), remittances from workers migrating to oil-rich Arab countries, the reopening of the Suez Canal, the return of the Sinai oil fields and increased tourism. Following the Camp David Accord, Western institutions and the U.S extended credit to Egypt. In this new situation, the private sector began to play a role in foreign trade, and private capital movement was legalised (Hansen, 1991)

Under Mubarak, the consolidation of trade with the Organisation of Economic Cooperation and Development (OECD) continued, owing in part to the aid to Egypt from the United States, and the U.S. emerged as Egypt's largest source of imports, since aid was conditioned on Egypt's purchasing American goods and services. In the beginning of the 1980s, between 1982 and 1986, an average of 16 percent of Egypt's total imports was obtained from the U.S., whereas on the average, 55 percent of Egypt's exports and 46 percent of Egypt's imports were purchased and supplied by OECD in 1986. Thus, we can say that Egypt concentrated its foreign trade with the Western industrialised countries.

Concerning the Arab nations and the third world, of which Egypt is considered part, we find that both were minor trading partners. In 1979 and due to the peace treaty with Israel, the Arab market had been closed to Egypt. However, the re entry of Egypt into the

Arab fold in the mid-1980s encouraged improved trade with the Arab nations. After this, Egypt, Iraq, the Yemen Arab Republic (North Yemen), and Jordan formed a regional economic Arab cooperation council in February 1989. This council set modest goals; however it would be suggested that there were hidden goals, the most important one being to help Iraq in capturing Kuwait. Also, it may be questioned whether this council was truly economic in nature, or more political, since it excluded Syria-which might be considered a natural partner in regional economic cooperation-as it stood alongside Iran in the war with Iraq. This council disappeared in the early 1990s without any clear explanation, marking the failure of Arab integration schemes. The following table indicates the most important partners for Egyptian exports in the beginning of the 21st century.

Table 1.14

The most important partners or markets for Egyptian Exports (US$ million)

	2001	2002	2003	Jan.-Dec. 2004	The percentage of change in Jan-Dec 2004
Italy	379	499	759	982	29
U.S.	346	387	527	586	11
Spain	156	152	288	422	50
Holland	280	200	229	392	71
India	254	412	467	382	-18
Saudi Arabia	116	143	184	221	20
France	165	117	168	163	-3
U.K	97	79	147	150	2
Germany	110	96	120	140	16
Libya	45	70	109	71	-35
Japan	65	71	98	58	-41

Source: Central Agency for Public Mobilization and Statistics of Egypt (CAPMS)

From this table, in 2004 compared to 2003, Italy continues to represent the greatest market for Egyptian exports. However, the exports to India decreased by 18%. Egyptian exports to Holland rose by 71%. The following tables illustrate Egypt’s principal merchandise import sources, 2004 and merchandise exports of Egypt.

Table 1.15
Egypt's global merchandise trade importers.

Country	(%) of the total imports
United States	%12.5
Germany	%6.8
Italy	%6.8
France	%5.8
China	%5.5

Source: Egypt profile

Table 1.16
Merchandise Exports of Egypt
(1987 $million)

	Value of all merchandise exports	Merchandise export (% GDP)
1980	4,248	10.48
1981	4,097	10.11
1982	3,723	9.190
1983	3,687	9.101
1984	3,450	8.517
1985	1,947	4.806
1986	2,285	5.641
1987	2,037	5.029
1988	2,041	5.039
1989	2,440	6.024
1990	2,281	5.631
1991	3,106	7.668
1992	2,524	6.231
1993	3,110	7.677
1994	3,480	8.591
1995	3,450	8.517
1996	3,540	8.739
1997	3,920	9.677
1998	3,130	7.726
1999	3,560	8.788
2000	4,690	11.58
2001	4,750	11.72
2002	4,910	12.12
2003	5,213	12.86
2004	5,120	12.63
2005	5,340	13.18
2006	5,430	13.40

Source: Own calculation based on IMF and International Financial Statistics.
From 1993 to 2000, World Development Indicators, 2002, World Bank.
From 2001-2006, Ministry of Industry and Trade of Egypt.
Note: U.S. GDP deflator used to convert to 1987 Dollars

1.5.4. The WTO and Economic growth in Egypt:

The aim of this section is to state the main priorities for Egypt from the WTO. Egypt is deeply interested in the WTO agricultural negotiations as both a net food importer and as a country which has substantial potential in exporting fruits and vegetables (see action plan for the Egyptian network, Cairo, 16-17 June 2003). In sectors where Egypt has a competitive advantage, WTO negotiations on market access for agricultural products should take into account market access preferences provided by existing or future bilateral trade agreements between Egypt and major trade partners.

Furthermore, Egypt is interested in those bilateral trade agreements that provide for better market access to Egyptian exports products to major markets. The Egyptian textiles and clothing sector wishes to have a sound assessment on the impact of the phasing out of quotas, the accession of China to the WTO, and the outcome of the WTO negotiations on market access and trade remedies. Egypt is convinced that a right orientation of the sector in those matters and the lowering of trade barriers will help in the structural changes in the sector. And there will be an acceleration of customs clearance, both in Egypt and the importing countries, which is expected to have a positive impact on trading activities. The Egyptian service sector has substantial potential for both exports and the domestic market. A crucial factor for the development of export activities is that the sector acquires an improved understanding of the WTO rules on service. Another important sector is pharmaceutical production. This sector is interested in any changes resulting from the full implementation of the WTO TRIPS agreement after 2005. Another source of concern is the pressure on the sector to accept TRIPS-plus disciplines. Finally there are serious impacts of the multilateral trade negotiations of the Doha Round on the Egyptian activities in all sectors like agricultural, services, textiles and clothing and pharmaceuticals.

1.6. Structure of the thesis:

The remainder of this thesis is organised as follows: both chapters 2 and 3 review the theoretical and empirical literature on the relationship between trade openness and economic growth, with reference to the miracle of the gang of four: South Korea, Singapore, Taiwan, and Hong Kong. Chapter 4, within a theoretical framework of an endogenous growth model, empirically presents the causality test applied to investigate the direction of relationship between Egyptian exports and its economic growth. Further contribution is introduced by applying on two different degrees of development; low-and middle-income countries. In chapter 5 we present the regression using a time series data of Egypt in the period 1970-2006; we test the Simultaneous Equation Model by employing Full Information Maximum Likelihood (FIML) techniques and 3SLS for panel data. Finally, chapter 6 discusses the main findings, drawing some conclusions and recommendations, and suggests directions for prospective research.

Chapter 2
Free Trade and Economic Growth: Theoretical Implications

2.1. Introduction:

There are continuous arguments in favour of free trade for the developing countries. In the absence of the market imperfections, free trade is optimal for a small open economy, such as most developing countries are (Greenaway, 1998). Trade in general is the interchange of goods and services. Its basic cause is the differences in prices from country to country. These prices reflect differences in costs of production. By the Ricardian law of comparative advantage, some things must be cheaper to produce at home and will then be exported to other countries and other things must be cheaper to produce abroad and will then be imported from other countries. The role of free trade is to minimise the real resource of worldwide production. Consequently, it “serves to maximise the real value of production by allocating world wide resource most efficiently” (Kenen, 2000, 19). Therefore, the volume of output (goods and services) from a given amount of productive effort tends to be greater when international trade prevails than when countries exist in a state of economic isolation. Hence, we can say that the result of free trade is to give the population of the world goods and services at a lower total cost than would otherwise be possible, thereby raising the standard of living and maximising the welfare of societies.

While free trade maximises the world output and the global welfare, achieving benefits for all nations, both developing and developed nations impose some trade restrictions such as tariffs on the free flow of international trade. A tariff is “a tax or duty levied on the traded commodity as it crosses a national boundary” (Salvatore, 1987, 183). Trade restrictions are designed and imposed for either revenue or protection. There are many important reasons to impose trade restrictions, such as to protect domestic industries from foreign competition. For example, if Americans buy Japanese cars instead of American-made cars, the American government might be tempted to help American car manufacturers by imposing a tariff on Japanese imports, making them more expensive than American- made cars. In addition, trade restrictions are imposed to increase employment and so to prevent the unemployment that tends to arise when cheap foreign goods are permitted to undercut domestic production and to create additional jobs through the promotion of new industries or expansion of the existing industries.

According to Krause (1965, 123), the purpose of tariffs, which are considered as the most important trade restrictions, is to protect the home market and to keep money at home. Trade restrictions, especially tariffs, are used for national defence and for preventing dumping of goods within a country by foreign exporters, which occur when a particular commodity is offered in the importing country at a price below that prevailing in the exporting country. Trade restrictions are also used to equalise the costs of production between domestic producers and lower-cost foreign producers. Another important reason is to promote infant industries, where temporary trade protection is justified to establish and protect the domestic industry during its infancy until it can meet foreign competition.

In the theory of international trade, the static gains from trade and losses from trade restrictions have been examined thoroughly. However, trade theory provides little guideline as to the effects of international trade on growth and technical progress. On the contrary, the new trade theory makes it clear that the gains from trade can arise from several fundamental sources: differences in comparative advantage and economy-wide increasing returns. The phenomenal differences among the growth rates of East Asia, the Latin American, and lack of that in sub-Saharan African countries over the last several decades have stimulated a renewed interest in the effects of trade policies on growth. During most of the 20th century, import substitution (IS) industrialisation strategies dominated most developing countries' development strategies. While developing countries in Latin America that followed IS strategies experienced relatively lower growth rate, East Asian countries, which employed export-promotion policies, consistently outperformed the countries. This probably explains why a growing body of empirical and theoretical research has shifted towards examining the relationship between trade liberalisation and the economic performance of countries since the late 1970s, especially the economic performance of the East Asian countries that adopted export-promotion policies with free trade as a long run objective.

This study will examine the relationship between trade liberalisation and economic growth, taking Egypt as an empirical case. However, there is a gap in the literature concerning this issue in Egypt or any other developing countries except the East Asian countries. Almost all the studies, especially empirical ones, take the East Asian countries as a model to examine the relationship between free trade or outward oriented strategy and growth. Therefore, the literature review, especially empirical, will analyse the relationship between free trade and economic growth through demonstrating the experience of the East Asian countries, as reviewed in the previous chapter in case of “the Gang of Four”: Hong Kong, South Korea, Taiwan and Singapore. The literature will be reviewed and critically analysed in chapters Two and Three. The current chapter deals with some theoretical implications of free trade and economic growth; the next chapter deals with the empirical evidence on this issue. In the current chapter, the gains, both static and dynamic, discussed in the international trade theory, will be first highlighted before discussing some views regarding free trade and economic growth in the theories of growth.

2.2 Gains from Free Trade:

These gains are divided into two types; the first one is the static gains and the other one is dynamic gains. According to the theory of comparative advantage, differences in countries’ natural and acquired resource endowments give rise to static gains from trade. This is different endowments cause differences in the opportunity cost and the slope of the production possibility curve. Thirlwall (2000) defines the static gains from trade as the cost that is saved by importing goods rather than producing them domestically. However, in the doctrine of comparative advantage, it is by no means guaranteed that the gains from trade will be evenly distributed. Indeed, a country may suffer a decline in the national welfare because of economic growth stimulated by technological progress. This case is called “immiserizing growth” (see Bhagwati, 1958 for details).

Such a situation arises because of a deterioration of terms of trade that outweighs the beneficial effect on welfare due to economic growth at constant product prices, resulting in effect, in over-consumption contributing to deterioration in global welfare. Thus, opening up to trade can lead to immiserization and reduced economic welfare, where distortions exist. Static gains of trade include reduced costs due to economies of scale, enhanced efficiency as a result of exploiting comparative advantage, reduction in distortion from imperfect competition, and a wider range of products available.

Significant problems remain in the distribution of the gains from trade between developing and developed countries. Free trade commitments require the developing countries to specialise in producing primary commodities (Abou Doh, 2003), which are characterized two main features:

1- As supply is increased, prices fall dramatically; and demand grows only slowly in relation to income due to the low price and low-income elasticity of demand for primary commodities.
2- These primary commodities (agricultural products and raw materials) are land-based and hence, like any land-based activity, are subject to diminishing returns, there being a limit to employment set by the point where the marginal product of labour falls to the minimum subsistence wage.

Therefore, developing countries may experience a loss from trade. According to Brecher (1974), more openness may lead to static losses when there are downward rigid real wages. The idea is, in case of labour intensive good as in developing countries, lower tariffs lead to more openness, implying that a decrease in the domestic wages of this kind of labour leads to unemployment and potential a loss in GDP.

On the other hand, the essence of dynamic gains is that they shift outwards the whole production possibility frontier by augmenting the availability of resources for production through increasing the productivity of resources and increasing their quantity (Thirlwall, 2000, 135). Dynamic gains of trade involve benefits from trade that accumulate over time in addition to static gains from trade.

2.2.1 Static Gains:

The doctrine that trade enhances growth dates back at least to Smith (1776), who argued that trade is important as a vent for surplus production and as a means of extending the market. Consequently, the division of labour and the level of productivity improve. In his view, foreign trade encourages improvement of the country's productive powers and augmentation of the country's production to the utmost, thereby increasing the real revenue of wealth and society. According to Thirlwall (2000), in the 19th century, Smith's doctrine developed into an export-drive argument, particularly in the colonies, which explains why classical trade theory is often associated with colonialism.

Ricardo (1817) developed the theory of comparative advantage, indicating that under the assumptions of perfect competition and the full employment of resources, welfare gains, which are static, can be reaped by specialising in the production of goods which have the lowest opportunity cost and trading the surplus of production over domestic demand. These static gains are derived from the reallocation of resources from one sector to another as increased specialisation, based on comparative advantage, occurs. There are trade creation gains that arise within customs unions or free trade areas as the barriers to trade are removed between members, but the gains are once-for-all. Once the tariff barriers have been removed, and no further reallocation takes place, the static gains are exhausted (Thirlwall, 2000).

The static gains from improved resource allocation are the classical source of a gain from freer trade where under perfect competition, a small, price-taking country will gain by eliminating tariffs. Consumers are better off because their incomes stretch further, and resources are used more efficiently because they are no longer used to produce goods that could be imported at a lower price. Concerning the increase of real income as a method of dealing with the question of "gain" from trade, Cairnes (1874) stated that free trade always makes more commodities available. And unless it results in an impairment of the distribution of real income substantial enough to offset the increase in quantity of goods available, free trade always operates, therefore, to increase the national real income.

Numerical Example demonstrating the Superiority of Trade vs. Autarky

Based on the Ricardian model, we try to investigate the best situation for the Egyptian economy in both closed and open cases. This model contains two commodities to be produced: agricultural and manufactured. As in the Ricardian model, labour is the only factor of production.

This model works analytically to demonstrate whether there are gains to Egypt from a complete specialisation in producing agricultural goods and exporting them to the rest of the world, especially the European Union which is considered the major trading partner for Egypt. Given that, the model tries to show the equilibrium in case of no trade (autarky), and equilibrium with complete specialisation.

In both cases, autarky (self sufficiency) and open economy, the Utility function will be calculated to demonstrate the superiority of the trade solution (if it exists).

In case of autarky (closed economy):

Let us begin with the first situation, where the Egyptian economy is closed, i.e. the autarky case. We can specify our problem as follows:

Egypt needs to maximise Utility (welfare) which can be indicated as:

$$\max U(X_1 X_2) \tag{1}$$

This utility maximisation function in the closed economy is subject to:

s.t. $X_i = S_i$

Where U is utility (welfare),

X_1 is consumption of the agricultural good,

X_2 is consumption of the manufactured good,

X_i is represented by X_1 & X_2, and

S_i is the production of good i, so,

S_1 is the production of the agricultural good, and

S_2 is the production of the manufactured good.

Also, the above utility maximisation function is subject to the following equation:

s.t. $a_{L_1}S_1 + a_{L_2}S_2 = L$ where L is labour supply. So we can summarise our problem as follows: in a closed Egyptian economy, Egypt needs to

$\max U(X_1 X_2)$

s.t. $X_i = S_i$ and

s.t. $a_{L_1}S_1 + a_{L_2}S_2 = L$

In a closed economy, both indifference curve (demand or consumption side) and production possibility frontier (PPF) curve (supply or production side) must have the same slopes when maximum welfare is attained and this represents the equilibrium condition. The slope of the PPF represents the marginal cost of the first good, which is the agricultural good in our proposed example. This marginal cost is measured in terms of either the resources used in the production or the other goods sacrificed and called the marginal transformation rate (MTR) which is the relative price of the agricultural good in autarky.

$$MTR = \frac{a_{L_1}}{a_{L_2}} \qquad (2)$$

The second slope is the slope of the indifference curve which represents the willingness of consumers to pay for the agricultural good and is called the marginal substitution rate (MSR), where

$$MSR = \frac{MU_1}{MU_2} \qquad (3)$$

As stated, the equilibrium condition is satisfied via

$MTR = MSR$, i.e. $\frac{a_{L_1}}{a_{L_2}} = MSR$

Using a numerical example to demonstrate:

In the closed economy as stated $X_i = S_i$ and so given $U = S_1 S_2$ (4)

$$MSR = \frac{S_2}{S_1} \qquad (5)$$

$a_{L_1} = 3$, $a_{L_2} = 2$, $L = 300$

$MTR = \frac{a_{L_1}}{a_{L_2}} = \frac{3}{2} = 1.5$, as stated, in autarky (closed economy), the production must equal consumption in all sectors of the economy and so,

$X_1 = S_1$ and $X_2 = S_2$ (6)

So Egypt needs to

$\max U = S_1 S_2$

$s.t. PPF = 3S_1 + 2S_2 = 300$ (7)

The equilibrium condition is where $MSR = MTR = \frac{S_2}{S_1} = \frac{3}{2} = 1.5$ and so

$S_2 = 1.5S_1$ (8)

By substituting $S_2 = 1.5S_1$ into the PPF (equation (7)), we get

$3S_1 + 2(1.5S_1) = 300 \Rightarrow 6S_1 = 300 \Rightarrow S_1 = 50$

$S_2 = 1.5S_1 = 1.5 * 50 = 75$

Where $U = S_1 S_2 = 50 * 75 = 3750$

This 3750 represents the utility (welfare) in the case of autarky, i.e., where the Egyptian economy is closed. But what about if this economy is opened?

In case of trade (open economy):

The aim is the same, i.e. for Egypt to maximise its welfare subject to total production value being equal to total consumption value, but here the problem is to choose four unknown variables $X_1, X_2, S_1 and S_2$ to $\max U(X_1 X_2)$

$s.t. P_1 S_1 + P_2 S_2 = P_1 X_1 + P_2 X_2$ (i.e. Income equals Expenditure) (9)

But it is always suggested to simplify the problem via two steps: the first is to maximise net domestic product subject to a constraint and the second is to solve our original problem.

So Egypt needs to maximise its net domestic product represented in $P_1 S_1 + P_2 S_2$ (10)

$s.t. a_{L_1} S_1 + a_{L_2} S_2 = L_{(PPF)}$. From this equation we can get the following:

$S_2 = \left(\frac{L}{a_{L_2}} - \frac{a_{L_1}}{a_{L_2}} S_2 \right)$, by substituting S_2 into equation (10) we can maximise the net domestic product as follows:

$$\max DP = P_1 S_1 + P_2 \left(\frac{L}{a_{L_2}} - \frac{a_{L_1}}{a_{L_2}} S_1 \right) \quad (11)$$

where DP is net domestic product.

The slope of the previous function is:

$$\frac{\partial DP}{\partial S_1} = P_1 - P_2 \left(\frac{a_{L_1}}{a_{L_2}} \right) \quad (12)$$

Equation 12 can be written as follows when getting the value of the slope:

$\frac{P_1}{P_2} - \frac{a_{L_1}}{a_{L_2}} >,<,= 0$, i.e. positive, negative or zero

In the case of a positive value, we can conclude that the world price of the agricultural good is greater than the autarky price of the same good. The opposite is in the second case where the value is negative. For the positive value Egypt chooses a maximum $S_1 = \frac{L}{a_{L_1}}$ and so $S_2 = 0$ (producing the agricultural good). For the negative value Egypt chooses a minimum $S_1 = 0$ and $S_2 = \frac{L}{a_{L_2}}$(producing the manufactured good). Both previous cases demonstrate that Egypt will specialise in producing one good (this is content in a Ricardian model). However, if the value equals zero, Egypt can produce any output.

To demonstrate the superiority of trade, let us use the same numbers used in the autarky case.

Given $\max U = X_1 X_2$,

$MSR = \frac{X_2}{X_1}$,

$a_{L_1} = 3, a_{L_2} = 2, L = 300, P_1 = 2 and P_2 = 1$

Two steps will be carried out to solve the problem as stated:

The first step is that Egypt wants to maximise $2S_1 + S_2, s.t. 3S_1 + 2S_2 = 300$ (13)

$\frac{P_1}{P_2} = \frac{2}{1} > \frac{3}{2} = \frac{a_{L_1}}{a_{L_2}}$, Egypt should specialise in good 1 (the agricultural good) and so

$S_2 = 0$

$S_1 = \frac{L}{a_{L_1}} = \frac{300}{3} = 100$

National income = 2*100 + 1*0 = 200, this 200 (income) will be used to maximise the utility in the second step.

The second step is to $\max U = X_1 X_2 s.t. 2X_1 + X_2 = 200$ (14)

The equilibrium condition is : $MSR = \frac{X_2}{X_1} = \frac{P_1}{P_2} = \frac{2}{1} Or X_2 = 2X_1$ (15)

By substituting the equilibrium condition into the budget stated in equation (14)

$P_1 X_1 + P_2 X_2 = 200$, we get $2X_1 + X_2 = 200 \Rightarrow 4X_1 = 200 \Rightarrow X_1 = 50$

So, $X_2 = 2 * 50 = 100$

and $U = X_1 X_2 = 50 * 100 = 5000 > 3750$ and so U for Egypt when its economy is opened (trade) is greater than that when its economy is closed (no trade or autarky) proving the superiority of the trade solution.

As illustrated in numerical example above in Ricardian model, unless the slope of the net domestic product equals zero, any country (in our example Egypt) can specialise in one product. Also, this example illustrates the superiority of trade vs. autarky, confirming the existence of static gains from trade that grow out of the fact that countries are differently endowed with both natural and acquired resources. As a result, the opportunity cost of producing products will differ from country to country. “The static gains from trade are measured by the resource gains to be obtained by exporting to obtain imports more cheaply in terms of resources given up, compared to producing the goods oneself. Or, to put it another way, the static gains from trade are measured by the excess cost of import substitution; by what is saved by not producing the imported good domestically” (Thirlwall, 2000, 134). That is a well-known standard theory. In this respect Thirlwall (2000) states that the problem for many developing countries is that they are forced to specialise, under the aegis of free trade, in primary commodities which have both a low price and low income elasticity of demand. That means that prices can drop when supply increases, and demand grows only slowly with income growth. In addition, these primary commodities are subject to diminishing returns and a limit to employment set by the point where the marginal product of labour falls to the minimum subsistence wage (as stated earlier). Such problems do not arise in manufacturing.

Haberler (1964), among others, pointed out the following important beneficial effects that international trade can have on economic development:

(1) Trade can lead to full utilisation of otherwise under-employed domestic resources.

(2) By expanding the size of the market, trade makes possible division of labour and economies of scale.

(3) International trade is the vehicle for the transmission of new ideas, new technology, and new managerial and other skills.

(4) Trade also stimulates and facilitates the international flow of capital from developed to developing countries.

(5) The importation of new manufactured products can stimulate domestic demand until efficient domestic production of these goods becomes feasible.

(6) Trade stimulates greater efficiency by domestic producers to meet foreign competition. This is particularly important to keep low the cost and price of intermediate products used as inputs in the domestic production of other commodities.

From the normative (or welfare) perspective, given certain assumptions, not only is free trade pareto-superior to autarky but it is also pareto-efficient, being superior to various degrees of trade restrictions, as demonstrated for a small economy by Samuelson (1939). Samuelson’s model showed that world prices diverged from autarky prices. This referred to a move from autarky to either free trade or restricted trade. The more the prices (world and autarky) diverge, the greater the gains will be. An additional contribution in Samuelson (1962) was to extend the argument to the large country case by use of the “Baldwin envelope”. Baldwin (1948) indicates consumption possibilities for a country that can affect its terms of trade. The envelope will be outside the autarky frontier. We can reach the optimal point on the frontier for any given income distribution by application of the optimal tariff, and so the opportunity to trade makes a country better off in both cases (small economy and large economy).

Kemp (1962) followed up Samuelson's (1939) hypothesis that the trade gains are greater, the more prices deviate from autarky. He showed that restricted trade is better than no trade and the lower the tariff, the greater the potential gain from trade. He added that less restricted trade is superior to more restricted trade. In all cases, these are potential gains, not actual gains. Actual gains can be achieved if compensation actually takes place or if a social welfare function is introduced. We should notice that these articles made a number of assumptions, which are the absence of increasing returns, no distorting domestic taxes, no externalities, the feasibility of lump sum transfers, and flexible factor prices that ensure full employment of all factors.

Other studies discussed the issue of gains from trade, and debated the real cost versus opportunity cost approach. The opportunity cost theory (Haberler, 1950) emphasizes the valuation of alternative choices of goods, and the role such choices play in imputing values through the structure of production to the original factors.

The central proposition of the real cost theory of value is that there is at least a strong presumption of rough proportionality between market prices and real cost (Viner, 1955). Viner based his argument on the three different methods followed by the classical economists of dealing with the question of "gain" from trade. These methods are (1) the doctrine of comparative costs, under which economy in costs of obtaining a given income was the criterion of gain; (2) increase in income as a criterion of gain; and (3) terms of trade as an index of the international division and the trend of gain.

An earlier work of Viner gave vigorous support to the "real cost" theory of value of the English classical economists (Viner, 1937). Viner's (1937) version of the simple static model, representing the efficiency gains of international trade, shows that there is an improvement in income and welfare when countries engage in international trade.

The studies that followed Samuelson and Kemp depended on the removal of some key assumptions, and suggest that the basic orthodox message of gains from trade theory is nevertheless confirmed. Dixit and Norman (1980) examined the one-consumer case, many consumers, lump-sum transfers, and commodity taxes, and concluded that free trade can be better than or at least no worse than autarky.

Jones and Kenen (1984), however, found that the move from a free trade situation which yields a differential income distribution to one combined with redistribution so that, all losers from the move to free trade are fully compensated, in the absence of lump sum transfers, involves a cost which may be the effects of income taxes and subsidies.

Samuelson’s conjecture that trade gains are greater with increased price divergence between autarky and free trade, was upheld by Krueger and Sonnenschein (1967) for the multi-commodity case, but not for two goods only. They also showed that the improvement in the terms of trade does not necessarily lead to an increase in the gains from trade in a model with more than two goods. Terms of trade improvement can lead to a welfare decrease by using a three-commodity counter- example.

The gains from trade analysis took another direction with the work of Helpman and Razin (1978) who allowed for uncertainty. They concluded that although trade may generate uncertainty, and uncertainty may generate costs, it remains true that there are gains from trade, as trade introduces more opportunities than autarky.

The analysis of the gains from trade was extended to growing economies by Deardorff (1973) who showed that the opening of trade may reduce the steady state level of consumption per head, under a constant saving propensity. However, this does not negate the usual gains from trade propositions. Optimal fixed savings propensity is difficult to achieve and higher consumption in the earlier period may offset the lower consumption in the steady state as the steady state is approached.

Discussion of the gains from trade with increasing returns opened with Kemp (1962) whose crucial assumption was that the increasing returns are Marshallian, i.e. external to the firm and internal to the industry. He demonstrated that when industry 1 has increasing returns and industry 2 has constant returns, if the opening of trade leads to the extension of industry 1, the small country will gain from trade. Subsequent research, however, suggests that under the condition of increasing Marshallian returns in one industry and constant returns in the other where there is an externality (i.e. distortion), one country will lose from trade (Melvin, 1969) and in the case between a small country and a large country, in any case, the small country is more likely to be the loser (Markusen and Malvin, 1981).

In the 1980s and early 1990s the most important development in the field of the gains from trade was the literature on product differentiation, monopolistic competition and increasing returns. Markusen and Melvin (1982) attempted to develop a unified approach for the gains from trade in a model with economies of scale monopolistic competition. They concluded that there are some issues on which there may be gains or losses owing to prices not being equal to marginal costs. The other issue is the complications associated with the existence of economies of scale. Concerning the limitations of tariffs, some researchers have already determined the welfare gains under the effects of the reduction of tariffs.

Harris (1984) explained static gains from trade by focusing on the nature of market structure. With the presence of monopoly or oligopoly, static gains are higher. Under these structures of market and free trade, the firm will be exposed to foreign competition and consequently, will strengthen efficiency through the trade induced rationalization effect or a pro competitive effect. In contrast, inefficient firms will have no option but to exit the market. Oligopolists, in order to face high price elasticity of demand, are forced to decrease their prices and also to increase the volume of production, in an effort to compensate for the new low prices.

According to Dornbusch (1992), gains from liberalisation result from scale economies and economies of scope that arise in wider markets. Moreover, markets in protected economies are narrow and lack of competitors from the rest of the world fosters oligopoly and inefficiency. Protectionism can create market power for domestic firms, where under free trade there would be none.

The implication of the traditional trade theory is that the present distribution of factor endowments and technology between developed and developing countries, the developing countries should continue to specialise in producing and exporting raw materials, fuels, minerals, and food to developed countries, which in turn will export manufactured products to developing countries.

Salvatore (2004) pointed out that while in the short run the welfare will be maximised, developing countries see that they will be deprived of the dynamic benefits of industry and maximising their welfare in the end. As developing countries find the static gains from comparative advantage to be irrelevant to the development process, they will concentrate on the dynamic gains that result from industrial production. this means a more trained labour force, higher and more stable prices for the exports of the country, more innovations and technology and finally, as a result of these, higher income for people.

It is worth mentioning that real trade theory based on the classical ideas of Smith and Ricardo and much of conventional modern trade theory ignores the monetary or balance- of payments consequences of trade. In addition, these consequences were neglected by orthodox theory. However, the balance-of-payments consequences of trade are one of the most important reasons for supposing a strong link between exports and growth. According to Thirlwall (2000), if a particular pattern of trade leads to balance-of-payments difficulties, and the balance of payments is not self-correcting through relative price(i.e. real exchange rate) movements, the gains from trade can easily be offset by the reductions in output and the increase in unemployment necessary to compress imports.

This is an important consideration in thinking about the potential role of strategic protection and the speed of trade liberalisation (Thirlwall, 2000).

During the nineteenth century, international trade was considered as the engine of growth. According to Nurkse (1970), the export sector was the leading sector that pushed the economies like US, Canada, and South Africa into rapid growth and development. However, as Cairncross (1962) argued, today's developing countries can depend much less on trade for their growth and development. Most, except for the petroleum-producing countries, are much less well endowed with natural resources than the regions of recent settlement during the nineteenth century like the U.S and Canada. Also, today, most of the developing countries are overpopulated and so any increase in their output of food and raw material will be consumed domestically.

Developing countries, moreover, face an outflow of skilled labour rather than an inflow and they have neglected their agriculture sector in favour of more rapid industrialization, which is an obstacle to their exports and development prospects. Also we find that the international flow of capital to developing countries is much less than in the regions of recent settlement in the nineteenth century. However on the demand side the income elasticity of demand in developed countries is less than 1 for the exports of food and agricultural raw material of developing countries. Also, the development of synthetic substitutes reduces the demand for natural raw materials. Technological advances have reduced the raw material content of many products and the output of services, with raw material requirements, has grown faster than that of commodities in developed countries and these countries have imposed trade restrictions on many temperate exports of developing countries (Salvatore, 2004).

2.2.2. Dynamic Gains

Beyond the general benefit of exposure to an advanced, competitive world market, the act of trade liberalisation also carries the potential of dynamic benefits. In respect to dynamic gains, we should distinguish between two dynamic effects of trade: out of steady state and steady state. Within the neoclassical model of growth, out of steady state, the transitional dynamics growth could be analysed. In this respect Corden (1985) expressed the main idea which is that part of the permanent increase in income level achieved via the static gains from trade discussed above is saved and invested resulting in higher capital accumulation and a temporary increase in the growth rate per capita income reaching new steady state.

Endogenous growth models, where the determinants of steady state (long run) growth are explicitly modelled, provide further explanation to the nature of the relationship between trade and steady state growth. Among these determinants initial conditions represented by various measures of development level (such as output per capita, labour productivity, stocks of physical capital or stocks of human and knowledge capital), physical capital growth, labour force growth, fertility, population growth, labour supply, education: both investment in human capital (educational expenditures) or educational attainment, government consumption expenditures, Research and Development (R&D), barriers to trade….etc.

Francois and Shiells (1993) concentrated particularly on the relationship between trade and steady state growth rates. For example, in models of growth arising from R&D, growth will increase because there is an increase in the stock of knowledge and a continuous increase in the range of products produced resulting from the R&D. Trade can stimulate growth here in the case that economic integration motivates international diffusion of knowledgement. Another example is the case of models of endogenous growth arising from returns to specialisation, where growth occurs because the quality of specialized inputs increases. Trade acts to induce growth in two ways, either through import of inputs at low costs or through expansion of market size, if the domestic market is small compared with the scale of production of these inputs.

Endogenous growth theory helps more to study the link between exports and growth (see Grossman and Helpman, 1991a). According to Rebelo (1991) AK model, trading in intermediate goods increases productivity in R&D and hence growth rate due to the rises in the number of different intermediate goods from trade openness. However, according to Grossman and Helpman (1991a, ch.8), if knowledge spillovers are not perfect, i.e. poor country can not use all the knowledge available in industrialized countries, trade openness leads to divergence in growth paths (the endogenous growth models will be elaborated later with more details).

In Thirlwall's (2000) view, trade brings several dynamic benefits, among them that the broadening of the total market for a country's producers, by exports. If production is subject to increasing returns, export growth becomes a continual source of productivity growth. Increasing returns also contribute in the accumulation of capital. A small, non-trading country has very little scope for large-scale investment in advanced capital equipment; the small market inhibits specialisation. Trading, in contrast, opens up the possibility of industrialisation and moving away from traditional methods of production. Export markets allow the production of many goods that would otherwise not be economically viable. Other important dynamic benefits from trade include the stimulus to competition; the transfer of knowledge, ideas and technical know-how; the possibility of accompanying capital flows through foreign direct investment, and changes in attitudes and institutions. The "new" growth theory views such gains as forms of externalities, which prevent decline in the marginal product of physical capital. Thus, trade enhances the long-term national economic growth.

2.2.3 Tariff Losses

Salvatore (1987) estimated the welfare gains from free trade using trade models and assuming that the nation redistributes the tariff revenue fully to its citizens in the form of subsidized public consumption and/or general income tax relief, in order to illustrate the general equilibrium effects of a tariff. His analysis was based on general equilibrium and partial equilibrium analysis of a tariff for a small nation and a large nation which impose an import tariff, whether for either revenue or protection. Irrespective of the reasons for imposing tariffs, Salvatore concluded that protection cost or dead weight loss will appear due to inefficiencies, so in the end all nations usually lose as a result of the tariff. Therefore, free trade maximizes world welfare.

In his recent book, Salvatore (2004) emphasises that in the absence of trade, a nation's production possibility frontier is also its consumption frontier. However, with trade, each nation can specialize in producing the commodity of its comparative advantage and exchange part of its output with the other nation for the commodity of its comparative disadvantage. By so doing, both nations end up consuming more of both commodities than without trade. According to Salvatore, the gains from trade can be broken down into gains from exchange and gains from specialization in production.

Kenen (2000) used the supply and demand curves to illustrate the main effects of a tariff. The tariff reduces the quantity demanded by domestic consumers. However, it raises the quantity supplied by domestic producers. He showed that the result of this situation is a decrease in consumer surplus that exceeds the increase in producer surplus and the difference will measure the welfare cost of the tariff.

The following figure illustrates that free trade is a better alternative than trade with tariffs and also shows the loss from the trade with tariff (Kenen, 2000, 24).

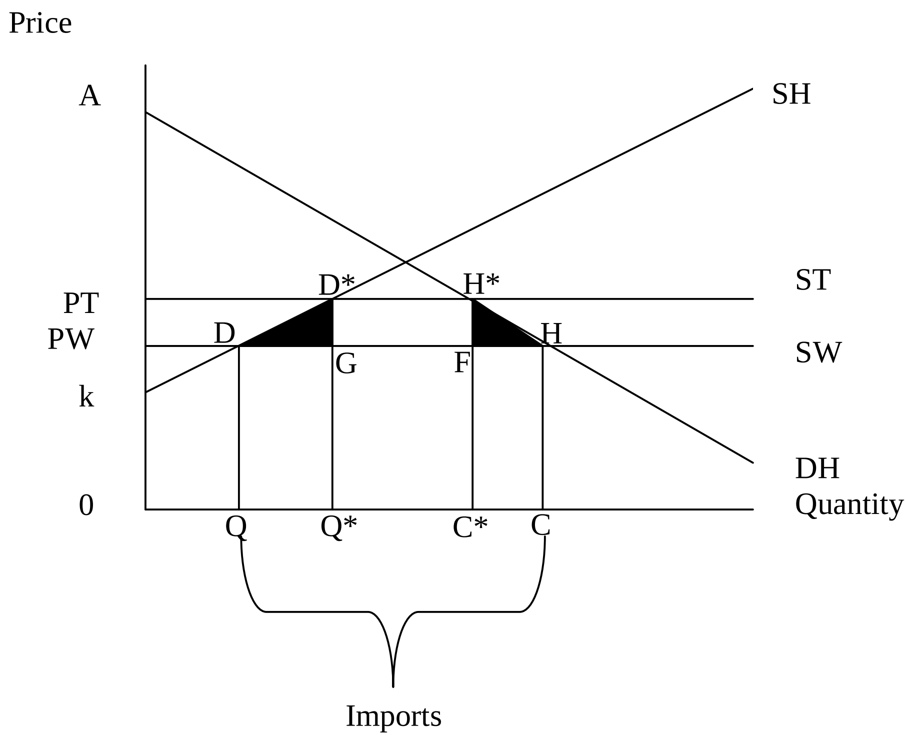

Figure 6: Loss from Trade Tariff

DH, SH and Sw are the demand and supply curves respectively. Domestic production is 0Q, domestic consumption is 0C and imports are QC. A tariff that adds Pw PT to the import price raises the domestic price to 0PT. Therefore it raises domestic production to 0Q* and reduces domestic consumption to 0C*. Imports fall to Q*C*. Producer surplus was kDPw and is kD*PT with tariff. Consumer surplus was PwHA and is PTH*A with the tariff. So producer surplus rises and consumer surplus falls. When the domestic price of the importable commodity rises by the full amount of the tariff, it measures the reduction in domestic consumption, increase in domestic production, reduction in imports, revenue collected, and redistribution of income from domestic consumers (fall in consumer surplus), who pay a higher price for the commodity to domestic producers (increase in producer surplus), who receive a higher price as a result of the tariff. So, a tariff leads to inefficiencies referred to as protection cost or dead weight loss (the two triangles FHH*, GDD*).

2.3. Trade and Economic Growth: The Neoclassical Theory

The neoclassical general equilibrium model was developed by Samuelson (1948, 1949) to explain how free trade results in every country specialising in the goods in which it has abundant factor(s) of production. It represents an extension of the work of Heckscher (1919) and Ohlin (1933), based on the Ricardian model of comparative advantage. Their logic is that, the products that utilise a country's abundant factor (s) of production should be exported and those that utilise its scarce factor (s) should be imported.

The original Heckscher-Ohlin model contains two countries, two commodities to be produced and two factors of production (labour and capital), unlike the Ricardian model, which used only one factor, labour. The most important assumptions of the H-O model are that the commodities have the same price everywhere and there are no barriers to trade, no imposing tariffs and no exchange controls and both countries produce both goods with or without trade.

They conclude that the exports of a capital-abundant country, usually developed, will be from capital-intensive industries and labour-abundant countries, usually developing, import such goods, in return, exporting labour intensive. The H-O model demonstrates the increase in aggregate efficiency when moving to free trade. Productive efficiency in each country will be improved because of shifts of production, while consumption efficiency will be improved, resulting from changes in prices. There will be an increase in national welfare for the two countries when moving to free trade, meaning that the gains to the winners (whose income increases from owning some production factors) exceed losses to the losers (whose income decreases) and so losers should be compensated by redistributing income from the winners to the losers before free trade occurs. In autarky, with an extra supply of a capital intensive good or labour intensive good, relative to the good of the other country, the prices of these goods will bid down.

Samuelson (1948, 1949), elaborating the H-O model, in his factor proportions model, called the Heckscher-Ohlin-Samuelson (H-O-S) model, added various considerations, like tariffs, to increase the predictive power of the H-O. Samuelson argued that the benefits of a tariff go to the relatively scarce resource, as the price of the scarce factor increases relative to the price of other factors or in terms of the price of any good. Samuelson added additional assumptions to the H-O model, for example, imposing a tariff does not alter the trade pattern, in that the export good remains the export good and the import good remains the import good, i.e. before and after imposing the tariff, the country produces both goods. Although the basis of H-O-S theory is that international trade can achieve static productivity efficiency and international competitiveness, it did not show the long run effect of free trade on economic growth, as did Ricardian theory. However, we can argue that international trade contributes to economic growth in the sense that the gains from trade (which is the theme of these models) lead to higher income, i.e. increasing in savings and investment.

2.4. Trade and Economic Growth: The Endogenous Growth Theory

The analysis of trade in the context of perfect competition according to the neoclassical trade theory gives an unrealistic simplification, as this model is unable to account for the presence of large start up costs, overhead costs, learning by doing or Research and Development (Brander, 1987). Thus, traditional competitive advantage analysis has been replaced by phenomena such as scale economies, learning by doing and technological change, phenomena central to the process of economic growth (Krugman, 1987, 1994). By allowing non-decreasing returns to knowledge and human capital, we can obtain endogenous growth. Endogenous means orginating on or growing within the side of something, like cells within the wall of the parent cell.

Further research tried to endogenise the growth rate after Solow's (1956) model, which considered growth as exogenous. The pioneers of the new theories of growth are Romer (1986), Lucas (1988), Romer (1990), Grossman and Helpman (1991a) and Barro and Sala-i-Martin (1995). Romer (1990) endougenously determined technological progress as the engine of economic growth. Lucas (1988) endogenously determined human capital accumulation to sustain growth. Jones and Manuelli (1990) developed another direction to obtain endogenous growth that is to abandon one of the standard assumptions of the neoclassical model, in particular, the assumption of diminishing returns to capital. Morrissey and Nelson (1998) suggested that the economic factors identified by endogenous growth theory: physical and human capital accumulation and technology that led to productivity growth are sufficient to explain the miracle of the East Asian countries.

Let us highlight the miracle of the gang of four, the East Asian countries, as the development of a number of endogenous growth models was stimulated by this experience. These countries achieved high rates of economic growth by promoting exports, producing a theoretical basis for the impact of international trade on growth. According to endogenous growth theory, there are four drivers of the impact of international trade on growth; physical capital accumulation, human capital accumulation, technological progress, and knowledge spillover.

2.4.1. Trade and Growth: Physical Capital Accumulation

Using the AK model (infinitely lived), Jones and Manuelli (1990) and Rebelo (1991a) studied international trade and growth. Jones and Manuelli's (1990) model equilibrium growth is convex on the technological side. Basing their analysis on taxation and international trade policies, they argued that tax and foreign trade policies represent a natural first step in the analysis of economic growth driven by physical capital. They suggested that as capital accumulation decisions are controlled by the after tax return rate, it is possible for the growth rates of two countries, having the same preferences and technology, to differ. The logic is simple; by considering two identical countries, a high-tax and a low-tax country, after one period, the low-tax country can be shown to accumulate more than the high-tax one and then this lower rate of accumulation translates, under some circumstances, into a lower growth rate (see Jones and Manuelli, 1990, 1011 for details).

They concluded that decreasing returns might be equivalent to constant returns and hence capable of sustaining long-run growth, given sufficient substitutability between reproducible capital and fixed factors of production.

On the other hand, despite the absence of increasing returns due to the existence of a "core" of capital goods that can be produced without the direct or indirect contribution of factors that cannot be accumulated like land, Rebelo (1991a) considered a model in which growth is endogenous. He proposed a two-sector model in which the increasing returns in the capital goods production are sufficient to overcome the growth-inhibiting effects of decreasing returns in the final output production. The production function is linear in the only input, capital. Hence, there are constant returns to scale and constant returns to capital,

$Y = F(K, L) = AK$, where A is an exogenous constant and K is aggregate capital broadly defined. Thus, K can include not only physical capital but also human capital as well as the stock of knowledge and even financial capital.

Although the Rebelo's paper did not resolve the issue of whether the type of increasing returns and externalities proposed by Romer (1986) is the key to understanding the growth process, it provides two reasons to re-evaluate the role these features play in growth models (Rebelo, 1991a, 519). First, increasing returns and externalities are not necessary to generate endogenous growth. That is because as long as there is a "core" of capital goods whose production does not involve non-reproducible factors, endogenous growth is compatible with production technologies exhibiting constant returns to scale (Rebelo, 1991a, 519). Second, despite the absence of externalities, there is a tendency for labour, but not capital, to migrate across countries in search for higher remuneration.

Overall, both studies concluded that trade policies (in the first study) and government policy, taxation (in the second study) affect growth rate through the effects of these policies on capital accumulation.

The two-sector AK model of Jones and Manuelli (1990) and Rebelo (1991a), with a capital sector and a consumption sector, was extended to an overlapping-generations model where a two-sector economy, with a consumer goods producer sector and an investment goods producer sector, is considered. According to Kebede (2002), individuals live for two periods, inherit nothing when born except being endowed with one unit of labour, and leave no bequest when dead. Only when young, each individual can work, save and consume, while they only consume when old. Assuming population and labour force to be constant over time, the overlapping-generations model emphasises that saving of the economy comes entirely from workers when they are young.

2.4.2. Trade and Growth: Human Capital Accumulation and Learning by Doing

This theory provides a theoretical basis for the positive relationship between international trade and long run economic growth and development. This theory assumes that lowering trade barriers will speed up the rate of economic growth and development in the long run. This is because lowering trade barriers, or we can say freer trade, will allow developing countries to absorb the technology of developed countries at a faster rate than with a lower degree of openness. Free trade will also increase the benefits that flow from research and development (R&D). Free trade will promote larger economies of scale in production, reduce price distortions and lead to a more efficient use of domestic resources across sectors.

Moreover, free trade will encourage greater specialisation and more efficiency in the production of intermediate inputs, and lead to the more rapid introduction of new products and services. Free trade also is beneficial for growth to the extent that it increases the total size of market and so the monopoly rents that can be appropriated by successful innovators. International knowledge spillovers will support the positive effect of free trade on growth through the fact that researchers in each economy can benefit from discoveries made in other economies. This will increase the incentive for individuals to engage in research rather than production activities and therefore motivate growth. In all of these ways, free trade can stimulate growth and development. Later, through empirical evidence, we will demonstrate these channels. This theory seeks to explain how endogenous technological change can create externalities that offset any propensity to diminishing returns to capital accumulation as assumed by neoclassical growth theory, which holds that diminishing returns appear when using more units of a variable input with fixed amounts of other inputs.

Romer (1986), following Arrow’s (1962) seminal work on the economics of learning by doing, used a competitive equilibrium model with endogenous technological change. He presented a model of long-run growth and assumed that knowledge is an input in production. His model departs from the Ramsey-Cass-Koopmans model (the basis for much of dynamic general equilibrium studies). It is a special case of the two-state variable model in which knowledge and capital are used in fixed proportions. Romer started the endogenous growth literature by considering a model with increasing returns to scale at the economy wide level, but constant returns to scale at the firm level. The model then supports a competitive equilibrium, but this equilibrium is non-optimal. A higher growth could be achieved if the externality associated with investment could be internalised.

Arrow's idea on the economics of learning by doing is that experience and increasing productivity are associated. He argued that a good measure of increase in experience is investment, because each new machine produced and put into use is capable of changing the environment in which production occurs, so that learning takes place with continuous stimuli and so Arrow then indexes experience by cumulative investment. Based on Knowledge as an input to production, Romer concluded that contrary to the model based on diminishing returns, growth rates can increase over time, the action of private agents can amplify the effects of small disturbances and large countries will always grow faster than small ones.

At this point, it would be useful to explain Ramsey-Cass-Koopmans model, since it is the basis for much dynamic general equilibrium work, as stated above. It is called the model of growth, and extends the basic Solow model by the introduction of consumers, formally represented by a single optimising agent, who provide labour to firms and consume output using the wages thereby earned.

Using endogenous growth models, Lucas (1988) considers three models; the first emphasises physical capital accumulation and technological change; the second, which has received the greatest attention, emphasises human capital accumulation through education and the third highlights specialised human capital accumulation through learning-by-doing (see Lucas ,1988 for details).

Using two-sector model of accidental learning by doing, Lucas (1988) demonstrates how human capital contributes to international trade and hence to growth. The model assumes that workers accumulate knowledge through their experience at work. Thus, while they do not choose firms with the conscious aim of learning or accumulating human capital, such accumulation of human capital occurs accidentally as a by-product of the skills and knowledge acquired during the course of their work. The model considers two consumption goods to be produced, C_1 and C_2 and one factor of production (labour), and assumes that consumers have homothetic preferences. Assuming a Ricardian type of technology in which the output of a good is determined by the efficiency of labour input, the production function of good (i) can be written as:

$$C_i(t) = h_i(t)\, u_i(t)\, N(t), \qquad i = 1, 2 \tag{2.1}$$

where h_i (t) denotes human capital experience accumulated in the production of good (i), $u_i(t)$ is the fraction of labour input allotted for the production of good (i) and N_i (t) represents the total workforce in the economy.

Assuming that human capital stock is a positive function of accumulated experience or the time devoted to producing good i, we can then write this relationship as:

$$\dot{h} = h_i(t)\delta_i u_i(t) \tag{2.2}$$

where δ_i denotes the positive coefficient of skill formation of the workers in sector i

Suppose that $\delta_1 > \delta_2$, i.e. sector 1 is the high-technology intensive good sector, while sector 2 is low-technology intensive good sector. Since the Ricardian type of technology is assumed, in which output of a good is proportional to the efficiency units of the labour factor (as stated), in the absence of physical capital, the marginal product of labour in sector i. in the case when both types of goods are produced, the production function given in (1) plus profit maximization implies that the price ratio is determined by human capital endowments.

In the context of a dynamic model for a closed economy to diversify between the two sectors, the two types of human capital should grow proportionally, i.e., $\delta_1 u_1(t) = \delta_2 u_2(t)$ (Kebede, 2002, 20). Note here, because of the endogeneity of the technological factor, the level of technology and consumption preference of the economy determine the autarkic relative price. The elasticity of substitution between the two goods determines the steady state situation for the price ratio. The steady state with diversification of producing both goods is unstable, if the two goods are close substitutes and a country tends to produce more of a good in which it is initially better. If, on the other hand, the two goods are poor substitutes, the steady state tends to be stable in producing both goods and hence the two sectors, ($\delta_1 u_1 = \delta_2 u_2$). The critical value of the elasticity of substitution is unity in the case when there are constant elasticity of substitution (CES) preferences.

Rather than depend on externalities, as in Romer, Lucas introduces human capital as the engine of economic growth in the production function. The production function of human capital, according to Lucas, is constant returns to scale in human capital, and thus the marginal product of human capital, which determines the incentive to spend time, is constant. In his developed human capital model, Lucas (1988) considered that constant returns to scale in the inputs that can be accumulated is obtained by arguing that all inputs can be accumulated. Lucas spells out the way in which human capital levels affect current production and the way in which the current time allocation affects human capital accumulation. According to Lucas's argument, we can say that to accumulate human capital is equivalent to withdraw effort from the production process in order to go to school. One of the most important characteristics of Lucas's human capital model is the dual role of human capital. There is an internal role, which is related to the effect of an individual's human capital on his or her own productivity, and an external role, related to the productivity of all factors of production.

Let N_t be the number of workers, their average quality measure is h_t and the fraction of working hours spent on producing goods is d. To produce output Y_t, we use dh_tN_t which is the total effective work force. According to Lucas's (1988) model, the output, Y_t, depends on:

1- Physical capital stock, C_t,

2- The total effective workforce, dh_tN_t, and the average skill level of human capital, h_s, and so,

$$Y_t = A_t C_t^{\alpha} (dh_t N_t)^{1-\alpha} h_s^{\beta} \tag{2.3}$$

where A_t, which is assumed to be constant, represents the technology level. The externalities from average human capital are represented by h_s^{β}.

In case of equilibrium, it is assumed that all workers have the same skill level, which means $h_t = h_s$

So,

$$Y_t = A_t C_t^{\alpha} (dN_t)^{1-\alpha} h_t^{1+\beta-\alpha} \tag{2.4}$$

From (2.4), we get the returns to scale: $(2 + \beta - \alpha) > (2 - \alpha) > 1$

According to Lucas's (1988) model, the increasing returns to scale due to externalities from average human capital represent the force driving a country's sustained positive economic growth rate, which depends on the value of β. Lucas (1988), for simplicity, assumes that the workers use a fraction *d* of their non-leisure time in current production and the remaining 1-*d* is devoted to human capital accumulation and so,

$$\frac{\Delta h_i}{h_i} = \delta_i d_i \qquad (2.5)$$

where δ_i denotes the positive coefficient of skill formation of the workers in sector i. In the sector producing high-technology goods, such skill-formation is greater.

It is worth notable that the theory of endogenous growth, based on the above models of Romer 1986 and Lucas, 1988, emphasises that long run growth rates are not pinned by forever diminishing capital productivity and can be affected by government policy.

Human capital and physical capital are combined together in a broad measure which is the Lucas-Uzawa approach. The Lucas-Usawa model of endogenous growth represents the combined work of Lucas (1988) and Uzawa (1965). Uzawa's (1965) model determines the evolution of technology by the resource allocation between a research sector and a final goods sector. As an endogenous growth model, Lucas-Uzawa model, compared to the Ramsey model, induces a much larger set of conditions of optimality as it is a two sector model with two controls and two state variables. Also, as an endogenous growth model, the Lucas-Uzawa model has the property of indeterminacy in the levels of the long run variables, causing problems for the literature that deals with this model.

In the Lucas-Uzawa model, learning in the process of the education enhances human capital; therefore this model concludes that the long run growth rate relies solely upon the resource allocation to education activities. It is assumed that, in the context of the Lucas-Uzawa model, human capital alone will be used by the education sector, resulting in the conclusion that long-term growth will be promoted by a higher devotion of human capital to education. As a result, this specification of human capital formation facilitates equilibrium dynamics analytical investigation, providing clear results regarding the transitional and balanced growth effects of various policy experiments (see Barro and Sala-i- Martin, 1995, ch.5 for details).

It is noted that in the Lucas-Uzawa model, when the physical to human capital stocks ratio is initially below or above the corresponding long run value, the imbalance effect is quickly reduced to the transition dynamics of the model. A few studies have tried to clarify this point theoretically. Some relevant aspects of the relationship between human capital accumulation and long run growth failed to be captured by the Lucas-Uzawa model. In particular, the association of a higher long run growth rate with a higher fraction of human capital devoted to education, as concluded by the Lucas-Uzawa model, does not fit the reality in many advanced countries. According to Pritchett (2001), there is no association between increases in labour efficiency promoting human capital accumulation with the growth rate in many advanced countries. He found that despite the continuous increase in participation rate in higher education and the expansion in the average number of years of schooling, long run growth was not accelerated and so, when using the Lucas-Uzawa model to investigate the relationship between human capital and growth in education, in particular, we have to modify the mechanics of human capital accumulation assumed in this model.

In his work in 1993, Lucas extended his 1988 work to examine the influence of international trade on productivity in small economies. He began by asking what current economic theory has to say about the growth miracles of East Asia, and argued that economic growth theory alone does not explain the East Asian miracle. He relied on another explanation for the growth of these countries, which is based on the theory of learning by doing. This theory proposes an important mechanism to connect between trade and growth, suggesting that these high rates of growth are due to the interaction between learning by doing, with spillover effects on old to new goods, and increased openness of these countries. Lucas (1993) argued that the human capital accumulation-of knowledge- represents the main engine of growth and the differences in human capital are the main source of differences in standards of living among nations. He concluded that in autarky, every country will entirely specialize in a commodity in which it has comparative advantage. When this country follows free trade as a policy, it accumulates the human capital that is distinct for the kind of commodity it produces.

According to Kebede (2002), the above model of Lucas has some policy implications, as under autarky before opening to trade, it is assumed that the country shows a short run comparative advantage in the low-technology intensive good and when opening up (outward oriented policy) this good will be exported and will then be completely specialized in. At the beginning, the country has to pursue restrictive trade measures and then can adopt a free trade policy after achieving a comparative advantage in a good that tends to grow faster. We can say that this country becomes one that has long-run comparative advantage in the high-technology intensive good. Learning by doing emphasises that only countries with initial comparative advantage in sectors with significant learning by doing will benefit from free trade.

The view is that an outward orientation can shift production from less to more sophisticated products by stimulating production of a mix of output different from the mix which was consumed at home (domestically) and so there will be a continuous increase in productivity growth which later leads to a high rate of economic growth. From this we can conclude that an inward-oriented development strategy, import-substitution, to satisfy domestic demand cannot produce high rates of growth, as the mix of goods consumed tends to change slowly and so provides little focus for learning by doing.

In this respect, Young (1991) states that if learning by doing with spillover effects results in unbounded growth, the effect of trade on growth will depend on whether static comparative advantage causes the economy to specialise in goods in which it has mostly exhausted learning by doing or in goods in which learning by doing still takes place.

Young's (1991) argument, in some detail, is that trade liberalisation between developed and less developed countries(LDCs) may inhibit learning by doing and therefore, the growth of knowledge in general in LDCs. Free trade could induce LDCs to specialize in product lines in which the potential for learning has been exhausted. His model of bounded learning by doing is an essentially Ricardian model of international trade, in which trade is driven by differences in technology rather than those in factor endowments. This model allows a particularly clear analysis of the effects of international trade on economic growth and welfare.

While the models of both Romer (1986) and Lucas (1988) provide a conclusion that the large countries grow faster than the poorer ones and acknowledge a close correlation between trade and growth, Chuang (1998) argued that they failed to explain how, by opening trade, developing or less developed poor countries could grow rapidly and narrow the gap with developed ones. To address the real growth effect of trade, Chuang (1998) tried to fill the gap by presenting a growth theory of trade-induced learning, based on Young's (1991) model of bounded learning. A development strategy for a less developed country to narrow the gap with the developed one has been presented by Chuang (1998). He emphasised that the model of growth through trade-induced learning by doing essentially needs two conditions (other things being equal). The first one is that both export and import represent important sources and are mutually reinforced in intensifying the learning process (Chuang, 1998, 698). The second condition is connected to trade openness, arguing that it is insufficient for rapid growth. Rather, to determine trade-induced technology spillover and hence affect growth, the trading partner represents the key factor as it determines the technology from which any country can learn. He therefore concluded that trade can affect developing countries' growth by trade-induced and technology-driven mechanisms.

Ventura (1994) discussed the "Asian miracle," arguing that international trade plays a basic role by allowing the East Asian countries to convert the excess production of capital intensive goods into exports instead of falling prices. This approach explains the role of trade, which enables these countries to challenge diminishing returns to capital and therefore to sustain such high rates of growth. As an extension of the previous work and by combining what Ventura (1997) called a weak form of the factor-price-equalisation theorem of international trade with the Ramsey model of economic growth, a model is specified to overcome the influence of the law of diminishing returns in the growth rate. This model can explain the persistent high growth rates and undiminished returns to capital, which are the two salient features of the East Asian growth experience.

Ventura (1997) shows the possibility for explaining the facts the conditional convergence, finding that, after controlling for education and government policies, poor countries tend to grow faster than rich ones, which potentially explains the miracle of the East Asian countries. Ventura indicates that human capital accumulation represents a source of economic growth and as the capital stock grows, it does not lead to the production of the same goods with more capital- intensive methods (as would happen in autarky) but brings about structural transformation that entails the movement of resources from labour-intensive to capital-intensive industries. This means that there will be an excess in demand for capital. International trade will convert the excess production of capital-intensive goods into exports, averting a fall in prices. In this case, diminishing returns apply to the world economy and not individual countries. Another implication concerns the conditional convergence where returns to capital are higher in countries with low capital stocks.

The conditional convergence hypothesis states that if countries possess the same population growth rates and technological possibilities, but differ in savings propensities and initial capital-labour ratio, then there should still be convergence to the same growth rate, but not necessarily in the same capital-labour ratio as in absolute convergence. The idea is that, in a given time, when economies trade and some form of factor price equalisation holds, investment is equally productive in each of the integrated economies, and the growth rate in each economy is determined by its rate of investment. Ventura pointed out that investment rates may increase or decrease with the stock of capital and so diminishing returns do not have to be associated with conditional convergence. He therefore concluded that conditional convergence does not necessarily provide evidence against endogenous growth models in which long run growth is driven by capital accumulation. The model shows that, depending on other factors such as labour force growth and technological change, the returns to capital can increase or decease.

Aghion and Howitt (1998) discussed the argument of Ventura in more detail. They argued that under autarky, as capital is used intensively, accumulating capital will lead to a fall in its marginal product. They stated that in a small open economy, the world's capital stock will determine this marginal product of capital, because this economy can export goods at prices that world conditions give. They went on to assert that as capital is accumulated by a country, it could shift into more capital-intensive export sectors. This means that a small open economy can avoid diminishing returns. This idea was used by Ventura (1997) to explain the rapid growth of East Asia, arguing that why the East Asian countries were able to grow through accumulating large amounts of capital without facing a large fall in the marginal product of capital.

2.4.3. Trade and Growth: Technological Progress

Other literature focuses on the channels through which free trade leads to faster growth. According to this literature, trade increases innovation through economies of scale, technological spillovers, and elimination of the replication of research and development (R&D) in different countries. It is known that basic forms in which technological progress takes place are innovation of new goods, improved factor productivity, and development of goods with better quality.

The importance of investment in technology as a means of reaping economic returns is consistent with the assumption on international trade and economic growth. Suppose we have two countries with identical technology and in a steady state growth situation. Also, assume that international trade occurs in two different conditions. The first is where there is no knowledge spillover, where trade is assumed to occur in goods only. The second condition is where there is perfect knowledge spillover, where trade occurs in ideas. The knowledge driven model, as advocated by Grossman and Helpman (1991a), supposes that the economic growth rate is determined by the new products innovation growth rate that in turn is determined by both the prevailing knowledge base and the scale of employment in the R&D sector (see Kebede, 2002 for details).

Consequently, we can say that the economic growth rate is determined by the prevailing knowledge or by labour force allocated to R&D sector. When there is no knowledge spillover, i.e. there is no trade in ideas, the prevailing knowledge base for every country remains unchanged. Economic growth, in this case, increases due to the increase in the labour force allocated to the R&D sector generating new ideas. Let us assume two cases, either the presence of free trade or the absence of free trade. In the absence of free trade, we find that the amount of machinery and equipment (capital goods) employed by the manufacturing sector must equal the amount produced domestically. When free trade prevails, the amount of capital goods employed approaches twice the amount used in the absence of free trade. As a result, in the long run, in the two countries, researchers will specialise in, thereby, avoiding the duplication of innovated goods, leading to the world stock of capital goods being doubled, raising the marginal productivity of human capital in manufacturing sector will specialise different types of designs in. In addition, when free trade prevails, the size of the market for newly developed products is twice as large as is was before free trade. Therefore, the price of patents and the return to investment in human capital will double as well. Because of doubling the returns of human capital in manufacturing and R&D sectors, free trade in goods does not affect the scale of employment and so the balanced growth rate of the economy will not be affected when free trade prevails.

The two countries experience higher growth rates when free trade in ideas prevails. The idea is, in relation to trade in ideas, that the total worldwide stock of ideas determines R&D activities. If the ideas are nonintersecting in the two trading countries, then when free trade prevails the stock of knowledge the R&D sector can use will be doubled by knowledge spillover. As a result, without affecting the productivity of human capital in manufacturing sector, the marginal productivity of human capital in the R&D sector increases due to the availability of more ideas in the research sector. Firms will shift more human capital from the manufacturing sector because of the increase in the profitability of the R&D sector (see Rivera-Batiz and Romer, 1991 for details). Let us begin with knowledge driven models. In these, the growth rate of any country is determined by the growth of innovation of new products which in turn is determined by both the base of prevailing knowledge and the R&D sector labour force.

Using the augmented one-sector neoclassical model with technological change, Romer (1990) finds an endogenous explanation of the source of the technological change model. According to Romer (1990), growth is driven by technological change arising from intentional investment decisions made by profit-maximising agents. The key premises in considering the importance of technological change in Romer's model are:

- Technological change, improved methods for using inputs to produce output, is central to economic growth,
- Technological change is not an exogenous process; however, choices of economic actors are reflected. Moreover, these actors (inventors) respond to market incentives and they are not social planners whose objective is to maximise social welfare. To sum up, the process which generates technological change should resemble, in a general sense, the process which produces other goods,
- There is no additional cost for using, repeatedly, improved methods in production characterising technological change.

The basic inputs of Romer's model are capital, labour, human capital, and an index of technology level. The measure of capital is units of consumption goods. Labour services L are skills such as eye-hand coordination available from a healthy physical body (Romer, 1990, S79); they are measured by counts of people. Human capital is a measure of the cumulative effect of formal education and on-the-job training. The production function is an extension of the Cobb-Douglas production function: $Y(H_Y, L, x) = H_Y^{\alpha} L^{\beta} \sum_{i=1}^{\infty} x_i^{1-\alpha-\beta}$ The only difference here from usual production function is its assumption about the degree to which different types of capital goods are substitutes for each other (see Romer, 1990, S81 for details).

The conclusion of Romer's model is that, to promote countries' economic growth, policies should:

1- Encourage investment in new research.
2- Subsidise the accumulation of total human capital.

Romer (1990) finds several interesting implications:

1- that open trade may be supportive of growth and technological development;
2- that an economy with a larger total stock of human capital will experience faster growth and so this suggests that free trade can act to speed up growth;
3- That low levels of human capital can help in explaining why a less developed economy with a very large population may still benefit from economic integration with the world economy, while the closed economies do not experience any growth.

According to Grossman and Helpman (1989), innovation of new products is a positive function of past innovations, which represent the stock of knowledge. International trade provides access to a large international market, to advanced technology, and therefore, to a larger stock of knowledge, leading to more innovations and faster growth. This implies that a country benefits from free trade with large economies and an advanced stock of knowledge, assuming that technological spillovers are absorbed to the same degree across countries. However, Grossman and Helpman (1990) show that free trade may sometimes shift labour from research into production and so this will slow down technical change.

Allowing for tariff imposition, Grossman and Helpman (1990) employed the same model as Romer (1990). They considered a two-country world. Supposing the first country has newly developed goods (R&D activity), they argued that if the second country imposed a tariff (import restriction for the second country and export barrier for the first one), a shift of labour to the R&D sector would occur in the second country, leading to an increase in the second country's growth. Grossman and Helpman (1990) emphasised, through their model, that the rate of growth could be enhanced by trade restrictions, under certain conditions, and the trade policy can affect growth through its effect on the amount of human capital devoted to the activity of R&D.

In chapter 8 of the work of Grossman and Helpman (1991a), a model of trade, where they permit knowledge spillover, is developed to study the determinants of patterns of specialisation and trade in a world economy with national spillovers of technical knowledge. They assumed that two trading countries, A and B, produce a homogenous product and a variety of horizontally differentiated goods. Labour is used as a single factor of production. New designs and equipment must be developed in the research lab before manufacturing begins. It is assumed that one unit of labour can be used to produce one unit of a traditional good or one unit of a high-technology product, or to expand the set of producible variations by the stock of knowledge capital per unit time (Grossman and Helpman, 1991a, 208). The traditional good is manufactured where production cost is lowest. The model equates each country’s stock of knowledge with its research activities. It also envisages different steady state equilibria. In the first condition, where country A has a larger share of the high-technology goods market and producing traditional goods costs the same in both countries, it is assumed that R&D activity is confined to country A, and both countries produce traditional goods. The second steady-state condition is where one country specialises in R&D while the other is focusing on the production of traditional goods. For this pattern, producing traditional goods should be cheaper or at least no dearer in country B than or equal to the cost of production in country A.

Grossman and Helpman (1991a) concluded that a prominent role in deciding the long-run outcomes is played by history. They assumed that the country that begins with accumulation of knowledge widens its productivity over time then becomes an exporter of new technology goods. They argue that the exceptions to this rule are when the country is much larger than its trading partner is or when there is government intervention regarding the research lab.

Following the previous literature, including Grossman and Helpman (1991a), some effects of trade can be deduced. The first is resource allocation, as when there is trade; the movement of resources from one sector to another is determined by static comparative advantage. The trade can stimulate the economic growth if the effect of this movement is to direct resources to growth-enhancing sectors. In the context of Grossman and Helpman (1991a), a country with weak human capital endowments will experience a fall in rewards to skilled labour and under-funding of R&D and consequently, this will affect economic growth. However, Grossman and Helpman show that good human capital endowments may decrease the growth rate as there will be an increase in skilled wages. As a result, we can conclude that international trade is able to enhance economic growth only to the extent that R&D is more closely associated with exporting sector than with import-competing sector. The expansion of market size, as a result of a country opening up trade, can increase the returns to the R&D sector by, for example, providing imports required for investment in the R&D sector at lower costs. Also, when trade prevails, countries can avoid engaging in the same type of innovative activities, which would lead to duplication by developing identical products.

2.4.4. Trade and Growth: Knowledge Spillover

Free trade may increase the degree of product market competition that is considered as detrimental to growth. This effect of competition relates to the issue of imitation, where introduction of new products (as a form of technological innovation) plays an important role. The adoption of new technology by other firms does not necessarily affect the original user of the new technology. However, if that technology is highly sophisticated and facilitates improved knowledge, productivity, or product quality, the originating firm will wish to be the sole user of the technology and will try to prevent rivals from adopting it; meanwhile the latter will be striving to imitate. This imitation process is a means of what is called technological transmission. Here, it is worth highlighting to the analysis of knowledge spillover across countries, assuming perfect domestic protection of new technology. Open economies have wider access to the global stock of knowledge, which is a driving force for sustained, long-run growth. In the analysis of knowledge spillover, two basic issues come to light: (1) costs of imitating of technology by developing countries and (2) the relevant features of the product-cycle hypothesis.

The product-cycle hypothesis provides a detailed explanation of how new products are invented and produced in high-income countries, and production subsequently shifts to countries where labour is cheaper. The significance of imitation and innovation processes in determining the pattern of trade between countries was first pointed out by

Posner (1961), who showed the impact of technological innovation on industrial competitiveness. The speed of technology adoption depends on the relative cost of imitation, which in turn depends on the available resources (human capital). The role of imitation and innovation in the process of development, and the factors that determine these processes, were subsequently discussed by Vernon (1966).

Vernon’s (1966) product-cycle theory of international trade was based on the idea that the North (developed countries) produce products first and after that, production is relocated to South (developing countries). Vernon (1966) began with the assumption that there is equal access to scientific knowledge in all advanced countries. However, he found it was a great mistake to assume an equal probability of applying this knowledge to generate new products. He assumed that, because of large markets and proximity to the developed countries’ market, new ideas emerge from the United States (U.S) and newly developed goods are innovated in the U.S as well. Then European and developing countries imitate these goods and the firms of the U.S abroad represent the main channel to transfer technology from U.S to other countries. Vernon (1966) argued that at the early stages of a product’s cycle, it needed to be close to markets; once it becomes standardised it can be produced away from the main markets of developed countries.

To provide some insights into neglected aspects of the international economy, Krugman (1979) formalised this product-cycle theory in a model in which both the rates of innovation in the North and imitation in the South are exogenous. A formal model was constructed of the product cycle where there is a continuous introduction of new products in developed countries. Krugman developed a simple general equilibrium model of product cycle trade. His model is different from the Ricardian or Heckscher-Ohlin models. Krugman’s model assumes two countries, innovating North and non innovating South. Innovation (technical progress) here means development of new products instead of increased productivity in the manufacture of old products. At first, North produces the new products and then the technology of production becomes available to South via export of new products to South from North (transfer of technology).

Once South imitates these new developed products, they become old goods. In this model, it is assumed that there is a continuous process of technological change and product innovation determines the patterns of trade. Krugman's model captures two major implications for economic policy for less developed countries. The first is the lack of knowledge about the factors that determine the rate at which technology imitation occurs. Second, the effects of borrowing or imitating technology are not encouraging, Krugman assumes that protection of the new technology of advanced countries could be a defence, as the success of less developed countries in accelerating their imitation and adoption of advanced countries' new technology can leave workers in developed countries worse off. However, slow imitation by less developed countries and faster innovation by the advanced countries means a larger income for developed countries.

Dollar (1986) constructed a highly stylised and in some respects unrealistic dynamic general equilibrium model of North-South trade. He tried to combine the product cycle approach of Vernon (1966) and Krugman (1979) with factor-price equalisation captured by the neoclassical trade model. The assumptions of Dollar's model are, as Krugman's that there is a continuous introduction of new products in developed countries (North). He assumes that the transfer rate is positively related to differences in costs of production in the North and South. Also, he added capital, besides labour, as a second factor of production and assumed that over time, the movement of capital between regions occurs slowly. In this model, imitation is an increasing function of the North-South wage gap, reflecting the monopoly on innovation by the developed countries. The main insights of the model are that for prices and terms of trade to be stable, the ratio of the number of goods produced in each region must be stable. Dollar's model concludes that the pattern of trade remains the same all over the world economy, where the North (developed countries) always innovates and produces new goods, whereas the South (less developed countries) specialises in old goods.

Young (1991) addressed the case of national spillovers of technological knowledge by the bounded learning by doing model. With national knowledge spillovers, the pattern of comparative advantage becomes endogenous at any one point in time, and relies on initial conditions. Simultaneously, this pattern plays an important role in determining the rate of technological progress at any one point in time as well. According to comparative advantage, a less developed country (LDC) which begins with a lower level of technological knowledge will specialize in unsophisticated goods with less potential for learning by doing. This results in a reduction in the rate of economic growth of this LDC. This reduction might translate into dynamic welfare losses from trade.

On the contrary, the developed country with which there is a trade, enjoys an increased rate of growth and dynamic welfare gains, which augment the standard static benefits from the exploitation of comparative advantage. Young's work investigates the dynamic effects of international trade on growth. He indicates that under free trade, less developed countries experience lower technical progress and growth rates less than those enjoyed under autarky do. He argues that if the labour force of developed countries is greater than that of the less developed countries, the technological gap between the two economies will increase without bound. He also suggests, but does not confirm, that if a set of countries with small populations enter the free trade era with a slight technical lead over the less developed countries like the East Asian they will be driven into concentrating all of their production in goods in which they experience rapid learning by doing. While the less developed countries remain in industries, in which they have already exhausted learning by doing (Young, 1991, 403).

It becomes evident that whether the sources of growth are the accumulation of traditional factors of production or technical process- in the new growth theory- trade policy can have a direct and deep impact on economic growth. The basic argument is based on the role of trade in changing the existing market conditions within which the various economic devices operate, providing motivations to collect production factors and act as drivers to technical progress, which is the source of long run growth in both the neoclassical theory of growth and the new growth theory (Francois and Shiells, 1993).

We end this section with reference to Fine's (2000) critical assessment of endogenous growth theory, which carries an obvious lesson: boost whatever economic activities are the carriers of advances in knowledge application, however, if it is not known which economic activities are the carriers of true advances in knowledge application, then boost all forms of investment to generate higher productivity according to the market return rate. Fine (2000) confirms the ability of the endogenous growth theory to explain some basic facts about growth which could not be explained by the orthodox growth theory, such as patterns of convergence and divergence. He also acknowledges its extraordinary evolution in accommodating endogenous productivity, monopoly, money and finance, the patterns of growth and cycles, and its ability to move into the fields of social sciences such as geography and environment. Nevertheless, he argues, endogenous growth theory has some shortcomings.

Fine (2000) argues that although endogenous growth theory aims to explain macroeconomic issues; it is based on micro foundations. For a partial theory, too much macroeconomic understanding is claimed using endogenous growth theory. Moreover, this theory has not reached any policy consensus and even where it has policy implications, they are not applicable in practice. Also, as endogenous growth theory is based on the microeconomics of market imperfections and technical change, Fine argues that this theory has been growing quickly and has extending its potential scope. As a result, the content of endogenous growth theory is arbitrary, due to the analytical strategy of generating endogeneity. Another shortcoming is that the studies based on this theory depart from assumptions and basic descriptive narrative as a result of highly sophisticated mathematics and statistics.

2.5. Strategic Trade Policy for Developing Countries:

Assuming perfectly competitive markets, free trade is usually the optimal policy for producers and consumers in all countries and any interventionist policies tend to distort relative prices and consequently induce a resource misallocation. A challenge to the concept of free trade was posed by the appearance of the theory of strategic trade policy, putting forward a possible new paradigm in international trade.

The main claim of this theory is that a significant share of international trade occurs in an imperfectly competitive environment. Therefore, strategic interactions among participating firms become relevant. Consequently, oligopoly theory, as an underlying concept, is required to describe these strategic interactions. Moreover, the government is viewed as an important actor in this regard, possessing the ability to alter these interactions in favour of domestic firms, and possibly in favour of domestic consumers. In other words, government interventionist trade policies by tariff, export subsidies, quotas, etc., through their effects on firms' strategic behaviour and exercise of market power, affects the prices at which a country's goods are sold on international markets. And shift profits from foreign to domestic firms, increasing growth rates and securing social welfare through improving domestic terms of trade, shifting profits to domestic firms, increased tariff revenue, increased consumer surplus, etc.

However, it is important to design the optimal strategic trade policy, taking into consideration the details of market structure and market conduct, which necessitates information for policy makers. Traditionally, situations of market failures, especially in capital markets and dynamic economies of scale, have sanctified temporary departure from free trade and infant industry protection-a form of strategic trade policy- by conventional trade policy tools of tariffs, quotas and subsidies. Recently, it is situations of market imperfections in the form of product differentiation, oligopoly, the existence of barriers to entry and the high cost of obtaining information about technology and markets that called for active intervention in the form of strategic trade policy and industrial targeting as the optimal alternative to a neutral trade policy regime (Elshinawy, 1998; Agosin, 1993).

Several situations have been identified by the strategic trade policy literature, which may be relevant to developing countries in which departure from free trade is advocated. However, whilst providing strong motivation for active government intervention, basically in the form of industrial targeting, the literature does not provide a clear cut criterion for the implementation of such policy, in terms of choosing sectors or picking winners (El Shinawy, 1998).

According to El Shinawy (1998), a case for strategic trade policy arises due to the presence of economies of scale in some sectors where marginal cost, essentially, declines as output increases. Applying what is called an import substitution for export promotion policy involves allowing a stage of IS where temporary protective barriers are permitted. This policy enables firms to expand their production in the domestic market, decrease costs and eventually export at a later stage, enjoying higher profit levels.

Import substitution for export promotion can also be applied to cases involving learning by doing, in what is called protection for export promotion. According to Brander (1987), protection of domestic firms in the domestic market enables them to produce more and acquire know-how more quickly. Consequently, they will develop competitiveness in the international export markets. In this case, exporting is the key focus objective of trade policy.

Another situation shown by Agosin (1993) is the situation of the presence of imperfect competition and product differentiation markets, which is very applicable to developing countries and represents a motivation to supervene in strategic trade policy. In this respect, it is important to state the reasons for product differentiation. It is due to differences in the design of the product, quality, and brand name and to a certain extent of agricultural goods, such as out of season fruits and vegetables. These activities result in spillover effects in the form of establishing new markets and reputation. Governments can best accomplish this, as they are able to identify the sectors that possess these advantages and can pursue export promotion.

Grossman (1987) stated that the major difficulty might be the amount and quality of information needed, in order to implement successful targeting. This results in costly mistakes, as insufficient information can lead to the targeting of an industry and its expansion at the expense of other equally profitable industries.

Brander and Spencer (1987) argue that the best sectors to be selected for strategic trade policy are those that possess a natural cost advantage represented in cheap raw material or primary input such as skilled or unskilled labour. These sectors enjoy a location advantage plus the existence of static or dynamic economies of scale. The above analysis reveals that the most outcome of an outward oriented regime can be achieved through an active government interventionist policy.

2.6. Concluding Remarks:

This chapter reviewed some important theoretical literature dealing with the relationship between free trade and growth, which is a highly debated topic in the growth and development literature and in international trade theory as well. The theory of international trade, the normative view, examined the static gains from trade and losses from trade restrictions. Free trade is asserted by the new trade theory to be better than intervention. The new trade theory makes it clear that the gains from trade can arise from many basic sources, such as differences in comparative advantage and increasing returns. New trade theories have posed a major theoretical challenge.

The assumptions of neoclassical trade theory are perfect competition, perfect information, complete markets and no externalities. Overall, international trade theory provides little guidance as to the effects of foreign trade, especially free trade policy, on economic growth. Many theoretical models, such as the comparative advantage model of Ricardo, representing the classical growth view, as discussed earlier, concentrated on the gains from international trade, especially static gains, and did not examine the impact on growth as well. Moreover, it is worth mentioning that the trade theories based on the classical ideas of Smith and Ricardo, such as real trade theory, ignore the monetary or balance of trade payments consequences, despite the strong role such consequences play in linking exports and growth. It is worth noting that the relationship between trade policies and growth has been given attention rather than the relationship between trade volume (restrictions) and economic growth in the theoretical growth literature. At best, a very complex relationship between trade restrictions and growth was suggested by theoretical growth theory (for endogenous growth literature, see Grossman and Helpman, 1990 and Romer, 1990).

Both Romer (1990) and Grossman and Helpman (1990) provide different models demonstrating that trade restrictions can decrease or increase the rate of growth. We will use tariff (import restrictions), export duties and tariff of trading partners to investigate the above relationship, while considering trade barriers. The analysis of trade in the context of perfect competition, given by the neoclassical trade theory, is unrealistically simplified and cannot account for the presence of overhead costs, learning by doing or R&D. For this reason, phenomena such as scale economies, learning by doing and technological change replaced the traditional competitive advantage. These phenomena are central to the process of economic growth. The importance of endogenous growth models is due to their successful isolation of the economic growth determinants. Besides, some endogenous growth models such as Romer (1986) and Lucas (1988) give a role for government policy and emphasise that long-run growth rates can be affected by government policy.

According to endogenous growth theory, there are four drivers of the impact of trade on growth. These drivers are physical capital accumulation (see Jones and Manueli, 1990; Rebelo, 1991a), human capital accumulation (see Romer, 1986; Lucas, 1988), technological progress (see Romer, 1990; Grossman and Helpman, 1990) and finaly, knowledge spillover (see Young, 1991). So, as discussed, we outlined different factors that stimulate growth in the context of East Asian countries: accumulation of capital, learning by doing, education etc…. However, despite its ability to explain some basic facts about growth which could not be explained using other growth theories, such as patterns of convergence and divergence, the endogenous growth theory is criticised. The most important criticisms are that: despite this theory's being based on micro foundations, its goals are to explain macroeconomic issues. Besides, the highly sophisticated mathematics and statistics on which this is theory based lead to studies based on this theory depart from assumptions and basic descriptive narrative.

Important insights for understanding the relationship between free trade and growth have been provided by the new growth theory, according to which trade can provide access to the advanced technological knowledge of any country's trading partners.

Moreover, it provides access to investment and wider markets, encouraging the development process through increasing returns to innovation. The new growth theory views dynamic gains from trade as externalities that prevent the decline in the marginal product of physical capital, arguing that in this way, long-run economic growth can be enhanced by trade. The relationship between free trade and growth needs more investigation and we can argue that neither the new endogenous growth models nor new trade theory succeeded in providing a clear and firm conclusion regarding trade openness (free trade) and economic growth. There is much still to be found out about trade openness and economic growth.

According to El Shinawy (1998), the virtues of outward orientation are highlighted by the gains from trade, sometimes in its extreme version, that is of free trade and neutral incentives. However, free trade continues to be theoretically challenged and to face serious dilemmas when it comes to practical implementation. A serious problem facing researchers is the lack of a clear definition of trade openness. Such a definition is needed, as some studies investigate the relationship between trade openness and growth, others investigate the impact of outward oriented policy and growth and sometimes we find studies investigating the relationship between free trade and growth. Therefore, it is important to bear in mind that for this thesis, for simplicity, we consider trade liberalisation, trade openness, outward oriented, or free trade as synonymous.

Let us turn to the empirical literature in chapter 3 and these issues may be made more clear, if we consider the empirical evidence.

Chapter 3
Free Trade and Economic Growth: Empirical Evidence

"In a world full of countries desperately trying to get richer, the winners become influential models for the rest. But exactly what is it that accounts for their success? This isn't merely an abstract academic debate. The consensus tends to get built into the policies of dozens of ambitious countries, affecting patterns of world trade and much else." (Washington Post, 1995, A26)

3.1 Introduction

The foregoing discussion of the theoretical implications of free trade has shown that it is considered as an important, influential and efficacious stimulus for economic growth. The theoretical frameworks, analysed in chapter 2, are simplistic and fail to address important questions such as the exact mechanism through which export expansion affects GDP growth. This study aims to overcome such shortcomings by analysing both theoretical and empirical aspects of the free trade and economic growth (for more details about the methodology, which is not given a separate chapter as it is discussed comprehensively in each chapter, see appendix 3). It sets background to investigate the issue of causality between growth of output and exports in Egypt as well as selected countries of low-and middle-income classification.

The empirical literature on trade and growth is reviewed in this chapter to set grounds for empirical analysis of Egyptian economy in the next chapter. It particularly reviews the export oriented trade policies of Asian tigers, e.g. World Bank (1987), Dollar (1992), Sachs and Warner (1995), etc.

The most obvious empirical evidence of this is the experience of the East Asian Countries, particularly the so- called "gang of four" or "four tigers" or "four dragons": Hong Kong, Taiwan, South Korea and Singapore. As Lucas (1993) has argued, if we are to understand the process of economic growth, we should have models that are able to replicate the East Asian experience. The Asian crisis of late 1997 and 1998 was quite different in its nature in each country and there is no evidence that it was anything more than a temporary adjustment. Despite the apparent weakening of the "Asian Miracle" and these countries' difficulties in this period, we find that their experience of moving from poverty and technological backwardness to economic flourishing and technological modernity and excellence over more than forty years cannot be ignored and their human, organisational and fiscal capital are still safe.

This experience represents a motivation for both theoretical and empirical studies of free trade and economic growth. Although Hong Kong is the only country that followed a free trade policy, the trade policy of the other three countries, export promotion, could be said to have the long run goal of free trade. All (except Hong Kong) started with a period of import substitution with a strong bias against exports. In the early 1960s, these countries abandoned import substitution (IS) and adopted outward-oriented trade strategies, using a variety of approaches to promoting exports, resulting in spectacularly rapid growth. Each of the gang of four moved to establish an export regime faster than other developing countries. Each shifted trade policies to encourage manufacturing exports in the late 1960s. In Korea and Taiwan, the governments established a pro-export incentive structure which coexisted with moderate but highly variable protection of the domestic market. A wide variety of instruments was used, including export credit, duty-free imports for exporters and their suppliers, export targets, and tax incentives (Page, 1994). Relatively uniform across-the- board incentives for exports were relied on as part of the growth and industrialisation strategy (Kruger, 1998). The following table summarises some literature that will be further demonstrated later.

Table 3.1
Success Explanation of East Asian Countries

Author	Success explanation basis
Sachs (1987)	- Trade liberalisation with active role of government in promoting exports.
Helleiner (1990)	- Government intervention as an important role in Korea's success.
Baysan and Blitzer (1991)	- Providing incentives to exports as short run policies to increase the short run supply of exports.
Birdsall and Sabot (1993)	- Export promotion policy through export incentives such as subsidies and tax credits.
Rodrik (1995)	- A number of strategic government interventions and favourable initial conditions such as the equality of income and wealth and the existing of an educated labour force.
Sachs and Warner (1995)	-Trade openness.
Young (1995)	- Capital Accumulation rather than productivity growth underlies the success.
Wacziarg (1998, 2001)	- Investment as the most important channel through which openness increases growth.
Hahn and Kim (2000)	- Openness which affect output growth by improving total factor productivity than enhancing capital accumulation.
Nam and Kim (2000)	- Domestic investment is a key link concerning the free trade and growth.
Cooper (2001)	- Export orientation which enables East Asian to undergo a process of IS and this has a positive effect on growth.
Quibria (2002)	- Openness as the most critical factor in producing the East Asian miracle by helping these countries overcome the limitations of domestic markets, provided new economic opportunities to exploit in international markets and allowed access to new technology through imports of new machnery and equipment.

3.2 Import Substitution (IS) and growth in developing countries

Before discussing in depth the experience of the "gang of four" and examining the empirical evidence of the relationship between free trade and economic growth, we should refer to the empirical evidence of the negative effect of protection on economic growth. Some cross- country studies such Balassa (1982) and Greenaway and Milner (1993) show the long-run consequences of depending on import substitution (IS) regimes, as did many developing countries. Under IS, developing countries sought to provide protection to new industries during the period of their development until they were able to compete with their counterparts in developed countries. According to Krueger (1998), the IS strategy, in practice, pulled most new resources into the activities of import competing, with a number of negative consequences. One result was that export earnings grew less rapidly than the demand for foreign exchange. Then, a universal policy response was to impose restrictive or germinated import licensing in response to foreign exchange shortage. Krueger (1998) attributed this to the need to conserve scarce foreign exchange for essential development needs. Thus, and with an increase in IS strategies, growth slowed owing to the greater restrictiveness of trade regimes. The following table sets out some empirical evidence from economic research relating to protection costs.

Table 3.2
The consequences of protection

Country	Year	Number of industries	Average EPR	Range Of EPRs	Negative Effect of protection	Negative Value added	Source
Korea	1968	150	10	-67-164	(76)	n.a	Balassa et al.(1982)
Israel	1968	94	76	-943-750	(9)	n.a	Balassa et al.(1982)
Singapore	1967	69	6	-1-86	(29)	n.a	Balassa et al.(1982)
Taiwan	1969	61	46	-18728-89	(26)	(6)	Balassa et al.(1982)
Argentina	1969	82	94	-596-1308	(15)	(0)	Balassa et al.(1982)
Colombia	1969	22	46	-51-215	(10)	(0)	Balassa et al.(1982)
Brazil	1980-1	22	46	-16-97	(6)	n.a	Taylor (1985)
Pakistan	1980-1	90	60	-799-1543	(22)	(13)	Naqvi et al. (1983)
India	1968-9	69	n.a	27-3354	n.a	(4)	Bhagwati and Srinivasan (1975)
Mauritius	1980	22	55	2-300	(0)	(0)	Greenawayand Milner (1988)
Madagascar	1983	58	156	-93-852	(7)	(5)	Greenaway and Milner (1990a)
Burundi	1985	46	_	-4-7896	(2)	(4)	Greenaway and Milner (1990b)

Source: Greenaway (1998)
n.a = not available

The empirical studies, referred to in Table 3.2, emphasised the consequences of long-term reliance on import substitution regimes in the form of high effective protection rates. The effective protection rate is used to estimate the protection really afforded to domestic procedures at each stage of production, i.e., show how much extra the producers can charge and still be competitive with imported goods. If the total value of the tariffs on importable inputs exceeds that on the output, the effective rate of protection is negative, i.e. the industry is discriminated against in comparison with the imported product (see appendix 2 for definition). Table 3.2 shows that many protective regimes involved not only high mean and high variance effective protection rates but also adverse consequences, reflected in the negative effect of protection on growth (see Greenaway and Milner, 1993 for details).

Also Barro and Sala-I- Martin (1995) found that protection has a negative effect on growth. They use tariffs on capital goods and intermediate inputs as a measure of protection and their conclusions are that countries with low tariffs grow faster than those with high tariffs.

Hsieh (2000) argued that the lack of a robust correlation between trade barriers and growth once macroeconomic imbalances and bad institutions have been controlled for does not mean that trade barriers do not have an adverse effect on growth. He drew attention to the problem of separating the effects of trade restrictions from those of macroeconomic imbalances and bad institutions. In other words, an open trading regime is often a proxy for a whole host of liberal policies and effective institutions (Quibria, 2002).

Sachs and Warner (1995) recognized this point as they noted that “open trade has tended to be correlated with other features of a healthy economy such as macro economic balance and reliance on the private sector as the main engine of growth” (Sachs&Warner, 1995, 63). Moreover, they emphasised that government policies in other areas improve with trade opening. The next pages will report this study in more details. They also presented evidence that economies liberalise only after a serious economic crisis. Here we should note that Bruno and Easterly (1996) reached a similar conclusion and Alesina and Drazen (1991) provided the theoretical foundation for this view. They show that an economic crisis can stop the war of attrition among economic groups that delays liberalisation in an effort to avoid its cost.

3.3 Trade Policy and Liberalisation

3.3.1 The National Bureau of Economic Research (NBER) projects

These studies were sponsored by the National Bureau of Economic Research and represented the first organised attempt to classify trade regimes. The pioneer of these projects was Krueger (1978)

Krueger (1978) divided trade and payment regimes into five phases. Phase I is characterised by the imposition of undifferentiated quantitative controls; phase II is characterised by the increased restrictiveness of the entire control system brought about by its increasing complexity and discriminatory treatment of different transaction types and phase III is characterised by a formal devaluation to reflect the *de facto* price of foreign exchange, accompanied by a reduction and simplification of the detailed regulations and consolidation of the multiple exchange rates (Krueger, 1978). Phase III, if successful, would put the country into the more liberalised states of phase IV and phase V; and if unsuccessful, the country would revert to the tighter exchange control regimes of phase I or phase II.

Krueger (1978) tested two hypotheses. The first hypothesis was: more liberalised regimes result in higher rates of growth of exports; the second was: a more liberalised trade sector has a positive effect on aggregate growth. In the latter case she conjectured that there are two channels through which openness positively affects growth. First, there are direct effects that operate via "dynamic advantages" including higher capacity utilization and more efficient investment projects, and second, there are indirect effects that work through exports: more liberalised economies have faster growth of exports and these, in turn, result in more rapidly growing GNP.

Her model used pooled data to estimate the following equations for both traditional and non traditional exports:

$$\ln\left(X_{i,t}\right) = a_{0,i} + \gamma_1 \ln\left(REERX_{i,t}\right) + \mathrm{a}_1\mathrm{T}_\mathrm{t} + \mathrm{a}_1\mathrm{d}_1\mathrm{T}_\mathrm{t} + \mathrm{a}_2\mathrm{d}_2\mathrm{T}_\mathrm{t} + \mathrm{a}_3\mathrm{d}_1 + \mathrm{a}_4\mathrm{d}_2 + \mathrm{u}_{\mathrm{i,t}} \qquad (3.1)$$

where X_{it} are either non-traditional or traditional exports in country i in period t; gREERX is the exports effective real change rate; T_t is a linear time trend; d_1 is a dummy that takes the value of one in phases I and II and zero otherwise; d_2 is a dummy equal to one when the country is in phases IV and V, and equal to zero in all other phases and $a_2d_2T_t$ is the interaction term with time and trade regime. She estimated the real GNP equation on time series data for each individual country, as:

$$\ln\left(GNP_{i,t}\right) = b_0 + b_1T_t + b_2\ln\left(X_{i,t}\right) + b_3d_1T_t + b_4d_2T_t + \varepsilon_{i,t} \qquad (3.2)$$

where $X_{i,t}$ is an index of the Dollar value of exports of country i in year t, relative to i's exports average over the whole period.

The results of Krueger's estimation suggest that the exchange rate devaluation positively affects non-traditional exports. Traditional exports, however, did not seem to be sensitive to changes in the real exchange rate. The coefficient of d_2 (the value of one in phases IV or V, and zero otherwise) was statistically significant and had a positive sign implying that free trade positively affects on the growth of exports. In relation to GNP growth, her estimates provided strong evidence in favour of an indirect impact of free trade on growth: higher exports positively affected GNP growth; however, the coefficients of the dummy variables were non-significant, implying that free trade has no direct effect on growth.

In another study, Krueger (1980) summarised the logic of the positive effect of export-promotion on economic growth in following three points:

1-Technologically export-promotion is superior due to such factors as minimum efficient size of plant, increasing returns to scale, indivisibilities in the production process, and necessity for competition.

2- Export-promotion policy could avoid excesses in the ways the import-substitution policies were administered. The import-substitution policy is notorious for its negative characteristics, with trade restrictions and exchange control leading to serious distortion of resource allocation.

3-Export-promotion constrains policy makers in such a way that they do not impede the growth rate as much as they otherwise would; export-promotion reduces rent-seeking behaviour. Thus, export-promotion seemed to be more market-friendly than import-substitution and, thus, made the East Asian economies more efficiently. However, the Korean and Taiwanese experience of economic development, for example, is full of stories of government intervention.

The view of Krueger is that the success of an outward-oriented trade strategy provides the momentum and impetus for further liberalisation, which then permits further economic gains from the trade strategy (Krueger, 1990). She emphasises again the accumulation of evidence of a positive correlation between growth of exports and the growth of GDP, countries with a more open trade orientation appearing to grow faster through time.

Krueger (1997) raises the question, why is growth so rapid with outward-oriented trade strategies and do countries with outward-oriented trade strategies grow? She concludes that there is much still to be learned about trade liberalisation, the best means of achieving an outer-oriented trade regime, and the reasons for the very rapid growth that the outer-oriented economies have achieved. However, the reason why trade liberalisation delivers more rapid growth is that IS, over time, becomes a failed strategy. Any significant degree of relaxation of restrictiveness can result in gains, unless there are other policies in effect in the economy that thwart its impact. Trade liberalisation undertaken from a period of declining growth rates or even falling real GDP can normally lead to a period of growth above the rates previously realised. It cannot, however, lead to sustained growth at the sorts of high rates achieved by the truly outward-oriented economies unless policy makers adopt far-reaching measures that effectively provide incentives within the tradable sector at world prices and thus an outward-oriented trade regime.

Krueger emphasises that, in brief, trade liberalisation is considered the only way for developing countries to avoid slowing growth rates. Also, since in fact, growth is at a standstill prior to the liberalisation effort, the apparent gain can be even greater. For example, the rate of economic growth of Turkey in the 1956-58 period was about 2-3%

annually. However, after liberalisation in the 1958-60 period, it became 7% for the next 7 years (Krueger, 1998). To complete this view we find that over the 1990s the conviction that free trade or trade liberalisation or openness was good for growth was fostered by some visible and well-promoted cross-country studies, e.g. Dollar (1992); Sachs and Warner (1995); Edwards (1998) and Frankel and Romer (1999).

Due to the unavailability of time series data on trade policy indicators, most of the studies used proxies for the actual policy variables. Balassa (1985), for example, constructed an index of trade policy as the deviations of actual volume of exports from the volume of exports predicted by a simple structural model of trade. More specifically, the author assumed that exports are a function of income per capita, population, and mineral resources availability. It is a subsidiary equation in which the author introduces income per capita (besides the explanatory variables mentioned above) as an explanatory variable for exports per capita (which is being used to proxy trade orientation). This is to examine the relationship between the choice of development strategies and policy responses to external shocks on the one hand and the rate of economic growth on the other hand in an intercountry relationship (Balassa, 1985, 28-29).

Adding the per capita income variable further increases the explanatory power of the regression equation, which has a high degree of statistical significance. After computing a linear exports equation for a 43 country sample, the author used the residuals as a measure of trade orientation: positive residuals were interpreted as reflecting “export promotion” policies, while negative residuals were considered a sign of “inward orientation.” When this trade orientation variable was included in a GDP growth equation, its estimated coefficient was significantly positive. Surprisingly, in this regression Balassa abandoned the production function framework, and did not include capital accumulation or labour force growth as regressors. Additionally, no effort was made to treat this index of trade orientation as a variable measured with error, or to check for the robustness of the results to alternative specifications of the exports equation.

Heitger (1987) argued that since openness and investment rates (the investment rate was significant in the regression) were strongly, positively correlated, the contribution of a high export share is insignificant only due to multi collinearity. He used restrictive measure of trade regimes rather than constructing index of trade orientation. He estimated his growth model using data of 47 countries over the period 1960-1970. He concluded that a high export share favoured capital accumulation and this in turn promoted economic growth. This explanation is unsatisfactory, since a positive correlation between the two variables does not establish causality. Causality may run from investment to openness through economic growth.

3.3.2 Developments in Openness Measuring

In this section the developments in measuring openness will be discussed. A number of openness measures, developed in the 1980s and 1990s, will be demonstrating. These measures are the openness measure provided by the World Bank (1987), the openness index of Leamer (1988), the distortion index of Dollar (1992), the openness index of Sachs and Warner (1995), and Economic Freedom Heritage Foundation index.

(i) World Bank (1987)

One measure of openness was provided by the World Bank. A group of 41 developing countries were classified into four categories in terms of their trade orientation. First: **strongly-outward oriented countries** where there were very low trade or foreign exchange controls. The developing countries maintained the exchange rate so that the effective rates for importables equal led those for exportables. There was no discrimination in production between producing for domestic market and exports, and between purchases of domestic and foreign goods. Second: **moderately outward oriented countries** where the overall incentive structure was moderately biased toward the production of goods for domestic market rather than for export. Third: **moderately inward-oriented countries** where the overall incentive structure was more definitely biased against export and favoured production for the domestic market (exchange rate was overvalued). Fourth: **strongly inward-oriented countries** where the overall incentive structure and trade controls strongly favoured production for the domestic market, discriminating strongly against imports.

The criteria used for these classifications were largely subjective and not free of controversy. For example, a number of authors have objected to Korea's classification as a strongly outward oriented country, and pointed out that government intervention played an important part in Korea's success story (Helleiner, 1990). The 41 countries were classified according to these four categories in the periods 1963-1973 and 1973-1985. The study used this index to compare the performance across these countries, finding that East Asian countries were strongly outward oriented and the countries of African were in moderately or strongly inward-oriented. From the publication of this study in 1987, free trade regimes became controversial, with an emphasis on the difficulty of providing a definite measure of free trade.

(ii) Leamer's (1988) openness index.

Leamer (1988) computed a trade intervention index, based on degree of government intervention and factor endowments (land, labour, capital, oil production and minerals). He used nine indicators of trade orientation. Leamer index regressed net trade within a product category on factor endowments for a cross-section of 30 developing countries for the period 1970-1982. This model did not predict the trade patterns under free trade; however it assumed that the world's average of protection was adopted by each country. The results showed that more open economies tend to grow faster. Consequently, despite the criticism by Rodrik (1993) about the inadequacy of the methods used to construct the indices which may lead to biased results, Leamer's model improved the traditional trade intensity measure, which concentrated on the terms of factor endowments and not on their level of protection.

(iii) Dollar's (1992) distortion index

Dollar (1992) tried to establish a relationship between openness (free trade) and economic growth. In what is the most heavily cited empirical paper on the link between openness and growth, he asked whether outward-oriented developing countries grow faster. The principal contribution of Dollar's paper lies in the construction of two separate indexes, which Dollar demonstrated are each negatively correlated with growth. He used his measure of distortion in conjunction with a measure of variability, the latter being a coefficient of variation of distortion measured on an annual basis. He was driven to do this because country rankings using distortion produce some "anomalies" For example, Korea and Taiwan have the highest distortion measures of the Asian developing economies and the rankings within the developed country groups are not very plausible (Dollar, 1992, 530-531). Dollar estimated across- country index of distortion in the real exchange rate and constructed two indexes of trade distortion: the index of real exchange rate distortion and the index of real exchange rate variability. His justification for using these indexes as indicators of outward orientation was as follows:

> **"Outward orientation generally means a combination of two factors: first the level of protection, especially for inputs into the production process, is relatively low (resulting in a sustainable level of the real exchange rate that is favourable to exporters) and second, there is relatively little variability in the variability in the real exchange rate, so that incentives are consistent over time" (Dollar, 1992, 524).**

His sample was 95 countries over the period 1979-85. Dollar used data from Summers and Heston (1988, Mark 4.0) on comparative price levels. He interpreted the variation in the values of distortion across countries as capturing cross-national differences in the restrictiveness of trade policy. He stated: "The index derived here measures the extent to which the real exchange rate is distorted away from its free trade level by the trade regime" and a "country sustaining a high price level over many years would clearly have to be a country with a relatively large amount of protection"(Dollar, 1992, 524). Rodriguez and Rodrik (2000) show that the comparison of price indexes for tradables is informative about levels of trade protection only under very restrictive conditions that are unlikely to hold in practice.

The measure of trade orientation is the degree to which the real exchange rate is distorted by not reflecting differences in the price level between countries. High relative prices indicate strong protection and incentives geared to production for the home market. Comparing between successful economies of Asia and different continents, Dollar found that the exchange rate in Latin America was over valued by 33 percent and in Africa by

86 percent during the same period. He estimated growth equations across countries using each country's measure of exchange rate distortion, controlling for differences in the level of investment and the variability of the exchange rate. He found that trade distortions in Africa and Latin America reduced the growth of income per capita by between 1.5 and 2.1 percent annum. The ten least distorted countries were found to be Hong Kong, Thailand, Malta, Sri Lanka, Bangladesh, Mexico, South Africa, Nepal, Pakistan and Syria. Burma's rating (90) equalled that of the United States. Taiwan (116) was judged more distorted than Argentina (113). Rodriguez and Rodrik (2000) commented that such results are not surprising, as distortion is highly sensitive to the form in which trade policies are applied and to exchange-rate policies, as well as neglecting geographic characteristics.

Dollar stated that the "number of anomalies declines substantially if the real exchange rate distortion measure is combined with the real exchange variability to produce an outward orientation index" (Dollar, 1992, 531). Overall, his conclusion is that each of the indexes was negatively correlated with growth.

Thirlwall (2000) argued that the result could not be considered as conclusive, as exchange rate distortions are likely to be correlated with internal variables that impair growth performance, but they are certainly suggestive. However, Rodriguez and Rodrik (2000) argued that the literature that shows a positive link between trade and growth is largely flawed. Their reason is that the measures of trade barriers that it employs are measures of either macroeconomic imbalance or bad institutions, but not of trade restrictions. They argued that Dollar's index of real exchange distortion is a measure of real exchange rate divergence, and not a measure of trade barriers, and that the Dollar measure of real exchange rate variability has little to do with trade orientation, but is more closely related to macroeconomic stability. They contended that no strong negative relationship exists between trade barriers and economic growth. Such a relationship does not exist empirically, as "there is no theoretical presumption in favour of finding an unambiguous, negative relationship between trade barriers and growth rates in the type of cross-national data sets typically analysed" (Rodriguez and Rodrik, 2000, 8-9).

Easterly and Levine (2001) concluded that there is no coherent body of evidence that trade restrictions generally stimulate growth, as even Rodriguez and Rodrik concede. Srinivasan and Bhagwati (2001) argue that Rodriguez and Rodrik's criticisms of the cross-country studies should not undermine confidence that openness enhances growth, because that view should never have been based on those studies in the first place. Case studies find a wide variety of causes and channels for growth, and frequently find openness at the very heart of the matter, for example the NBER study summarised in Krueger (1978).

(iv) Sachs and Warner's (1995) openness index

Sachs and Warner (1995) used the same model as Levine and Renelt (1992), where the dependent variable is growth in average annual GDP per capita for 1970-1990. To test the effect on growth of free trade or to belong to a regional trade agreement, they specified a cross-country growth equation as follows:

$g = a + b_1\,(\textit{initial GDP per head}) + b_2\,INV + b_3\,(Sch) + b_4\,(\textit{population growth}) + b_5\,(\textit{world GDP growth}) + b_6\,D_1 + b_7\,D_2$

where D_1 is a dummy variable if the country participates in a Regional Trade Agreement (RTA); and D_2 is a dummy variable for the Sachs-Warner openness variable or the trade share variable. The standard independent variables are the log of *GDP* per capita in 1970, the average share of investment in physical capital over *GDP* in 1970-1990, the secondary school enrolment in 1970, the average population growth in 1970-90, the average growth rate of world *GDP* in 1970-90. An economy is characterised as open if it has trade barriers toward all countries. However, Sachs and Warner (1995), as stated, used an openness dummy and constructed a trade openness index based on five important aspects of trade policy. They defined an economy as open if all the following conditions were true:

(a) the important duties averaged less than 40 percent,
(b) the quotas covered less than 40 percent of imports,
(c) the black market premium on the exchange rate was less than 20 percent,
(d) a state monopoly of major exports was absent, and
(e) the economy was not socialist.

And so, the Sachs-Warner (SW) openness indicator (open) is a zero-one dummy, which takes the value 0 if the economy was closed according to one of the following criteria:

1- it had average tariff rates higher than 40% (TAR);
2- its non tariff barriers covered on average more than 40% of imports (NTB);
3- it had a socialist economic system (SOC);
4- it had a state monopoly of major exports (MON);
5- its black market premium exceeded 20% during either the 1970s or the 1980s (BMP)

Sachs and Warner (1995) used data from Lee (1993) for non-tariff barriers, Barro and Lee (1993) for tariffs, World Bank (1994) for state monopoly of exports, Kornai (1992) for the classification of socialist and non-socialist countries, and international currency analysis (various years) for black market premia. The indicators of trade policy were combined into a single dichotomous variable. The rationale for doing so is that they represent different ways in which policy makers can close their economy to international trade. Tariffs set at 50 percent have exactly the same resource-allocation implications as quotas at a level that raised domestic market prices for importables by 50 percent. The trade openness index of the Sachs-Warner indicates that, by the 1960s, almost all economies of East Asia were open. The following table demonstrates the openness indicators of three countries from the four tigers.

Table 3.3
Openness Indicators of selected Asian Economies and years.

Economy	Not open	open
Miracle Asia **Hong Kong, China**		**1950-92**
Korea, Rep	**1950-68**	**1969-92**
Singapore		**1965-92**

Source: Sachs and Warner (1995)

By using their data in their cross-country regressions to explain growth between 1970 and 1989 in 117 countries, Sachs and Warner (1995) found a strong association between openness and growth within the groups of developing and developed countries. Within the group of developing countries, the open economies grew at 4.49 percent per year, and the closed economies grew at 0.69 percent per year, while within the group of developed economies, the open economies grew at 2.29 percent per year, and the closed economies grew at 0.74 percent per year. The Sachs- Warner trade openness index had a high, robust coefficient of growth regression. In the original benchmark specification, the effect of openness on growth was about 2.5 percent, which means that, on average, open economies grew 2.5 percent more rapidly than closed ones.

Rodriguez and Rodrik (2000, 27), analysing the Sachs-Warner results, found that the strength of Sachs-Warner dummy is largely attributable to the combination two variables; the black market premium (BMP) and the state monopoly of exports (MON) variables. Other variables add little to the dummy's statistical power. Notably, the two variables that are the most direct measures of trade policy: tariff and non-tariff barriers (TAR and NTB) have little effect. The authors go on to discuss to what extent the black-market premium and state monopoly variables are measures of trade policy. They suggest that the success of the Sachs-Warner model in explaining growth can be explained by its correlation with other determinants of growth: macroeconomic problems in the case of the black-market premium, the location in Sub-Saharan Africa in the case of the state monopoly variable. They therefore conclude that the Sachs-Warner indicator represents a wide range of policy and institutional differences, and that it yields an upwardly biased estimate of the effects of trade restrictions per se.

Like Sachs and Warner (1995), Collins and Bosworth (1996) found that openness during the 1970s and 1980s was strongly associated with growth. Their interpretation is that an open trade policy is the most important element of overall economic policy. If and only if poorer countries are open will they tend to catch up. Further, they argued that the main reason to expect convergence of open economies is that poorer countries can import capital and modern technology from wealthier ones, reaping "the advantages of backwardness" (Sachs and Warner, 1995, 2-3). Rodriguez and Rodrik (2000) argued that the Sachs and Warner openness index is a dummy for sub- Saharan Africa (with state monopolies of exports) and for Latin American countries (with high levels of black market premiums on the exchange rate, reflecting serious macroeconomic imbalances).

Vamvakidis (1998) estimated a similar model. He examined the effect of international trade on growth from 1970 to 1990. He investigated whether the openness, market size, and level of development of countries in the same region foster growth in the home country and presented evidence that the size of domestic market is important for growth only for closed economies. Whereas a large international market fosters economic growth for open economies and found that free trade and growth were positively correlated only in the 1970s and 1980s. No correlation existed in the earlier decades in the sample, except for a negative correlation in the 1930s and so the literature suggests that a country that is more open to free trade will have greater technological spillovers and, therefore, faster growth than a country that is less open. He added that the economies of countries near large and open economies grow faster. Also, the level of development of neighbouring economies, especially when open, has significant positive spillover effects. By contrast, the size and level of development of closed neighbouring economies have little or no effect on domestic growth and so this suggests that trade agreements between developing countries and large and more developed countries may lead to faster growth. In summary, his article showed that countries with open, large, and more developed neighbouring economies experience positive spillovers.

v) Economic Freedom Heritage Foundation Index

Heritage Foundation developed the Index of Economic Freedom in 1995. According to O'Driscoll et al., (1999), the factors contributing directly to economic freedom are annually examined by this index. The index includes institutional factors such as corruption, trade distortions, the fiscal burden, rule of law, regulatory burdens, monetary and financial restrictions, labour market regulations and black-market activities (Santos-Paulino, 2005, 796). This index takes values of one to five, trying to measure the extent to which the trade distortions are caused by government policy. The countries are divided into four categories:

(1) free - countries with an average overall score of 1.95 or less; (2) mostly free - countries with an average overall score of 2.00-2.95; (3) mostly unfree - an average overall score of 3.00-3.95; (4) repressed - an average overall score of 4.00 or higher. The following table shows that trade policy score is assumed to be based on the average tariff

rate of a country, representing an adverse relationship; the higher this rate, the worse the score.

Table 3.4
Heritage's Trade Policy Grading Scale

Score	Protectionism levels	Criteria
1	Very low	Average tariff rate of less than or equal to 4% and/or very low non-tariff barriers.
2	Low	Average tariff rate greater than 4% but equal or less than 9% and/or non-tariff barriers.
3	Moderate	Average tariff rate greater than 9% but equal or less than 14% and/or moderate non-tariff barriers.
4	High	Average tariff rates greater than 14%but equal or less than 19% and/or high non-tariff barriers.
5	Very high	Average tariff rate greater than 19% and higher and/or very high non-tariff barriers that virtuall close the market to imports.

Source: Santos-Paulino (2005)

3.3.3 The Robustness of Economic Openness Indices

Prior to his study in 1998, Edwards (1991) investigated the link to growth performance of a broad range of indicators of openness proposed in the literature and concluded that the sum of the evidence amounted to persuasive evidence of the beneficial effects of an outward trade orientation. Also, in a major study of trade orientation, distortions and growth in developing countries, Edwards (1992) developed a model assuming that the more open economies are, the more efficient of them at absorbing exogenously generated technology. Edwards' model uses one channel through which trade liberalisation enhances growth, which is absorption of foreign technology and here we should refer to Thirlwall (2000) who comments that although it is important, there are other important mechanisms.

In 1998, Edwards undertook a robustness analysis using a wide range of trade-policy indicators, including some subjective indicators. In his paper titled, "Openness, productivity and growth: what do we really know?" (Edwards, 1998), he used new comparative data for 93 countries to analyse the robustness of the relationship between openness and total factor productivity growth. While the papers by Dollar and by Sachs and Warner dealt with the data problem by constructing new openness indicators, Edwards (1998) took the alternative approach of analysing the robustness of the openness-growth relationship to the use of different existing indicators. Edwards writes, “The difficulties in defining satisfactory summary indexes suggest that researchers should move away from this area, and should instead concentrate on determining whether econometric results are robust to alternative indexes” (Edwards, 1998, 386). To carry out this robustness analysis, Edwards ran regressions of total factor productivity growth on nine alternative indicators of openness, using initial income and a measure of schooling as controls. His estimates of total factor productivity growth were the Solow residuals from panel regressions of growth on changes of capital and labour inputs.

The nine indicators of openness he used were: (1) the Sachs-Warner openness index; (2) the World Bank’s subjective classification of trade strategies in World Development Report 1987; (3) Edward Leamer’s (1988) openness index, built on the basis of the average residuals from regressions of trade flows; (4) the average black market premium; (5) the average import tariffs from UNCTAD via Barro and Lee (1994); (6) the average convergence of non-tariff barriers, also from UNCTAD via Barro and Lee (1994); (7) the subjective Heritage Foundation index of Distortions in international trade; (8) the ratio of total revenues on trade taxes (exports+imports) to total trade; and (9) Holger Wolf’s regression-based index of import distortions for 1985. The results were presented as weighted least squares (WLS) regressions of TFP growth on (1)-(9), where the weighting variable was GDP per capita in 1985. Six of the nine indicators were significant and all but one had the expected sign. Edwards repeated the analysis using instrumental weighted least squares and found 5 of 9 indicators significant at 10%(3 at 5%) and all having the correct sign. He also built an additional indicator as the first principal component of (1), (4), (5), (6) and (9), which he found to be significant in WLS estimation. He concluded that these results were quite remarkable, suggesting with tremendous consistency the existence of a significantly positive relationship between openness and productivity growth.

Rodriguez and Rodrik (2000), however, argue that Edward's evidence does not warrant such strong claims. The robustness of the regression results is largely an artefact of weighting and identification assumptions that seem to them to be inappropriate. Of the 19 different specifications reported in Edwards (1998), only three produce results that are statistically significant at conventional levels once they qualify these assumptions. Furthermore, the specifications that pass econometric scrutiny are based on data that suffer from serious anomalies and subjectivity bias. Edwards (1998) suggested that more open countries experienced faster productivity growth, and argued that the positive association between trade and openness is robust to the measure of openness used.

However, Rodriguez and Rodrik (1999) challenge this conclusion, arguing that although there is little systematic evidence linking inward oriented trade policies and growth, the evidence linking outward orientation and growth overstates the relationship between the two. A possible link between openness and growth has been an important factor in stimulating an unprecedented wave of unilateral trade reforms, with over 100 countries committing to some kind of trade liberalisation over the last 20 years. Many of these programmes have been voluntary; most however have been tied to the policy conditionality which is central to World Bank Structural Adjustment Loans (SALs).

Greenaway and Milner (1993) give details about the SAL process and its intergradient. Although not as extensive as that on trade orientation and growth, there is a literature on trade reform/ trade liberalisation and (short run) growth. Some studies have identified a positive association; others find no association, or even a negative association. Some of the reasons why the literature is inconclusive relate to the fact that different analysts use different proxies for liberalisation and rely on different methodologies. In addition, of course, a given sample will include liberalisations of differing intensities and durations (Greenaway et al., 2002).

Levine and Renelt (1992) tested the robustness of the earlier empirical conclusions on the growth analysis by using an instrumental variable technique. They used extreme-bounds analysis. Their regression equation is as follows:

$Y = \beta_i I + \beta_m M + \beta_z Z + \varepsilon$,

where Y is per capita GDP, I is the set of variables always included in the regression, M is variables chosen to be tested and Z is a subset of variables used as explanatory variables of growth. They found that free international trade indirectly affects growth through investment. Their result was that the countries that have low trade barriers invest more and therefore grow faster. Taylor (1998) found that investment is a key link and thus implies that poor investment policies could undermine the benefits of free trade. This represents indirect evidence that examines the steps in the causal relationship between free trade and growth and the main issue here is the effect on productivity.

Pritchett (1996) shows that trade indicators are only poorly correlated with other indicators of openness, while Harrison (1996), Hanson and Harrison (1999) and Rodriguez and Rodrik (2000) show that most of Sachs and Warner's explanatory power comes from the non-trade components of their measure, where the use of policy-measures equates trade liberalisation with *laissez- faire* policies, but for outcome measures, e.g. trade shares, openness might be induced or at least accompanied by considerable intervention, as, for example, is asserted to have applied in East Asia (see, for example, Rodrik 1995, 1997).

To sum up, because of the failure of the earlier empirical cross-country studies on trade policy and liberalisation, such as Krueger (1978), to provide a convincing classification of trade regimes for countries, authors such as Leamer (1988), Dollar (1992), Sachs and Warner (1995), constructed their own trade liberalisation indexes. However, it is obvious that the studies surveyed here failed to provide evidence on causality issues and it seems that they failed, as well, to provide a theoretical framework to connect trade policy and economic growth. The next parts deal with these shortcomings.

3.4 Trade Policy and Economic Growth: Cross-Section and/or Time Series (lessons from the gang of four)

Let us begin with the basic question, do open economies grow faster than closed ones? Almost all empirical growth studies have provided an affirmative answer to this question. Evidence suggests that outward-orientated economies consistently have higher growth rates than in inward-oriented countries (Yanikkaya, 2003), and reveals the tragic failure of import-substitution strategies, especially in the 1980s, and overstated expectations from free trade (Rodrik.1999). It is, however, very difficult to understand this unconditional optimism in favour of free trade among the economics profession and in policy circles. The relationship between trade openness and growth is a highly debated topic in the growth and development literature, and the issue is far from being resolved. Theoretical growth studies suggest at best a very complex and ambiguous relationship between trade restrictions and growth. The endogenous growth literature has been diverse enough to provide a wide array of models in which trade restrictions can decrease or increase the worldwide rate of growth (see, for example, Romer (1990) and Matsuyama (1992)). If trading partners are asymmetric countries in the sense that they have considerably different technologies and endowments, even if economic integration raises the worldwide growth rate, it may adversely affect individual countries. See Lucas (1988), Grossman and Helpman (1991b) and Grossman and Helpman (1991c). The basic explanations for the success of the East Asian experience are stated below with concentrating on the outward-oriented strategy adopted by these countries with a reference to some literature on EU as the greatest trading partner of Egypt. All are discussed in the context of the relationship between trade policy and economic growth, whether cross-section and/or time-series regressions.

3.4.1. Trade Policy (outward-oriented) and the East Asian Growth

Let us analyse the role of free trade or openness represented in export promotion and growth by considering the experience of the East Asian countries (highlighted in ch.1). In explaining this experience, there are many studies that emphasise the influential role of free trade, or accurately, outward-oriented trade, in speeding the economic growth of these countries. Adherents of the neoclassical view focus on the policy of openness of the foreign trade sector along with macroeconomic stability in the East Asian countries. The most important studies according to this view are Edwards (1993), Krueger (1995) and Sachs and Warner (1995). The argument here goes that an economy that is integrated with the rest of the world with an open trade regime is likely to have access to foreign markets and technologies. Also, opening up to international competition might force domestic industries to follow market signals and improve productivity. Sachs and Warner (1995) go further than this as they argue that poor countries will tend to catch up with rich countries if and only if they are open. By contrast, others attribute the East Asian growth to the extensive government intervention in specific industries (Amsden, 1989).

Let us demonstrate first the neoclassical supply-side model as one of the models of export-led growth**.** This model assumes that the export sector has a chance to be exposed to foreign competition conferring externalities on the non-export sector, and that the export sector has higher productivity than the non-export one, which is significant for the overall growth performance. In this respect, the first formal analysis to evaluate the relationship between export growth and output growth was provided by Feder (1983). He presented a two-sector model with an export (*X*) and a non-export sector (*N*) and assumed the output of *X* to be a function of labour and capital, while the output of *N* was assumed to be a function of labour, capital, and the output of *X*. Feder applied his model to a sample of 31 semi-industrialised countries. Feder argued that exports can affect growth in two ways. The first is by generating positive externalities to the non-export sector via its effect on efficient production techniques and providing better management skills. The second way is through the reallocation of resources from non-export sector (less productivity) to the export sector (higher productivity). His derivation of augmented neoclassical growth equation took the following form:

$$(Y^*/Y) = \alpha + \beta\ (I/Y) + \gamma(dL^*/L) + [F_x + (\delta/(1+\delta))]\ (X/Y)(dX^*/X),$$

where (Y^*/Y) is the growth of output, I/Y is the investment-output ratio, dL^*/L is the growth of labour force, dX^*/X is the growth of exports, X/Y is the share of exports in GDP, $\delta/ (1+\delta)$ is the differential productivity effect, and F_x is the externality effect. Feder obtained the following results:

$$(Y^*/Y) = 0.002 + 0.178(I/Y) + 0.747(L^*/L) + 0.422(X/Y)(X^*/X)$$
$$\quad (0.18) \quad (3.542) \qquad (2.862) \qquad (5.454) \qquad\qquad R^2 = 0.69$$

Figures in parentheses are t-values

His finding strongly supports the higher of marginal factor productivities in the export sector than in the non export sector.

Trade policies do affect the volume of trade, of course. However, there is no strong reason to expect their effect on growth to be quantitatively (or even qualitatively) similar to the consequences of changes in trade volumes that arise from, say, reductions in transport costs or increases in world demand. To the extent that trade restrictions represent policy responses to real or perceived market imperfections or, at the other extreme, are mechanisms for rent-extraction, they will work differently from natural or geographical barriers to trade and other exogenous determinants.

Frankel and Romer (1999) recognized this point in their paper on the relationship between trade volumes and income levels. Whilst noting the long history of discussion on trade, and the great effort devoted to studying the issue, they found little persuasive evidence concerning the effect of trade on income. They specified a simple three-equation model as follows:

$$\ln Y_i = \alpha + \beta T_i + \gamma W_i + \varepsilon_i$$

where Y_i *is income per person,* T_i *is international trade,* W_i *is within-country trade, and* ε_i *reflects other influences on income*. The other two equations concern the determinants of international and within-country trade.

- For international trade

$$T_i = \psi + \varphi P_i + \delta_i$$

where P_i *is a proximity to other countries*.

- For within-country trade

$$W_i = \eta + \lambda S_i + V_i$$

where S_i *is country's size*.

Using same bilateral trade data from the IFS Directive of Trade Statistics for 63 countries for 1985 (cross-section data), they conclude that a rise of one percentage point in the ratio of trade to GDP increases income per person by at least one-half percent and trade appears to raise income by spurring the accumulation of physical and human capital and by increasing output for given levels of capital.

They analyse the relationship between trade and income by estimating cross-country regressions of income per capita on the trade-GDP ratio and two measures of country size (population and land area), with the aim of addressing the issue of the likely endogeneity of trade with respect to income. For trade-share, they first estimated a gravity equation, in which bilateral trade flows are regressed on geographic characteristics then aggregated the fitted trade values across partners to create a measure of the actual trade share. In an earlier paper, they included initial income among the regressors in the second-stage equation to enable a growth interpretation. The main finding of the paper is that the IV estimate of the effect of trade on income is if anything greater than the OLS estimate (Rodriguez and Rodrik, 2000, 54).

Frankel and Romer's (1999) paper has received considerable attention since its publication. With regard to the role of trade flows proper, Rodriguez and Rodrik (2000, 55) question the validity of Frankel and Romer's geographically-constructed trade share, arguing that trade is at best only one among numerous channels through which geography may influence income. These include public health, (and hence the quality of human capital) through disease exposure; quality of institutions, through the impact of colonialism, migrations, and wars; and the availability and quality of natural resources. Correction of the geographically-determined component of trade with all these other factors may result in upward bias on the IV estimate unless these additional channels are explicitly controlled for in the income equation. They therefore re-ran the Frankel-Romer income regressions adding three summary indicators of geography: (i) distance from the equator (used in Hall and Jones 1998); (ii) the percentage of a country's land area that is in the tropics (from Radelet et al., 1997); (iii) a set of regional dummies. Their findings are consistent with the hypothesis that non-trade effects of geography are the main driving force behind the findings of Frankel and Romer (see Rodriguez and Rodrik, 2000, 56 for detail).

Frankel and Rose (2002) repeated the instrumental variables approach of Frankel and Romer and showed that the basic conclusion is robust to the inclusion of geographical and instrumental variables in the growth equation. This suggests that openness does indeed play a role, even after allowing for geography.

Sachs (1987), has however, questioned the premise that trade liberalization is a necessary component of successful outward oriented strategies. He argued that the success of the East Asian countries was to a large extent due to the active role of government in promoting exports in an environment where imports had not been fully liberalized, and where macroeconomic (and especially fiscal) equilibrium was fostered.

We should notice that while the traditional trade discussion often focuses on final, homogeneous goods, the case for freer trade is enriched by including the fact that trade liberalisation increases the variety of goods, and raises productivity by providing less expensive or higher quality intermediate goods. This aspect has been explored in some models of growth; for example, Romer (1989) emphasises both the productivity of specialised resources and the limitations given by the size of the market. In this model, a greater variety of inputs does more for production than a greater quantity of a narrow range of inputs. Thus, access to a variety of foreign inputs at a lower cost shifts the economy-wide production function outward, which illustrates a concrete link between productivity and the trade regime.

The new theories of growth pioneered by Romer (1986) and Lucas (1988) have provided persuasive intellectual support for the proposition that openness affects growth positively. Romer (1992), Grossman and Helpman (1991) and Barro and Sala-i-Martin (1995), among others, have argued that countries that are more open to the rest of the world have a greater ability to absorb technological advances generated in leading nations. Barro and Sala-i-Martin (1995, ch.8), for example, consider a two-country world (one advanced and one developing), differentiated inputs, and no capital mobility. Innovation takes place in the advanced (or leading) nation, while the poorer (or follower) country confines itself to imitating the new techniques. The equilibrium rate of growth in the poorer country depends on the cost of imitation, and on its initial stock of knowledge. If the costs of imitation are lower than the cost of innovation, the poorer country will grow faster than the advanced one, and there will be a tendency towards convergence. In this type of model it is natural to link the cost of imitation to the degree of openness: more open countries have a greater ability to capture new ideas being developed in the rest of the world (Obstfeld and Rogoff, 1996).

A number of writers, for example, Noureldin (1995) and Brahmahatt and Dadush (1996) have made comparisons between Asian (particularly East Asian) and other economies, noting the differences in growth of exports. The following tables demonstrate this.

Table 3.5
Comparing African with Asian countries 1970-90 (in percentage points)

Countries	Actual rate of growth	Export Volume effect	Terms-of-Trade effect	Real capital flow effect
African countries Algeria	4.9	4.21	10.15	-8.72
Benin	2.9	0.96	1.44	1.35
Burkina Faso	4.2	3.03	-5.17	5.63
Burundi	5.6	3.21	1.69	-1.26
Egypt	6.9	4.36	-2.37	7.31
Sudan	3.1	1.13	0.14	1.92
Tunisia	5.69	5.24	0.87	1.48
Average	**3.66**	**2.45**	**-0.27**	**1.80**
Average excluding oil exporters	**3.4**	**1.99**	**-0.84**	**2.49**
Asian Countries Hong Kong	9.07	8.34	-0.07	1.01
Korea, Republic	9.11	13.47	-0.81	-2.49
Average	**6.6**	**5.91**	**-0.18**	**1.31**
Average excluding Japan and Korea	**6.58**	**4.46**	**0.03**	**2.39**

Source: Noureldin (1995)

Table 3.6
Distribution of countries by speed of Integration

Integrators	East Asia	South Asia	Latin America And the Caribbean	Middle East and North Africa	Sub Saharan Africa	Europe and Central Asia
Fast	6	3	5	2	2	5
Moderate		2	5	4	10	2
Weak	3		9	2	10	
Slow			2	5	14	2
Total	9	5	21	13	36	9

Source: Brahmahatt and Dadush (1996)

Such studies highlighted that the high performance Asian countries are the most spectacular examples of economic success linked to exports (irrespective of the crisis in East Asian). The economies of Korea, Taiwan, Singapore, and Hong Kong have recorded some of the highest GDP growth rates in the world, 6 percent per annum since 1995 and export growth rates about 10 percent per annum.

The World Bank (1993), however, concluded that there is no single East Asian model. What is important for growth is not whether the free market rules or the government intervention, but getting the fundamentals for growth right. Three policies are identified as contributing to the success of these "tiger" economies: first, industrial policies to promote particular sectors of the economy; secondly, government control of financial markets to lower the cost of capital and to direct credit to strategic sectors; and thirdly, policies to promote exports and protect domestic industry. The World Bank conceded that most of the countries deviated from free market economics but deviated less than other developing countries, and got the fundamentals right (such as high levels of human and physical capital accumulation).

Harrison (1996) contributed methodologically by examining the relationship between trade policy and growth in a panel setting, using fixed effects for countries. Rodriguez and Rodrik (2000) see this approach as having the advantage that it enables the analyst to look for evidence of the effects of trade liberalization within countries.

Harrison (1996) cites disappointing results with cross-section regressions as a motivation for going the panel route. However, this approach has the disadvantage that the available time series are necessarily short, requiring the use of annual data or (at most) five-year averages. As Rodriguez and Rodrik (2000) acknowledge, it may be a lot to ask such data to reveal much about the relationship between trade policy and growth, because of both the likely lags involved and the combination from business-cycle effects. Harrison used seven indicators of trade policy, and found that three of these “exhibit a robust relationship with GDP growth” (Harrison, 1996, 443). These three are the following: (a) the black market premium; (b) a measure based on the price level of a country’s tradables (relative to international prices); and (c) a subjective measure of trade liberalization constructed at the World Bank.

The gang of four, except Hong Kong, like other East Asian economies adopted an outward orientation from 1960s after the early phase of import substitution. They lowered tariff rates and export taxes, removed quantitative restrictions on trade and reduced international flows of investment (ADB, 1997). By the 1970s these economies, except Hong Kong and Singapore, which maintained no trade barriers, had substantially reduced their trade barriers. For instance according to the World Bank (2001), the average tariff rates in Korea were much lower (12.49) than the corresponding rates in India (29%) and the developing countries as a whole (23%). Even in the areas that maintained trade protection, we find that some measures were adopted to avoid anti-export bias, from which most other developing countries suffer. These measures include adhering to competitive exchange rate policies, allowing exports easy access to inputs at world market prices through duty exemptions and free access to foreign exchange, and developing new institutions such as processing zones that represent an innovative way to avoid the political difficulties associated with across-the board trade liberalisation (Quibria, 2002). By such means, these economies created new opportunities for trade without eliminating protection from import-substituting industries.

ADB (1997) commented that while export processing zones have a mixed record in other parts of the world, they are generally more successful in the East Asian economies.

In the 1980s and 1990s, the East Asian economies reduced the import tariffs more than before and eliminated their export taxes and non-tariff barriers. By the mid-1990s, the average tariff rates in Korea had fallen below the 5% level, while India's remained high at 30% and those for developing countries had fallen to about 13%. In this way, with rising openness, the economies of East Asian achieved what we can call inroads into international markets (Quibria, 2002).

Both the OECD (1998) and IMF (1997) argued the benefits of trade openness for economic growth, and Stiglitz (1998) asserted that most specifications of empirical growth regressions support such a view.

Rodrik (1999), however, doubted the benefits of openness. His study implied that openness was not a reliable mechanism for generating sustained economic growth as it widens income and wealth disparities within countries; it also makes the economy very weak in facing external shocks, and acts as a motivator to domestic conflicts. Rodrik went further to argue that policies of import substitution achieved great success bringing high growth to Latin America and North Africa in the 1980s. He finally asserted that the most important mechanisms for growth are investment and macroeconomic policy, not openness.

Other writers, too, have called into question the simple association between openness and growth. Hahn and Kim (2000) for example, comparing East Asia with other developing regions, found that openness seems to affect output growth by improving total factor productivity than enhancing capital accumulation. However, quantitatively, the most important determinant of economic growth is institutional quality. They comment that, however, if they allow for the possibility that openness affects growth not only directly but also indirectly by improving institutional quality, then the quantitative importance of openness in explaining growth becomes much more pronounced, consistent with the view of Krueger (1990) stated above. They concluded also that while openness and institutions might be the most important factors distinguishing between divergent growth experiences of East Asia and other developing regions such as Latin America, the relationship between openness and institutions is not yet fully understood.

According to Cooper (2001) the benefit of export orientation is that it enables East Asian economies to undergo a process of import liberalisation and this has a positive effect on growth during the period of liberalisation and for some time thereafter, because of the lagged response to resource allocation.

Yanikkaya (2003) demonstrated that trade liberalisation does not have a simple and straightforward relationship with growth, using a large number of openness measures for a cross section of countries over the last three decades. The paper investigates the relationship between a wide variety of trade openness measures and growth. Two types of openness measures are used: measures of trade volume and measures of trade restrictions. Trade shares, export shares, and import shares in GDP are found to be significantly and positively correlated with growth. However, contrary to the conventional view on the growth effects of trade barriers, the estimation results show that trade barriers are positively and , in most specifications, significantly associated with growth, especially for developing countries and they are consistent with the findings of theoretical growth and development literature.

According to Greenaway et al. (2002), establishing whether or not liberalisation has impacted on growth is not straightforward, for three reasons. First we need to frame an appropriate counterfactual. Is it sensible to assume a continuation of pre-existing policies and performance? Second, how does one disentangle the effects of trade reforms from other effects? Third, supply responses will differ from economy to economy: how long should one wait before conducting an assessment of reforms?

There are many cases where a positive link between liberalisation to growth is apparent; equally there are many cases where no association is reported. Moreover, as Rodriquez and Rodrik (1999) show, many of the reported results are not very robust to changes in specification and/or sample frame. Given the diversity of components of liberalisation programmes, the range of indicators used and the fact that dynamics are rarely modelled, Greenaway et al. (2002) comment, this is not surprising.

Greenaway et al., (2002) tested a dynamic model of growth in the context of several samples and, more importantly, several measures of liberalisation. Their base specification was:

$$\Delta lnY_{i,t} = \beta_1 lnY_{i,65} + \beta_2 Sch_{i,65} + \beta_3 \Delta lnTTI_{i,t} + \beta_4 \Delta lnPOP_{i,t} + \beta_5 (INV/GDP) + \beta_6 LIB_{i,t} + \Delta\varepsilon_{i,t}$$

where $Y_{i,t}$ *is real GDP per capita,* $Y_{i,65}$ *is real GDP per head as at 1965,* $Sch_{i,65}$ *is the level of secondary school enrolment as at 1965,* $TTI_{i,t}$ *is terms of trade index, POP is population, (INV/GDP) is the ratio of gross domestic investment to GDP and LIB is dummy capturing liberalisation episode*. The dynamic specification was the same, except that lags of GDP per head were added, and so the dynamic model of growth takes the following form:

$$\Delta lnY_{i,t} = \alpha\, \Delta lnY_{i,t-1} + \beta_1 lnY_{i,65} + \beta_2 Sch_{i,65} + \beta_3 \Delta lnTTI_{i,t} + \beta_4 \Delta lnPOP_{i,t} + \beta_5 (INV/GDP) + \beta_6 LIB_{i,t} + \Delta\varepsilon_{i,t}$$

where $Y_{i,t-1}$ *are lags of GDP per head or capita*.

Their results suggest that liberalisation has a favourable impact on growth of real GDP per capita. However, the effect would appear to be lagged and relatively modest. Their results also suggest that at least four factors may be at work in explaining why the previous literature on the growth effects of liberalisation is so inconsistent. First there is the obvious point that sample sizes and composition vary, as do methodological approaches. Second, different analysts have used different measures; some are ex ante indicators of liberalisation, some are ex post and others are clearly indicators of openness. Third, it is clear that many models which have been estimated are mis-specified. Fourth, it is important to model the dynamics in order to distinguish between impact and medium run effects.

Quibria (2002) focused on the openness to trade as the most critical factor in producing the East Asian miracle, arguing that it helped the East Asian countries overcome the limitations of domestic markets, provided new economic opportunities to exploit in international markets, created competitive pressures for the domestic economy and allowed access to new technology through imports of new machinery and equipment. Asia’s development experience provides almost a laboratory for exploring the link between openness (outward-orientation), growth and poverty, as over the past four decades, these economies pursued an outward-oriented strategy of development and the evidence is the rising shares of exports and imports as a proportion of these economies’GDP. The following table demonstrates this for three countries from the four tigers.

Table 3.7
Trade indicators, selected Asian Economies and selected regions, 1960s-1990s

Economy and region	Exports (%GDP1960s)	1970s	1980s	1990s	average	imports (%GDP1960s)	1970s	1980s	1990s	average	Exports+Imports (%GDP1960s)	1970s	1980s	1990s	average
Hong Kong	79.7	87.8	112.8	138.7	104.7	81.7	83.2	106.5	136.8	102.0	161.3	170.9	219.3	275.4	206.7
Korea	8.9	26.8	34.6	32.9	25.8	19.2	33.1	33.7	32.0	29.5	28.1	59.9	68.3	65.0	55.3
Singapore	118.7	155.5	188.9	180.1	160.8	129.7	166.2	188.1	168.0	163.0	248.5	321.7	377.0	348.1	323.8
East Asia and Pacific	10.2	16.7	23.1	31.7	20.4	13.3	18.1	23.2	30.2	21.2	23.5	34.7	46.2	61.8	41.6
Latin America And Caribbean	9.5	10.9	14.3	14.4	12.3	9.9	12.5	11.8	15.5	12.4	19.4	23.3	26.0	30.0	24.7
South Asia	5.0	6.9	7.7	12.1	7.9	6.9	9.4	12.1	15.6	11.0	11.9	16.3	19.8	27.7	18.9
Sub-Saharan Africa	24.7	27.2	26.8	27.9	26.6	24.3	28.0	26.9	29.1	27.1	49.1	55.2	53.7	57.0	53.7
World	13.0	16.9	19.0	21.7	17.7	13.0	17.2	19.0	21.2	17.6	26.0	34.1	38.0	42.9	35.3

Source: ICSEAD (1999); World Bank (1980, 2000)

From the table we notice that the economies of tigers achieved spectacular improvements in their incomes and the adoption of outward- orientation allowed them to make tremendous strides in economic development, while the closed economies such as those of south Asia lagged behind economically. This led many to conclude that outward orientation has a strong connection with economic growth (Quibria, 2002).

Winters (2004) documented the strong presumption that trade liberalisation contributes positively to economic performance. He noted that whilst part of the benefits of trade liberalisation depends on other policies and institutions being supportive, there is also evidence that openness actually induces improvements in these dimensions.

Winters (2004) asserted that while there are serious methodological challenges and disagreements about the strength of the evidence, the most plausible conclusion is that liberalisation generally induces a temporary (but possibly long-lived) increase in growth. A major component of this is an increase in productivity. However, there are arguments about whether trade liberalisation results in or from economic growth.

Winters (2004) moreover notes that the received theory of economic growth is concerned with steady-state rates of growth, which are important conceptually but, essentially unobservable. In practical terms, therefore, one should also consider long-term transitional growth-rates. If trade liberalisation shifts the economy onto a higher but parallel growth path, actual growth rates exceed the steady-state rate while the change occurs. Given that policy reforms are typically phased-in over several years and that their effects can take decades to occur, it is difficult to tell such transitional rates from changes in steady-state rates empirically (Brock and Durlauf, 2001).

The treatment of trade liberalisation raises similar issues. Conceptually it is important to distinguish openness to trade, a level or state variable, from trade liberalisation, which refers to its change: in practice, however, they can be difficult to separate. Both should strictly be measured by policy stances but, since that is so complex, outcome measures are often used instead.

3.4.2. Export Incentives as a Short Run Policies and the East Asian Growth

The export-promotion policy, by providing incentives to exports, has occupied much of the discussion in explaining the East Asian experience. According to Baysan and Blitzer (1991), export incentives as short run policies are necessary to increase the short run supply of exports, given fixed capacity as a better allocation and utilisation of resources occur. However, these incentives themselves are not sufficient to produce a sustained long run growth in exports. This sustained growth in exports can occur only through a permanent change (resource allocation) and installation of new capacity. Investment responds to expectations of long run profitability as reflected in the real exchange rate in the long run. If free trade can change investment expectations, it can change investment allocation and this can occur in part if free trade is considered and announced as a long run objective.

Birdsall and Sabot (1993) commented that East Asia pursued an export-promotion policy by providing incentives to export through subsidies and tax credits. The export-promotion policy in East Asia was quite unorthodox in the 1960s when an import-substitution policy was popularly recommended as a development strategy. Particularly, unlike other developing regions whose export consisted mainly of agricultural product, East Asia pushed export of manufactured goods, which might have improved technology and organisation of enterprise. The advantage of export-promotion policy is well documented by Krueger (1980, 1990, and 1997). However, it is true that East Asia protected strategic industries. Even though there is a large variation among countries, East Asia, particularly Korea and Taiwan, are famous for state involvement in resource allocation through industrial policies.

Rodrik (1994), however, found no theoretical justification to associate export incentives with the growth taking place in Korea and Taiwan. On the contrary, based on relative factor endowments and the Stolpler Samuelson theorem, there will be a reduction in the returns of capital and consequently investment. It is suggested that for poor countries like Taiwan, Korea and Singapore, export incentives and the increase in the profitability of export of labour intensive industries are behind this reduction. In other words, the first degree of the boom in investment is the growth of exports, created by depending on tax incentives in Taiwan and on credit subsidies in Korea. And according to Rodrik (1994), the role of export incentives was to allow a sufficient supply of exports to provide the resources which may be necessary for import expansion resulting from the increase in the demand for investment.

Subasat (2002) asked, does export promotion increase economic growth? He reported the empirical link between exports and economic growth, i.e. export-led development. The basic objectives were to attempt to control for structural features that determine “export orientation” in order to derive an index of export promotion that captures policy effects only, and then to test whether or not this index is a determinant of growth. Subasat concluded that the empirical results did not provide strong evidence for export-led development, as only for middle-income countries was there a weak positive correlation between export promotion policy index (EPPI) and economic growth. For low-and high-income countries, there was no evidence for the benefits of promoting exports. Nor, however, was there evidence that promoting exports harms the economy. Subasat concluded that in the real world, matters are rarely simple and there can be no “handbook” for development purposes. He advised that developing countries should have a pragmatic approach to trade policies. Industrial policies in general and trade policies in particular should be produced according to a country’s specific circumstances.

3.4.3. Investment Role in the East Asian Growth

Investment plays an important role in explaining the relationship between free trade and economic growth through explaining the East Asian experience.

Wacziarg (1998) made an ambitious attempt to uncover the channels through which openness affects economic growth. His index of trade policy is a linear combination of three indicators: (a) the average import duty rate; (b) the NTB coverage ratio; and (c) the Sachs-Warner indicator. The weights used to construct the combined index come from a regression of trade volumes (as a share of *GDP*) on these three indicators plus some other determinants. Using a panel made up of five-year averages for

57 countries during 1970-89, Wacziarg found that investment is the most important channel through which openness increases growth, accounting for more than sixty percent of the total effect. Rodriguez and Rodrik (2000) expressed doubt whether the Sachs-Warner measure, on which the Wacziarg indicator is partly based, is a meaningful indicator of trade policy. Wacziarg remarked in a footnote (1998, fn.9) that the "exclusion of (the Sachs-Warner indicator) from the trade policy index reduced the precision of the estimates…but did not change the qualitative nature of the results."

Based on the virtuous circle models of export-led growth, Nam and Kim (2000) re-examined the Korean case and argued that the domestic investment boom only followed after the shift from a policy of inward orientation to one of outward orientation in the 1960s. They noted that in the aftermath of the reform, export response was quick, doubling every five years, but that the investment response was much slower. "Investment responded vigorously only after export growth moved into a higher gear in the later half of the 1960s" (Nam and Kim, 2000, 126). They argued that the virtuous cycle of growth, initially ignited by outward orientation policy, went on until the late 1980s when the export to GDP ratio began to fall and domestic savings and investment began to decrease. Wacziarg (2001) also found that investment is a key link concerning the free trade and growth.

However, previous studies concerning this point, such as Rodrik (1995) did not accept the view that the growth process in the East Asian economies was sustained by the rise in investment that was nurtured by outward- oriented policies adopted by these economies. He argues that the investment boom was not caused by the preceding increase in the relative profitability of exports created by outward- oriented policies in the 1960s. According to Rodrik, exports were too small in relation to GDP and so they had no significant influence on aggregate growth. That means that the investment boom which occurred in Korea did not depend on trade policy reforms of the 1960s. He considered the boom as the outcome of a number of strategic government interventions and favourable initial conditions, such as the equality of income and wealth and the existing of an educated labour force.

However, Bhagwati (1996) emphasised that even if Rodrik's view is correct, the investment boom could not have flourished in a closed economy. He added that the argument of Rodrik is not totally persuasive as the problem of demand constraint would have been faced by the East Asian economies if they had followed an import-substitution strategy, with the efficiency of other policies in generating investment seriously impaired or ruined. Moreover, the ultra export promotion strategy with its mild bias in favour of the export market and the policy–backed ethos of entering world markets means that a major role in affecting investment decisions must have been played by the export incentives, not only in the exporting countries, but also in the much larger range of non-tradable industries.

In any event, the growth of exports from East Asia was so phenomenal that the share of initial exports in GNP rose rapidly to levels that would lay the objection of Rodrik to rest even if it were conceptually correct. For more details see Bhagwati (1996, 18).

Beyond the general benefit of exposure to an advanced, competitive world market, the act of trade liberalisation also carries the potential of dynamic benefits. In their systematic study of industrialization and development, Chenery et al. (1986) focused on the sources of growth in total factor productivity. Their work suggests that periods of trade liberalisation also tend to be periods where total factor productivity growth is unusually high.

3.4.4 Capital Accumulation Role in the Success of the East Asian experience

To complete the discussion we should mention the argument that capital accumulation rather than productivity growth underlies the success of the East Asian experience (Young, 1995; Collins and Bosworth, 1996). Similarly the subsequent economic slowdown could be taken as evidence of reduced rates of accumulation due to diminishing returns (Krugman, 1996). See the following tables:

Table 3.8
Summary data on East Asian growth (1966-1990*)

	(1) Growth Rate of output	(2) Assumed cost share of capital	(3) Contr -ibution of capital	(4) Contr -ibution of labour	(5) Contr-ibution of TFP	(6) Steady State Contri-bution	(7) Transit -ional Contri-bution	(8) Transit-Ional Growth rate	(9) Steady State gap
S. Korea	10.3	0.30	0.40	0.44	0.17	0.86	0.14	1.4	1.3
Taiwan	9.4	0.26	0.34	0.39	0.28	0.89	0.11	1.0	1.2
Singapore	8.7	0.49	0.65	0.33	0.02	0.69	0.31	2.7	2.4
H.Kong	7.3	0.37	0.41	0.28	0.32	0.94	0.06	0.4	1.1

Source: Young (1995).

*Hong Kong data for 1966-1991

Table 3.9
Summary Data on East Asian Growth (1960-1994)

	(1) Growth Rate of output	(2) Assumed Cost share of capital	(3) Contri-Bution Of capital	(4) Contri-Bution Of labour	(5) Contri-Bution Of Production	(6) Steady state Contri-bution	(7) Transit-ional Contrib.-ution	(8) Transit-Ional Growth rate	(9) Steady State Gap
South Korea	8.3	0.35	0.51	0.30	0.19	0.76	0.24	2.0	1.6
Taiwan	8.4	0.35	0.48	0.27	0.25	0.80	0.20	1.6	1.5
Singapore	8.0	0.35	0.54	0.26	0.20	0.69	0.31	2.5	2.0

Source: Collins & Bosworth (1996)

Tables 3.8 and 3.9 present relevant data for the gang of four: Hong Kong, South Korea, Taiwan, and Singapore, based on the data of Young (1995) and Collins and Bosworth (1996) where growth is divided into a transitional and a steady state component. Young's data has the advantage of including the capital cost share estimates for each country, whereas a constant value of 0.35 was used by Collins and Bosworth (1996) as shown in the tables. On the other hand, the agriculture sector, which has an important role in explaining, partly, lower rates of its growth, was excluded. Based on the estimates of Young, it is noted that capital contribution is high in the gang of four economies.

It is notable, as well, that Hong Kong's path of growth can be described in terms of steady state growth conditions; note the values of the contribution of capital and the assumed cost share of capital, as well as the transitional growth rate, which is close to zero. The high value of the contribution of capital, in this case, is a consequence of high capital share. The lowest cost share belongs Taiwan, but it has a similar high value for the contribution of capital, which is, in this case, due to transitional growth. Thus, within the context of standard growth theory, it is suggested that Hong Kong has mostly accumulated capital in response to productivity change; however, Taiwan has experienced shocks, such as changes in savings rates, resulting in capital deepening (see Young, 1995 for details). The data of the two tables indicates the small contribution of transitional growth to *GDP* growth in all economies, except in Singapore. Also, it is noted that these economies entered steady state growth in the late 1980s to 1990s, when the steady state gap was very close to unity for all countries.

Coe et al. (1997) find that interacting with the importing country's openness measure has a statistically significant positive effect in the growth in total factor productivity (TFP). Winters (2004) comments that while these results are instructive, Coe et al. do not formally test trade against other possible conduits for knowledge and Keller (1998,2000) has suggested that their approach is no better than would be obtained from a random weighting of countries' knowledge stocks.

Studies by Young (1994) and Kim and Lau (1994) were a challenge to the debates over the role of policies in East Asia. Young showed after careful examination of the detailed data on four East Asian countries that the rates of total factor productivity growth (TFPG) of those countries are only modest and comparable to those of developed countries, contrary to the causal belief. That is, after accounting for the huge accumulation of physical and human capital, there is not much left to be explained about the extraordinary output growth of East Asia. To the extent that both neoclassical and revisionist arguments on East Asian growth were based on the productivity or efficiency gains from open and liberalised trade regimes or active government intervention, these empirical results weakened the basis of the debate (a similar view is expressed in Collins and Bosworth, 1996, 171).

3.4.5 Trade Policy (Opennesss) and Economic Growth and the Customs Union of the EU

Other studies were conducted on the European Union in the 1990s to investigate the relationship between free trade and growth. The first one was conducted by Ben-David (1993) who shows that open economies converge and that the trade agreements of the European Union have resulted in the convergence of its membership.

Vamvakidis(1997) comments that it is a known puzzle in the empirical literature on growth that economies do not experience the convergence that the neoclassical growth model predicts and in general, growth of the world economy agrees more with divergence than with convergence. The work of Ben-David showed that the only economies that converge are those that are integrated in the world economy through trade. Ben-David (1993) considers income convergence in countries that have integrated with each other (such as the European Community Countries). He takes an altogether different approach to studying the impact of openness on economic growth and analyses the effect of trade policies on income by asking whether trade liberalization leads to a reduction in the dispersion of income levels among liberalizing countries (i.e., whether it contributes to what has been called σ-convergence). His work is non parametric and not regression-based. The expectation that trade liberalization might lead to income convergence is grounded in the factor price equalization (FPE) theorem.

According to trade theory, free trade in goods leads to the equalization of factor prices under certain conditions (including equal numbers of goods and factors, identical technologies, and the absence of transport costs). As barriers to trade are relaxed (and assuming in addition that differences in capital-labour ratios and labour-force participation ratios do not countervail), a tendency towards FPE can be set into motion, resulting in convergence in per capita incomes. Ben-David's argument goes beyond simply ascertaining that a decrease in dispersion occurred during the post war era. He tries to show that trade liberalization caused this decrease by discarding other plausible alternatives. Thus he argues (i) that the observed convergence was not simply a contribution of a long-term convergence trend unrelated to post war economic integration; (ii) that the European countries that chose not to enter a free-trade agreement did not experience the same levels of convergence as the EEC; (iii) and that other subsets of economies in the world which were not economically integrated did not experience convergence. Baldwin and Sephezza (1996) documented the positive growth effects of European Union for the medium term.

In the same year, Vamvakidis (1996) showed that the trade policies of countries in the same region matter for growth and compared the importance of a large international market for the growth of open economies with the importance of a large domestic market for the growth of closed economies. In this respect, Henrekson and Torstensson (1997) showed that a dummy for participation in the European Union has a positive coefficient in cross-country growth regressions, but its significance is not always robust and depends on the specification of the empirical mode. Most of the literature on trade and growth did not examine the impact of regional integration on growth, except for Ben-David (1993) who shows that trade agreements in Europe have caused convergence.

To give empirical evidence on the growth effects of customs unions and trade liberalisation, the results of Vamvakidis (1999), based on a forty-year sample for over one hundred countries, are more convincing than those of purely cross-sectional studies. Vamvakidis concludes that multilateral liberalisations over the period 1950-89 were associated with increases in rates of growth, while discriminatory regional trading agreements were not. He considers liberalisations only up to 1989, in order to leave enough post-reform data to identify growth effects.

After demonstrating the positive effect of free trade on economic growth, we should refer briefly to the opposite view. Concerning the negative effect of the free trade on economic growth, we find that while studies of the relationship between economic freedom and economic growth have shown it to be positive, significant and robust, it has been strongly argued that different areas of economic freedom may have quite different effects on growth. In that connection, Carlsson and Lundstrom (2002) advanced the literature using the Economic Freedom of the World Index (EFI) by investigating the growth effects of various areas of index. They reported a surprising finding, namely that the area “international exchange: freedom to trade with foreigners” exerts a negative influence on economic growth. Berggren and Jordahl (2005) find that “taxes on international trade” seems to drive this result. They show that this result is not robust and caution against using the negative result in offering policy advice.

Even though most economists have argued for a positive effect of free trade, as stated before, there are theoretical arguments to support both the contention that free trade improves economic performance and the opposite view, for example, Bhagwati (1994), Krueger (1997), Srinivasan (1999) and Srinivasan and Bhagwati (2001). Berggren & Jordahl (2005) raised the following arguments: free trade might reduce growth in countries that do not specialise in research and development or other promoting activities of growth; higher growth rates could lead to higher tariffs rather than the other way around, perhaps due to some political logic , or they could be jointly determined; the effect of one variable, such as free trade, is not always fully manifested in the coefficient of the variable itself but through other variables that are themselves related to growth, e.g. investment; less free trade could induce more growth if trade and foreign direct investment (FDI) are substitutes and if it is combined with freedom for FDI; and perhaps some countries are able to act as price makers on the international market, using trade policy strategically, and it may be that they have higher growth rates. Hence, this is, in the end, an empirical issue. And the bulk of the literature supports the view that free trade and trade openness does have, at least some, positive effects on efficiency and growth. An example is the survey provided in Berg and Krueger (2003).

Rodriguez and Rodrik (2000) claim that the results in this literature are less trustworthy than has been claimed, due to poor measures and methods; but Baldwin (2003) maintains that there are credible studies to the effect that openness is growth-enhancing in combination with a stable and non-discriminatory exchange rate system, responsible fiscal and monetary policies and an absence of corruption. Berggren and Jordahl (2005) use in their study a data set consisting of averages of economic freedom measures (1970-1995) and macroeconomic variables (1975-2000) for 78 countries. Using a newer version of the index, and hence partly new data, they find that the area “Freedom to exchange trade with foreigners” is associated with slower growth. By decomposing the index even further, they can establish that the component “Taxes on international trade” seems to drive this result- the higher these taxes, the higher the growth.

3.4.6. Trade and Economic Growth: Time series regressions (ELG and/or GLE) Hypotheses.

Recent studies on causality between exports and economic growth have been based on individual country case studies. Such studies have been conducted for both developing and developed economies. Almost all support the long run relationship between total exports and economic growth. Some of these studies are summarised in the following table, starting with the recent ones:

Table 3.10
Some literature on causality between international trade and economic growth (ELG and/or GLE)

Author	country	study period	Methodology (Technique)	findings
Herzer et al., (2006)	Chile	1960-2001	production function framework	- Manufactured exports enhance productivity. - Primary exports appear to have productivity limiting effects.
Tsen (2006)	China	1978-2002	Granger Causality	- Bi-directional Granger causality among Exports, domestic demand and economic growth.
Awokuse (2005)	Korea	1963-2001	Granger causality based on VECM	- Bi-directional causal link between real exports and real exports and real GDP growth.
Keong et al., (2005)	Malaysia	1960-2001	the bounds testing approach	- a cointegrated relationship between exports and economic growth was detected in both short and long runs. - exports and labour force are positive stimuli to economic growth, whereas imports and exchange rate have a negative influence on growth - further evidence supports ELG.
Ahmed (2004)	Pakistan	1972-2001	Granger non-causality developed by Toda and Yamamota	- A long-run relationship exists among the variables: domestic output, export growth and FDI. - Supports ELG. - Nexus between FDI and domestic output, but not between FDI and export growth.
Sharma and Panagiotidis (2004)	India	1971-2001	The analysis is based on the model of Feder (1983)	- Failed to support the hypothesis that exports Granger-cause GDP; the same holds for the relationship between exports and investment

Awokuse (2002)	Canada	Quarterly data for the period 1961-2000	Granger causality based on VECM	- A long-run steady state among the all variables of the model exists. - A unidirectional Granger causality from real real exports to real GDP exists.
Medina-Smith (2001)	Costa Rica	1950-1997	An augmented Cobb-Douglas production function	- Export led growth is valid for short and long runs.
Chuang (2000)	Taiwan	1952-1995	Granger causality based on recent techniques (cointegration)	- Human capital accumulation fosters growth and stimulates exports. - Exports promote long-run growth by accelerating human capital accumulation process
Hatemi-J & Irandoust (2000)	Nordic countries	Quarterly data 1977.1-1996.1 for Denmark 1975.1-1994.4 for Finland 1975.1-1996.1 for Norway 1980.1-1995.2 for Sweden (seasonally adjusted)	Cointegration (Johansen's Maximum Likelihood procedure) and the augmented Granger causality tests	- Unidirectional real output Granger-causes export growth. The relationship is bi-directional in the cases of Finland and Norway.
Biswal & Dhawan (1998)	Taiwan	1960-1990	Cointegration and causality tests	- Long-run equilibrium relationship between total exports and GDP. - Bi-directional causality between the same variables. - Long-run relationship between manufactured Goods exports and GDP, with a stronger causality from GDP to manufactured goods exports and weak causality in the reverse direction.
Shan& Tain (1998)	Shanghai	1990-1996	A six variable VAR model	- unidirectional causality running from GDP to exports.
Lui et al., (1997)	China	Quarterly data 1983.3-1995.1	Integration and Cointegration procedures. (Granger, Sims, Geweke, and Hsiao models)	- Feedback causal relationship between economic growth and exports& imports exists.

To sum up, whether using cross-section or time-series data, a review of the previous single equation literature in international trade and economic growth indicated the failure to consider the endogenous nature of the growth process. These studies ignored the endogeneity of the export growth variable within a growth equation. It is highly likely that trade affects, and is affected by, the economic growth rate, i.e. the relationship between trade and economic growth is likely to be bi-directional. In a regression model, the presence of interrelationships among the dependent and independent variables can cause simultaneity bias. For this reason, the conclusions of the studies reviewed may not be valid for the export-growth hypothesis as, to a large extent, these studies are subject to a simultaneity bias.

To deal with the simultaneity bias problem, many methods have been proposed. One way is to carry out causality analysis, as indicated in subsection 3.4.6) to determine the direction of the relationship between trade and economic growth. Further investigation for this analysis will be carried out in the next chapter (Ch.4) to determine the direction of the relationship between trade (represented by real exports) and economic growth (represented by real GDP). Another proposed way to deal with simultaneity bias is by building a simultaneous equations model that captures the bi-directional relationships which cause simultaneity bias in single equation models such as those in the previously reviewed literature.

A simultaneous equation model will be specified in Ch.5 to capture the bi-directional relationships between trade (represented by exports growth) and economic growth (represented by GDP per capita growth) to deal with this simultaneity bias. The next section reviews some studies, which dealt with the problem of simultaneity bias and further empirical investigation in both Chs 4&5 (as stated) will be conducted using data for Egypt and a sample of some selected low-and middle-income countries.

3.5. Trade and Economic Growth: Simultaneous Equation Models

Although not all of these studies are in line with our strategy of concentrating on the gang of four when reviewing the literature, we consider that it is important to highlight studies using simultaneous equation models to examine the relationship between trade and development, while noting that it would not be fair to compare between the number of these studies and the number of studies based on a single equation model of the same relationship. Also, it is noted that the simultaneous equations model studied did not concentrate on the trade liberalisation policy; their contribution to the study of the international trade and economic development lays in their construction of simultaneous equations models. The absence of any indicators of trade liberalisation in these studies does not reduce their importance, as they used a different technique when investigating the trade-development relationship.

Attempting to overcome most of the shortcomings of previous empirical studies, based on a single equation, Salvatore (1983) developed a simultaneous equations model which captures the most important quantitative aspects of the relationship between international trade and economic development. He tested this relationship by pooling data for 52 developing nations from 1961 to the 1978. His model was estimated by Full Information Maximum Likelihood (FIML), validated by dynamic simulation, and utilised to conduct dynamic policy and other counterfactual simulations (Salvatore, 1983, 67). His model started from a general aggregate production function:

$$Q = F(K, L)$$

where Q is output and K and L are capital and labour inputs, respectively. His constructed four system simultaneous equations model was as follows:

$$DY_t = \alpha_0 + \alpha_1 I_t + \alpha_2 R_t + \alpha_3 DX_t$$

where,

DY_t = *growth of real income per capita in year t;*

I_t = *gross fixed capital formation as a percentage of gross domestic product (GDP);*

R_t = *industrial output (manufacturing plus construction) as a percentage of GDP;*

DX_t = *growth in the percentage of exports to GDP.*

The second equation was as follows:

$$I_t = b_0 + b_1 Y_t + b_2 DY_t + b_3 X_t + b_4 F_t$$

where,

I_t = gross fixed capital formation as a percentage of GDP in year t;

Y_t = real income per capita in U.S. dollar;

DY_t = growth of real income per capita;

X_t = exports as a percentage of GDP;

F_t = capital inflow (net imports of goods and services) as a percentage of GDP.

We have to note here that, as stated by Salvatore (1983), the appearance of *DY* in the second equation establishes one of the simultaneity links in the model. In the first equation *DY* is a function of *I* whereas, *I* is a function of *DY* in the second one, moreover, there is a direct relationship between *DY* and *DX* in the first equation, however an indirect relationship (but positive) between *DY* to *X* in the second equation. The third equation was:

$$R_t = c_0 + c_1 DY_t + c_2 X_t + c_3 R_{t-1}$$

where,

R_t = industrial output as a percentage of GDP;

DY_t = the growth of domestic economy;

X_t = rate of exports;

R_{t-1} = rate of industrial output in the previous year.

Finally, the fourth equation was as follows:

$$X_t = d_0 + d_1 P_t + d_2 W_t + d_3 R_t$$

X and *R* are defined earlier

P is the ratio of the consumer price index in the nation relative to the consumer price index of all market economies.

W is the index of real GDP of all market economies.

The fourth equation is linked simultaneously to the third one and the rest of the model through R. In brief, Salvatore (1983) found that the sign and statistical significance of estimated coefficients, also the dynamic validity simulation strongly support the model empirically. He found the relation between trade and growth to be unequivocally positive and so he supported in the conclusions of Haberler (1959) and Caves (1970) who regarded trade as an engine of growth. Salvatore (1983) concluded that trade can be very important to the development process, but is more in the nature of a handmaiden than an engine of growth. Also, Salvatore's study strongly confirms the retarding effect of the policy industrialisation through import substitution (adopted by most of developing nations) on growth.

Like Salvatore (1983), Esfahani (1991) took the endogeneity of exports into consideration. He developed a simultaneous equations model to deal with the relationship between exports and economic growth with concentrating on export-promotion policy as a superior development strategy. He developed a three- equation system of *GDP*, exports, and import growth model simultaneously. His developed model of the relationship between export performance and *GDP* growth rate is in some basics similar to that of Feder (1983). He assumed that Y, total output, is produced through two different processes. The first one is production for using domestically, *D*, and the other is production for exports, *X*. *K*, total capital, and L, total labour, produced the value added in these two processes. To capture export externality effects Esfahani (1991) assumed that the productivity of factors used in the domestic goods production depend on the level of exports. Also, he added an intermediate good to the ingredients list for the production of each product to allow for the impact of shortages in the imported intermediate goods supply. Following Feder (1983), Esfahani (1991) used a cross-sectional data set consisting of a sample of 31 countries identified by Chenery (1980) as semi-industrialised, excluding the major oil exporters. The data were for the periods 1960-1973, 1973-1981, and 1980-1986, representing three different phases of the world economy since 1960 (Esfahani, 1991, 95). His paper made (according to Esfahani, 1991) two contributions. The first one is that the correlation established between export expansion and output growth is mainly due to the contribution of exports to the reduction of import "shortages", which restrict the growth of output in many semi-industrialised countries. The second contribution of Esfahani's paper (1991) is his development of a simultaneous equations model enabling him to deal with the simultaneity problem between *GDP* and export growth rates.

By bridging the work between the economists and sociologists on the relationship between international trade and economic growth, Sprout and Weaver (1993) provided a valuable contribution to the literature by constructing a simultaneous equations model taking into consideration, like Salvatore (1983) and Esfahani (1991), the endogeneity of export growth. The two previous groups (economists and sociologists) have contrasting opinions regarding the size and growth of the export sector. While economists see that the larger the export sector and the greater its growth, the more the economy expands, the sociologists see an inverse relationship. Concerning trade liberalisation policy, Sprout and Weaver (1993) stated the views of both economists and sociologists. The economists support trade liberalisation and greater integration into the economy of the world for LDCs, whereas, the sociologists argue that foreign trade is detrimental to the interests of the LDCs. Sprout and Weaver (1993) explained the above divergence in views, by the fact that the two groups are addressing different aspects of the gains and losses from trade. The economists' tests assess the possibility of absolute gains from trade, while the sociology studies examine the relative gains (Sprout and Weaver, 1993, 299). Their model consists of three simultaneous equations specified as follows:

The first equation is

$DGNP = a_1 + (a_2)\ GDI + (a_3)\ DLABOR + (a_4)\ DX$

The second one is

$GDI = b_1 + (b_2)\ GDPPC + (b_3)\ DGNPPC + (b_4)\ XSHARE + (b_5)\ KI$

The third equation is concerned with exports growth:

$DX = c_1 + (c_2)\ DGNP + (c_3)\ PRICE + (c_4)\ TPGROWTH + (c_5)\ TPCON + (c_6)\ TSCOMP$,

where *DGNP* = growth of real *GNP*; *GDI* = growth domestic investment as a percentage of *GDP; DLABOR* = growth of the labour force; *DX* = growth of real exports *(DX1),* or growth of export share of *GDP (DX2); GDPPC* = real *GDP* per capita; *DGNPPC* = growth of real *GNP* per capita; *XSHARE* = export share of *GDP* (exports as a percentage of *GDP); KI* = capital inflow (net imports of goods and services) as a percentage of *GDP*; *PRICE* = price competitiveness (inflation and exchange rate changes in the LDC relative to its 5 leading partners; TPGROWTH = trade partner's growth (weighted average of real *GNP* growth of the LDC's 5 leading trading partners); *TPCON* = trade partner concentration (proportion of total exports received by the LDC's 3 leading partners);

TSCOMP = trade structure composite average of the value of primary exports as a percentage of total exports (*PRIMX*) and the value of the 2 leading export commodities as a percentage of total exports (*CCON*). Data for 72 LDCs were used for the period from 1970 to 1984. Sprout and Weaver (1993) divided the 72 LDCs into three types, which were supported by empirical and theoretical literature, large exporters, small primary product exporters, and small non primary product exporters. The model was estimated using 2SLS.

Sprout and Weaver's results suggest that those with more processed exports benefit the most from trade (Sprout and Weaver, 1993, 298), and so the small primary product exporters benefit the least. On this point, Sprout and Weaver (1993) support the sociology studies in highlighting the importance of the structure of the export sector. Sprout and Weaver (1993) concluded that the larger the export sector, the greater is domestic investment and so they found that trade structure plays an indirect role in affecting economic growth rate as well through investment and export growth. They found that the growth of export sector decreases as there is an increase in the proportion of primary exports. However, they did not find any adverse effect on the economic growth as a result of few number of trading partners. Evidence of a simultaneous relationship between economic growth and export growth among some LDCs appeared in Sprout and Weaver's paper (1993). Their test results supported the economists' and sociologists' perspectives regarding the greater gains from trade in more processed exports and in a more diversified export sector (Sprout and Weaver, 1993, 298). Sprout and Weaver's results supported the opinion of the economists regarding the size and growth of the export sector mentioned earlier. Finally, their findings support the argument of the sociologists that the primary export countries that fail to diverse their exports experience less economic growth from expanding the export sector than those that can diversify their exports.

To deal with the previous simultaneity problem in the openness-growth relationship, Frankel et al. (1996) used instrumental variables that are truly exogenous and are not highly correlated with trade from the gravity model of bilateral trade, such as proximity to trading partners. Their basic specification is given by regression equation based on Mankiw et al. (1992).

By including total trade (exports+imports) as a share of *GDP*, Frankel et al.(1996) extended the Mankiw et al. empirical analysis. Mankiw et al. (1992) specified their augmented model based on the steady state of a Solow growth model with Cobb-Douglas production function and exogenous technical changes and population growth. One production function that is consistent with their empirical results is:

$$Y = K^{1/3} H^{1/3} L^{1/3}$$

In the model of Frankel et al. (1996) the dependent variable is *GDP* per capita at the end of the sample, 1985. At the beginning of the sample (1960), *GDP* per capita appears as an explanatory variable. Their basic equation is as follows:

$$\log(Y/pop)_{85} = \alpha + \beta \log(T/Y)_i + \gamma \log(I/Y)_i + \delta \log(n)_i + \varphi \log(Sch)_i + \lambda \log(Y/pop)_{60} + u$$

where, *Y* is *GDP*; *pop* is the country's working-age population; *T/Y* is total trade (exports+imports) as a share of *GDP; I/Y* is gross investment as a share of *GDP*; *n* is the rate growth of *pop*; *Sch* is an estimate of human capital investment based on schooling. Their sample contains 100 to 123 countries, depending on availability of some variables. Their instrumental variable regression results confirm a significant impact on *GDP* per capita and more specifically, the role played by openness in promoting growth is stronger in contributing to East Asian growth by both the exogenous or geographical component of openness and by the residual or policy component.

By using panel data, authors such as Easterly et al. (1997) and Kebede (2002) tackled the endogeneity problem. Easterly et al. (1997) found that trade share of *GDP* acted as an openness regressor is significant. By considering six endogenous variables (*GDP* growth, the ratio of investment to *GDP*, growth of exports, the ratio of foreign direct investment to *GDP*, human capital and infrastructure), Kebede (2002) supported the positive impact of trade openness on economic growth and confirmed that using panel data reveals that the results obtained in cross-section studies are dubious.

To sum up, it is noted that none of the single equation studies reviewed, whether using time series or cross-sectional data, took the simultaneity issue (endogeneity problem) into consideration when investigating the relationship between international trade and economic growth. Even studies using simultaneous equation models did not focus on trade liberalisation policy; their contribution was just in constructing the simultaneous equation models. Our study will try to consider this point when investigating the relationship between international trade and growth for the Egyptian economy.

3.6. Trade and Growth: The causality issue and openness definition

Previous research raised a number of problems. The first problem is causality, that is, whether free trade results in or from economic growth.

Earlier empirical work often regressed export growth rates on economic growth rates to determine whether they were correlated. However, this was criticised on the ground that exports are a component of GDP, and an autocorrelation between them would be expected, and other important determinants of economic growth were excluded (Michalopoulos and Jay, 1973; Michaely, 1977).

Dollar (1991, 536) recognizes "the possibility that causation runs in the other direction: from poor growth performance to inward-orientation." He argues that an external factor, such as a debt crisis, may cause both slow economic and export growth.

World Bank researchers are also aware that "the link between trade strategy and macroeconomic performance is not entirely clear," and raise the question of whether "outward-orientation leads to the better economic performance or superior economic performance paves the way for outward orientation" (World Bank, 1987, 83). In fact, the vast majority of the literature fails to establish the direction of causality.

Theoretically, "the stage of development" theory of comparative advantage, for example, argues that economic development tends to stimulate exports as the earlier stages of development, whereas exports tend to stimulate economic development after some degree of development is attained. It is argued that higher growth rates are not necessarily determined by exports, but by processes that are independent of trade policy (Pack and Page, 1992). The strong correspondence between levels of development and trade policy orientation suggests that export performance is related to the level of development.

As development takes place, the economy becomes stronger, markets become more efficient and fewer bottlenecks occur. This well-functioning economy facilitates greater penetration into world markets. Thus, Yaghmanian (1994) argues that both economic growth and successful export performance are determined by processes of development and structural change. Exports, and the growth rate of GDP, may, or may not, reinforce each other. However, as countries become more developed, they are more likely to get the prices right, and in so doing to follow a more neutral policy stance both with respect to exports and the domestic economy.

In the case of the East Asian countries, estimates of growth equations have found a role for openness in explaining rapid growth, but major concerns of simultaneous causality between growth and trade have been expressed (Frankel et al., 1996). Rodrik (1994) argues that export-promotion is not a cause of economic growth but the result. And that most factors of growth, such as technology, institutions, and capital goods inflow through imports rather than exports (Rodrik, 1999).

According to Rodrik, the reverse causality mechanism runs as follows: in developing countries, such as Korea, an exogenous rise in investment with a comparative disadvantage in producing capital goods will call for a rise in imports of these goods and consequently a rise in exports to pay the imports. Levine and Renelt (1992) and Bradford and Chakwin (1993) reached the same conclusion.

Frankel et al. (1996) aimed to deal with the endogeneity of trade by using as instrumental variables the exogenous determinants from gravity models of bilateral trade, such as proximity to trading partners. They identified the subject of their paper as trade-led growth and in measuring trade, lumped together exports and imports. Either could generate technical spillovers (Grossman and Helpman, 1991b; 1991c).

Frankel et al., (1996) adopted the “conditional convergence” specification that has become common in the empirical literature on growth. Their sample contained 100 to 123 countries, depending on the availability of some variables, their results suggested that reverse causation (implying simultaneity) is not a serious problem in estimating the effects of openness on trade. They concluded that openness plays a substantial role in many countries, especially Hong Kong and Singapore.

Frankel and Romer (1999) and Irwin and Tervio (2002) address the problem of causation by examining the effects of the component of openness, independent of economic growth, such as population, land area, borders and distances. This component appears to explain a significant proportion of the differences in income levels and growth performance between countries, and from this the authors cautiously suggest a general relationship running from increased trade to increased growth. The problem, however, as Rodriguez and Rodrik (2000) and Brock and Durlauf (2001) observe, is that such geographical variables could have effects on growth in their own right and this could explain the significance of the instrumental estimate of trade constructed out of them. For example, geography may influence health, endowments or institutions, any one of which could affect growth.

Causation is a particular problem in studies that relate growth to openness measured directly- usually, as (exports + imports)/GDP. Such openness could clearly be endogenous, as both the export and import share seem likely to vary with income levels.
Another problem is that for liberal trade policies to have a long-life effect on growth almost certainly requires their combination with other policies, such as those that encourage investment, allow effective conflict resolution and promote human capital accumulation.

The second problem is concerned with the problem of the definition of openness, as stated earlier in chapter 2. In the context of policy advice, it is most directly associated with a liberal trade regime (low tariffs, very few non-tariff barriers etc.) but in fact that is rarely the concept used in empirical work. Thus, for example, Dollar's (1992) results rely heavily on the volatility of the real exchange rate, while Sachs and Warner (1995) combine high tariff and non-tariff measures with high black market exchange rate premia, socialism and the monopolisation of exports to identify non-open economies.

The definition of openness has varied over time. On the one hand, Krueger (1978) discussed how trade liberalization can be achieved by employing policies that lower the biases against the export sector. According to her definition, one can have an open economy by employing a favourable exchange rate policy towards the export sector and at the same time use trade barriers to protect the importing sector.

On the other hand, Harrison (1996, 420) viewed the concept of openness, applied to trade policy, as be synonymous with the idea of neutrality, implying a balance between saving a unit of foreign exchange through IS and earning a unit of foreign exchange through exports. Clearly, a highly export oriented economy may not be neutral in this sense, particularly if it shifts incentives in favour of export production through instruments such as export subsidies. It is also possible for a regime to be neutral on average, and yet intervene in specific sectors. Yanikkaya (2003) comments that a good measure of trade policy would capture differences between neutral, inward oriented, and export promoting regimes. Recently, the meaning of openness has become similar to the notion of free trade, which is a trade system where all trade distortions are eliminated. Various openness measures have different theoretical implications for growth and different linkages with growth. However, empirical studies are not usually clear on this issue (Edwards, 1993, 1365).

According to Rodrik (1995), in most studies on openness and growth, "the regime indicator used is typically measured very badly" and "openness in the sense of lack of trade restrictions is often confused with macroeconomic aspects of the policy regime" (p.2941). The lack of high quality comparative data on total factor productivity (TFP) has complicated things further, impairing the analysis of the connection between openness and productivity growth.

3.7 Concluding Remarks:

We find that there is a consensus on the welfare gains from free trade and a considerable degree of agreement on the positive relationship between free trade and economic growth.

By analysing theoretical writings and empirical applications, we find also that there are three main strategies by which previous studies were conducted. The first one is constructing alternative indicators of openness (e.g. Dollar, 1992; Sachs and Warner, 1995); the second is testing robustness by using a wide range of measures of openness, including subjective indicators (e.g. Edwards 1992, 1998); the third is comparing convergence experience among groups of liberalising and non-liberalising countries (e.g. Ben- David, 1993).

Two stages can be identified in the methodology concerning cross-country econometric studies on the relationship between trade orientation and growth. In the first stage it is assumed (rather than tested) that more liberalised economies experience faster growth of exports. In the second stage, it is tested whether countries with faster growth of exports have experienced a more rapid rate of growth of GDP.

The analysis shows that there is no doubt that free trade policy, the objective of which has changed from one of emphasising a larger share of the domestic or home market to one of emphasising a larger share of world trade for a country, represents an important factor that contributes to economic growth. Although some studies show a negative impact of trade liberalisation (openness) on economic growth, more studies show a positive impact. However, the nature of the relationship between trade policy (free trade) and economic growth remains very much an open question.

One challenge arises from the problem of causality. Up to now, it is unresolved whether free trade results in or from economic growth. Another problem concerns the definition of "openness". Winters (2003) argues that the definition of the openness in the context of policy advice is most directly associated with a liberal trade regime (low tariffs, very few non-tariff barriers etc.). However, in fact the concept is rarely used in empirical work, as illustrated with reference to the work of Dollar (1992) and Sachs and Warner (1995).

Almost all the studies about free trade and economic growth are based on cross-sectional data. There is no enough use of time series for one country, and panel data approach, such as will be used in this study.

Moreover, there has been a predominant focus on the economies of the East Asian countries, especially the four tigers: Hong Kong, Korea, Taiwan and Singapore; hence the need to examine the relationship between trade orientation and economic growth for other developing countries such as Egypt.

An active government interventionist policy was noticed when discussing the experience of the four tigers. If a free trade regime is adopted, a chance should be given for active and vital government intervention, which will organise the structure and the execution of this free trade regime. As we have seen, an outward oriented regime is not possible through neutral incentives, but rather occurs through an active government interventionist policy, as in Taiwan.

The success of the East Asian economies owes much to temporary export promotion by export incentives with free trade as a long run objective, and investment incentives. However, these could not have been influential unless the macroeconomic indicators like real exchange rates, real interest rate and demand had been conducive to economic growth. Export incentives and various investment incentives work together to contribute to a sustained long run growth in export. In brief, the evidence suggests that openness enhances growth but there are methodological problems in defining and measuring openness, in identifying causation and in isolating the effects of trade liberalisation, which face researchers who conduct cross- country studies. There is a view that case studies can avoid some of these problems, but their results cannot confidently be generalised.

Due to the complex nature of commercial policy, international tariffs, quotas, licences can affect trade, prohibition, and exchange controls, among others. This suggests that attempts to construct a single indicator of trade orientation may be futile, and will tend to generate disagreements and controversies. This means that in order for research on the relationship between trade policy and growth to be persuasive, its results have to be robust to the way in which (policy-induced) openness is measured. An important challenge that lies ahead for research in measuring trade orientation is to obtain more reliable measures of trade policy and to investigate in greater detail the channels through which greater outward orientation affects growth. Most cross-national econometric research, especially of the 1980s, focused on the relationship between exports and growth, and not on trade policy and growth, where much cross- country regression has conceptual shortcomings.

We begin in the following chapter by investigating the issue of causality between growth of output and exports in Egypt as well as selected countries of low-and middle-income classification.

Chapter 4
Trade Openness and Economic Growth Causality: An Empirical Analysis

> **"Since trade theory does not provide a definite guidance on the causal relationship between exports and output growth, the debates are usually informed by empirical analyses that often yield ambiguous results"**
> **(Awokuse, 2005, 693)**

4.1 Introduction

Using the framework of an endogenous growth model, this chapter empirically analyses the relationship between trade liberalisation policy and economic growth, in the context of a causality test between export performance and economc growth, in Egypt as well as in low and middle-income countries using cointegration and Error Correction techniques for the period 1970-2006. We apply cointegration analysis to look for a linear combination of non-stationary time series of Egypt and panel data for low-and middle-income countries that are themselves stationary. Also, cointegration analysis is used, along with an error correction term, to investigate the dynamic behaviour of the process of adjustment from short run disequilibria to long run equilibrium (steady state).

Our contributions are:

1- We set up a human capital model of endogenous growth incorporating an index of trade liberalisation.

2- Within this human capital model of endogenous growth, we empirically investigate the causality between export and trade with respect to human capital as a way to capture technical progress through the human capital variable, higher education, as a type of technological knowledge in the context of the Egyptian economy, low-and middle-income countries.

3- Finally, while the case study (Egypt) is useful for identifying the significance of crucial variables (real export, real import and human capital) for economic growth, in the context of using some selected low-income and middle-income economies, we empirically examine the ability of conclusions from the case study (Egypt) to be generalised.

It is noted from the earlier chapters of the literature review (2&3) that causality represents an important challenge when trying to find out the influence of trade liberalisation (openness) on economic growth, i.e. whether free trade (represented by export) results in or from economic growth. The importance of determining the causal pattern between exports and growth is due to the important implications for policy-makers' decisions about development strategies and the way growth should be targeted. Developing countries' policy makers should advocate export promotion as a development strategy if export could contribute to economic growth; however, they should advocate import substitution if economic growth causes export growth. Both neo-classical and endogenous growth models represent the theoretical basis for empirical work on the relationship between exports and growth. Positive externalities, generated from higher export growth, are the basic argument of the neo-classical growth theory. This holds that exposure to greater competition in world markets results in increased efficiency in resource allocation, increase in domestic production volume and efficiency (economies of scale), and so, long-term economic growth.

The argument of the endogenous growth models, which provide a more convincing conceptual framework for the analysis of the relationship between free trade policy and economic growth, is concentrated on many ways through which the long run relationship between trade orientation and economic growth can be established. According to Dollar (1992), the outward orientation helps to use external capital for development without facing problems in servicing the corresponding debt. For example, in the case of the East Asian countries, it is assumed that FDI brings export technology from advanced countries to developing ones. According to Lewis (1955), it is argued that a more open economy and less distorted trade regime result in a faster rate of absorption of technological progress orginating in advanced countries. Import liberalisation plays an important role in this regard, as it promotes technology transfer through the import of advanced capital goods.

The export oriented strategy for development leads to higher growth through knowledge spillover effects, through which exports affect growth, since that long-run growth is considered as a function of technological changes. According to Kruger (1978), the export-oriented strategy for development leads to higher growth through returns to scale. The relationship between exports and economic growth has acquired additional importance due to recent developments in trade policy literature that focus on the potential dynamic effects of free trade in accelerating the flow of technical knowledge from the world market leading to a quick imitation of advanced techniques in production (Grossman and Helpman, 1991a). The importance of the literature on the relationship between exports and economic growth is further enhanced due to the new developments in econometric techniques used to investigate this relationship, such as cointegration and causality tests (Granger, 1969; Sims, 1972). However, several studies using econometric tests for examining Granger causality between exports and growth may prove inconclusive. Biswal and Dhawan (1998, 699) attribute this inconsistency to many factors, including the quality and quantity of data, the period examined, and test procedure and econometric specification, etc.

Considering that causality is an important issue when regarding the relationship between free trade and economic growth, this chapter is organised as follows: the first section, as a reminder, presents some applications of empirical studies on the causality between exports and economic growth. The second section indicates the location of Egypt in the causality literature. The third section clarifies the importance of adding human capital to the traditional model as an important variable affecting growth and trade by setting up an endogenous growth model to specify a model to test causality. Then, our causality model is specified within an endogenous growth model framework. Methodology is demonstrated in details for both the case of Egypt (time series data) and a sample of low- and middle-income countries (panel data). Using Pc-Give, we will estimate our model in both cases to investigate the following tests:

1- Unit Root test for stationarity;
2- Cointgration test;

3- Granger causality test under Vector Autoregressive model (VAR) or Vector Error Correction Model (VECM), depending on the results of the cointegration test. If cointegration is established, the Granger causality test will be based on VECM, and in case of the absence of cointegration, on VAR (for more details about Pc-Give see Volume I-III of Doornik and Hendary, 2003).

When obtaining the results for both Egypt and low-and middle-income countries sample, we can analyse comparatively both cases. The chapter ends with concluding remarks summarising the findings.

4.2 Background Implications of Exports and Economic Growth

Empirical studies on the causality between exports and economic growth have two approaches. Authors like Michaely (1977), Krueger (1978), Kavoussi (1984), Feder (1983), Balassa (1985) and Salvatore and Hatch (1991) investigate the relationship between openness and economic growth by using a regression model based on the production function. Liu et al. (1997) have commented that these models can identify the relationship between exports and economic growth in alternative equations including various factors of production and in some cases like Timmer (1988), Syrquin (1988) and Yaghmanian (1994), the process of development and structure change. On the other hand, authors like Jung and Marshall (1985), Chow (1987), Kunst and Marin (1989), Dodaro (1991), Sharma and Dhakal (1994), Ghartey (1993), and Doraisami (1996) test the causal relationship between exports and economic growth directly in a bivariate or a multivariate framework.

Empirical studies use two types of data: cross-section and time series data. Most of the cross-country studies such as Michaely (1977), Feder (1983), Edwards (1992) and Ngoc et al. (2003) confirm that exports are important for the developing countries; however, this confirmation is not for the effect of trade liberalisation. For instance, Clarke and Kirkpatrick (1992) using data for 80 developing countries in the period from 1981-1988, found no effect of trade reform (trade liberalisation) on economic growth.

Herzer et al. (2006) criticised the studies based on cross-sectional data for assuming a common structure and similar production technologies across countries, as they assume the same production function across different types of economies, resulting in misleading results. In addition, although these studies take positive correlations to be evidence of causation, the direction of causality is not tested. Another criticism is that these studies ignore differences in the political, economic and institutional structure of the countries and their reactions to external shock (Hatemi-J and Irandoust, 2000).

Because of the problems of cross-sectional data, the most recent econometric studies have used time-series data for an individual country, whether developing or developed, to find out the causal relationship between exports and growth using the Granger causality test. However, these studies have also been criticized. Shan and Tian (1998) criticized the arbitrary choice of lag length, the application of F-statistics for the causality test, which is not valid if time series are integrated and using a simple two-variable relationship in the model specification. Other criticisms concern the neglect of the characteristics of the time series data, like stationarity and cointegration (Hatemi-J& Irandoust, 2000; Sims et al., 1990).

Whether studies are based on production function or not, whether based on cross-section or time series data, and whether applied on developing or developed countries, four views on the causal relationship between exports and economic growth can be identified. The first is the neoclassical export-led growth hypothesis. The neoclassical growth theory suggests that the direction of the causal relationship is from exports to economic growth (Michealy 1977; Balassa 1978; Feder 1983; Chow 1987 and Xu, 1998). According to Liu et al.(1997), this direction of causation results from greater economies of scale resulting from the increase in exports resulting in an increase in productivity, and exporters' exposure to international consumption patterns, resulting in a higher-quality products (more details can be found in Krueger, 1985).

Also, according to the World Bank (1993), the so-called new orthodoxy asserts many reasons why the expansion of exports is beneficial for both developed and developing countries: exports generate greater capacity utilization, they take advantage of economies of scale, they bring about technological progress, they create employment and increase labour productivity, they improve allocation of scarce resources throughout the economy, they relax the current account pressures for foreign capital goods by increasing the country's external earnings and attracting foreign investment and increase the TFP and consequently the well-being of the country.

The second view, held by Kaldor (1967), Vernon (1966) and Sharma and Dhakal (1994) is that the causality runs from economic growth to exports. Kaldor (1967) attributes this to the decrease in production costs resulting from higher productivity (economic growth), which facilitates exports process, making the exported products cheaper to their importers. Vernon's (1966) explanation for this direction of causality is that with economic growth come innovation and technological progress, which should result in well developed markets, improving the performance of exports in the trade sector.

Bhagwati (1988) assumed that growth led export is possible. Neoclassical trade theory supports this where economic growth leads to enhancing skills and technology, creating a comparative advantage for the country and thereby facilitating exports. The technology theory of trade supports this assumption, as this theory assumes that technological innovation in a certain sector will increase the output from this sector more than the domestic demand and so the surplus will be sold in the foreign markets (Liu et al., 1997). Sharma and Dhakal (1994), explain the impact of economic growth on exports in terms of increased domestic production relative to demand, resulting in a surplus, which is sold in the foreign market. Giles and Williams (2000a; 2000b) argued that the failure of the market and consequently the intervention of the government would result in growth led exports.

The third view (e.g. Kunst & Marin, 1989) is that there is feedback or a bi-directional causal relationship between economic growth and exports. The fourth view is that of Pack (1988) who denies that there is any causal relationship between economic growth and exports; rather, he implies that both economic growth and exports are the result of development and structural change.

Concerning the statistical techniques used in the empirical studies, Sharma and Panagiotidis (2004) stated that these varied from focusing on correlations between exports and income, to studies with limited samples for developing countries (Balassa, 1978), followed by studies focusing on aggregate production functions that included exports as an explanatory variable (Feder, 1983). These, in turn, have been supplemented by causality tests (Chow, 1987; Jung and Marshal, 1985; Khalifa, 1997). Some examples of the recent studies in dealing with causality tests will be discussed in the following sub-section.

4.3. Egypt in causality test literature:

Egypt represents an ideal case for investigating the causal relationship between openness and economic growth, as it has experienced different economic stages, from a socialist economy to an open economy. Egypt's experience in trade and economic growth will therefore provide a useful reference point for developing countries in transition. Moreover, Egypt has a sufficiently long series of macroeconomic data, and it has political stability so that the political factor can be excluded from the analysis. Nevertheless, there is a gap in application to Egypt in literature on the causal relationship between exports and economic growth. After searching we found just two studies applied on Egypt.

The first study was not concerned predominantly with causality as such, but with investigating the effects of some factors, especially government expenditure and exports, on economic growth. Causality testing was a logical requirement to get the result. In their article to investigate the combined effects of growth in government expenditure, exports, investment and labour supply on economic growth in Egypt between 1955 and 1996, Morley and Perdikis (2000) used cointegration and error correction models. Their findings are the presence of a long run relationship between the variables, but less evidence of one in the short run. They added that both dummy variables representing policy reforms in 1974 and 1991 have significantly affected the relationship between government and expenditure and growth in a positive direction, but have had a negative effect on exports and growth.

In another recent study using data for Egypt from 1977 to 2003 based on IMF statistics, Abou-Stait (2005) examines the export-led growth (ELG). He sets three hypotheses to test ELG for Egypt; (i) that GDP, exports and imports are cointegrated using Johansen's approach; (ii) that exports Granger cause growth; (iii) that exports Granger cause investment. To test these hypotheses, a variety of analytical tools including cointegration analysis, Granger causality tests, and Unit root tests, coupled with vector auto regression (VAR) and impulse response function (IRF) analyses. The first and second hypotheses fail to be rejected, while the third one is rejected using VAR based on F-statistics. Abou-Stait's analysis reveals that exports of goods remain one important source of economic growth, despite Egypt's dependence on raw materials. He infers that economic reform policies and the shift towards a free market have helped the economy to reallocate its resources to productive uses. Yet, there remain a variety of issues that need to be addressed, including further trade liberalisation, further tariff revisions, non-tariff barriers, exchange rate policies, and the building up of an efficient service infrastructure.

Taking a different line of argument from the above two studies applied on Egypt and depending on Chuang's (2000) opinion that the best understanding of the real sources of growth is required to examine the human capital-trade-growth nexus, we try to analyse the causality test to investigate the relationship between exports and economic growth. In so doing, we will focus mainly on exports and human capital as the main engines affecting economic growth and affecting each other. However, imports should not be ignored. Many studies using an export-augmented production function fail to incorporate imports along with exports, but this can result in spurious conclusions regarding the export led growth hypothesis, because capital goods imports are considered as the inputs for export and domestic production (Riezman et al., 1996). According to Herzer et al. (2006), export growth will provide more foreign currency, relieving the foreign exchange constraint, and allow import of capital goods to foster economic growth. Provision of foreign exchange allowing for the increase of capital imports is considered as the indirect effect of export expansion on growth. Following Alam (2003) and Herzer et al. (2006), we can control for the indirect effect in our empirical analysis by incorporating capital goods imports into the estimation equation.

4.4. Human capital, Trade, and Growth

The following lines indicate the importance of human capital for trade and economic growth and in the other direction the importance of economic growth and trade for human capital.

4.4.1 Human capital (measured by education) and growth

Human capital refers to human characteristics which can be acquired and which increase Income, such as knowledge and skills, strength and vitality. Human capital theory focuses on health and education as inputs to economic production (Appleton and Teal, 1998).

Endogenous growth theory, discussed earlier in Ch.2, argues that either human capital or trade is the primary engine of growth (see Lucas 1988; Romer 1990).

Taking education, as in our study, as a measure of human capital, Barro (1991, 437) asserts the importance of the level of education in fostering growth rate in the following lines:

> **"Given the initial level of per capita GDP, the growth rate is substantially positively related to the starting amount of human capital thus the poor countries tend to catch up with rich countries if the poor countries have high human capital per person (in relation to their level of per capita GDP), but not otherwise. As a related matter, countries with high human capital have low fertility rates and high ratios of physical investment to GDP."**

Using a growth accounting framework, Lee and Barro (1993) argued that education improves the productivity of individuals contributing to growth and thereby fosters the long-run growth rate of the country. Their idea is that education increases the human capital stock of individuals.

To complete his explanation, Barro (2001) asserts that the higher ratio of human to physical capital resulting from a higher initial stock of human capital increases growth through two channels. In the first, the rise in human capital facilitates the absorption of superior technologies from developed countries. The importance of this channel is for secondary and higher levels of schooling. The second channel is that the country starting with a high ratio of human to physical capital grows faster by adjusting upward the quantity of physical capital. This is obvious in the aftermath of a war that destroys primarily physical capital. On the other hand, others (e.g. Bils and Klenow, 2000) argue that growth promotes schooling, through the skill-bias of technological change (Foster and Rosenzweig, 1996). Low levels of human capital may lower the ability of the economy to absorb information and one of the great virtues of education is that it makes workers more flexible and so human capital not only works as a cause of economic growth but also grows as a result.

4.4.2. Human capital and trade

Chuang (1998) argued that the sources of knowledge externalities from the expansion of exports are increasing competitiveness, more efficient management styles, better forms of organisation, labour training and knowledge about technology and international markets. Exports can promote the human capital accumulation in developing countries. At the same time, causation can run in the other direction, with the improvements of human capital also promoting exports.

Chuang (2000) argued that opening up trade provides opportunities for human capital, and indicates many channels through which this may occurs. For example, export growth promotes learning and the diffusion of technical knowledge including management, marketing, and production skills. Also, trade increases technology transfer, which is biased in favour of skilled labour, from industrial to developing countries, stimulating human capital accumulation (Pissarides, 1997). Stokey (1991) argued that openness in trade accelerates investment in human capital in a developing economy that is open to capital flows and trade may result in a sharp rise in wage rates. Conversely, human capital enhances the quality of labour and hence increases factor productivity, creating comparative advantage in further exports.

4.5. The Model

4.5.1. Trade Liberalisation Policy and Economic Growth in Endogenous Growth Theory: Theoretical Framework.

The key to endogenous growth models is the inexistence of diminishing returns to the inputs that can be accumulated. Because of leaving a role for policy, growth models by which steady-state growth rate is determined endogenously, are interesting. Following Rebelo (1991b) we consider a simplified model which is one-sector economy with a standard preferences and a linear production function. This linear model in which human capital is reproducible captures the essential features increasing returns to scale technology (see Rebelo, 1991b for details). Assume that output can be used for consumption and accumulation of human capital. Production is linearly related to human capital input. Basic assumptions of Rebelo type linear production function is written as:

$$Y_t = A_t H_t = C_t + I_{H_t} \tag{4.1}$$

Where A represents the technology level and market clearing is: $Y_t = C_t + I_{H_t}$. For the purpose of current study it is not necessary to model parameter (A_t).

Generally it is believed that human capital will improve from openness. Egypt can import for investment in human capital (I_H) or it can export of human capital. These inflows and outflows of capital link trade with growth in the current model. Besides, without modeling the parameter A_t, as stated, we can argue that the exogenous total factor productivity (TFP) reflects open economy technology-human capital spillover effects (for the definition of TFP, see Appendix 2).

The accumulation condition is as follows:

for human capital, $\dot{H}_t = I_{H_t} - \delta H_t$ (4.2)

The current value Hamiltonian can be written as follows:

$$J = u(C)e^{-\rho t} + \phi(I_{H_t} - \delta H_t) + \mu(AH_t - C_t - I_{H_t}) \tag{4.3}$$

By using utility function as $u(C) = \dfrac{C_t^{1-\theta} - 1}{1-\theta}$ (4.4)

By differentiating the current value Hamiltonian for C and I_H, we can obtain first order conditions as follows:

$$\frac{\partial J}{\partial C} = \frac{(1-\theta)C^{1-\theta-1}}{(1-\theta)} e^{-\rho t} - \mu = C^{-\theta} e^{-\rho t} - \mu = 0 \quad (4.5)$$

$$\frac{\partial J}{\partial I_H} = \phi - \mu = 0 \quad (4.6)$$

$$\dot{\phi} = -\frac{\partial J}{\partial H} \quad (4.7)$$

These three equations, representing first order conditions, can be used to solve the values $H, Y, C \,\&\, \phi$ and shown how much economy can grow at a constant growth over time.

From equation (4.6)

$$\phi - \mu = 0 \Rightarrow \phi = \mu \quad (4.8)$$

Where ϕ is shadow price of human capital (see appendix 2 for definitions).

$$\dot{\phi} = -\frac{\partial J}{\partial H} = -(-\phi\delta + \mu A) = \phi\delta - A\mu \quad (4.9)$$

From equations (4.5) and (4.6)

$C^{-\theta} e^{-\rho t} = \mu$ and $\phi = \mu$ so,

$$C^{-\theta} e^{-\rho t} = \phi \quad (4.10)$$

By taking log both sides we obtain,

$$-\theta \ln C - \rho t = \ln \phi \quad (4.11)$$

And by differentiating both sides of (4.11) with respect to time and Substituting $\dot{\phi}$ we get,

$$-\theta \frac{\dot{C}}{C} - \rho = \frac{\dot{\phi}}{\phi} = \frac{\phi\delta - A\mu}{\phi} \quad (4.12)$$

From equation (4.8) $\phi = \mu$

So,

$$-\theta \frac{\dot{C}}{C} = \frac{\phi\delta - A\mu}{\phi} + \rho \quad (4.13)$$

$$\frac{\dot{C}}{C} = -\frac{1}{\theta}(\delta - A + \rho) \quad (4.14)$$

So,

$$C_{growth} = \frac{1}{\theta}(A - \rho - \delta) \tag{4.15}$$

Equation (4.15) represents the conditions for the growth of consumption.

It is noted that the first and the third terms inside the brackets of (4.15) are the net marginal product of human capital because:

from production function which is $Y_t = A_t H_t$, we can get the following:

-For human capital,

$$\frac{\partial Y}{\partial H} = A \tag{4.16}$$

And so $\frac{\dot{\phi}}{\phi} = \frac{\phi\delta - \mu A}{\phi} = \delta - A$ (because from (4.8) $\phi = \mu$) (4.17)

Returning to equation (4.15), we can say that investment may take place in human capital, with cost, in terms of output. Therefore, the marginal product of human capital can be written as follows:

$$MP_H = A \tag{4.18}$$

In the steady state the ratio of human capital will be constant where there are no diminishing returns to human capital, when human capital is taken into consideration.

In the steady state,

$$(\mathrm{g}) = \frac{\dot{Y}}{Y} = \frac{\dot{C}}{C} = \frac{\dot{H}}{H} = \frac{\dot{\phi}}{\phi} \tag{4.19}$$

On the assumtion that TFP remains conastant, $\frac{\dot{A}}{A} = 0$

Free trade raises human capital, which is input for the gross domestic output of the economy's sectors, and the export sector, to advanced skill through FDI and/or import is possible with free trade, the skill level of the workers increases. The causal relationship between free trade and economic growth in Egypt is empirically verified using an aggregate production function framework. Based on the previous endogenous model the production function of Egypt is specified as:

$$Y = f(HC, FT) \tag{4.20}$$

Where Y is real GDP, HC is human capital (input) and FT is an index of free tree. We augment the above human capital model by the FT variable. FT is represented by real exports (X), affected by export duties, and real imports, affected by Tariff. We use real depreciation of the domestic currency in the real exports measure.

The idea is, this depreciation results in increasing in the price of tradeables relative to the price of non-treadables. As a result, resources move out of the non-tradeable sector into the tradeable ones. Regarding import measures, trade liberalisation aims at reducing tariffs and consequently reducing the prices of imports relative to those of exports, causing resources to move from imports to exports. Overall, real exports are expected to increase due to the real exchange rate-based trade liberalisation policy (see Sachs, 1987, for details).

Based on Lucas (1988), workforce effectiveness is proxied by education. This proxy focuses on labour augmenting technical progress; a type of technological knowledge needed to be captured through our VECM model for causality between real exports and real GDP. Focusing on human capital, and ignoring physical capital, our aggregate production function is written as follows:

$$GDP = f(X, M, HC) \tag{4.21}$$

We can get the following equation by taking the logarithm:

$$\log GDP_t = \gamma_0 + \gamma_1 \log X_t + \gamma_2 \log M_t + \gamma_3 \log HC_t + \varepsilon_t \tag{4.22}$$

Where the coefficients γ_1, γ_3, γ_2 are elasticity parameters with $\gamma_3 > 0$, $\gamma_1 > 0$ and $\gamma_2 < 0$

This leads to specification of a general VECM of the production function as follows:

$$\Delta \log GDP_t = \delta_{GDP} + \lambda_{GDP} ECT_{t-1} + \sum_{i=1}^{m} \beta_{GDPX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{GDPGDP,i} \Delta \log GDP_{t-i} +$$

$$\sum_{i=1}^{m} \beta_{GDPM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{GDPHC,i} \Delta \log HC_{t-i} + \varepsilon_{GDPt}$$

$$\Delta \log X_t = \delta_X + \lambda_X ECT_{t-1} + \sum_{i=1}^{m} \beta_{XX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{XGDP,i} \Delta \log GDP_{t-i} +$$

$$\sum_{i=1}^{m} \beta_{XM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{XHC,i} \Delta \log HC_{t-i} + \varepsilon_{Xt}$$

$$\Delta \log M_t = \delta_M + \lambda_M ECT_{t-1} + \sum_{i=1}^{m} \beta_{MX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{MGDP,i} \Delta \log GDP_{t-i} +$$
$$\sum_{i=1}^{m} \beta_{MM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{MHC,i} \Delta \log HC_{t-i} + \varepsilon_{Mt}$$

$$\Delta \log HC_t = \delta_{HC} + \lambda_{HC} ECT_{t-1} + \sum_{i=1}^{m} \beta_{HCX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{HCGDP,i} \Delta \log GDP_{t-i} +$$
$$\sum_{i=1}^{m} \beta_{HCM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{HCHC,i} \Delta \log HC_{t-i} + \varepsilon_{HCt}$$

Where ECT_{t-1} is an error correction term lagged one period.

We apply, first, time-series techniques to avoid the previously mentioned limitations of cross-country regressions. Also, we will go beyond the traditional two-variable causality relationship and estimate a four-variable system to avoid any specification bias. The most important point is that our explanatory variables include human capital and to the best of our knowledge, very few empirical studies have tested the existence and nature of any causal relationship between exports, imports, human capital accumulation and output by employing causality tests. Furthermore, we employ the recently developed techniques in causality testing procedures, as will be demonstrated subsequently. Therefore the causal relationship will be examined among human capital accumulation, exports, imports and economic growth using data for Egypt's real *GDP*, real exports, real imports and higher education attainment over the period 1970-2006. The value of education as a measure of human capital is based on the idea that education contributes enhances cognitive and other skills, thereby making labour more productive, which in turn encourages innovation and technological progress, leading to higher economic growth.

Among developing countries, Egypt appears to be in a good position to benefit from equitable education-led growth (Birdsall, 1999). In this thesis we will use two measures of human capital based on education. The first is higher education attainment, to examine the causality test, since there is a bias towards higher education in Egypt. The share of public expenditure on education that is allocated to higher education has tended to be high; more than 30 percent on average, compared to 15 percent on average in East

Asia. In this regard Egypt tries to ensure that it follows the precedent of East Asia by continuing to improve the speed of education. However, the distribution of education is still relatively unequal. In the next chapter, we will use another measure, based on education as well, for human capital of Egypt, which is secondary school enrolment for age over 15 years to investigate if the results of the effect of human capital on growth will differ or not. Panel data for low and middle-income countries will be used as well, to investigate the causality between these four variables, that is, to increase the number of observations and consequently, the power of the test.

4.5.2. Methodology.

There are serious concerns as regards concepts and methodology raised in the literature. A simultaneous equation bias represents a problem in the single equation studies using Ordinary Least Square OLS regression. Another concern is the ignoring of the possibility of a feedback effect from economic growth to exports, as most early studies centre on the assumption that export growth causes output growth. VAR/Granger type analyses are appropriate only if all the variables used are stationary; otherwise, they make no sense and give false spurious results. Therefore, time series data should be adjusted by taking differences until we have a stationary time series.

Prior to testing for a causal relationship between the time series, the first step is to check the stationarity of the variables.

4.5.2.1. Unit Root test for stationarity

A causality test holds only for stationary variables. According to Sims et al. (1990), causality tests require that the time series be stationary; otherwise, empirical results may be misleading and the F- statistics from these tests will show non standard distributions. Therefore, it is important to determine the stationary properties of time series prior to testing the causality, which means it is necessary to establish the order of integration presented. According to Granger and Newbold (1974), the presence of non-stationary variables causes a so-called spurious regression, which means that the obtained results suggest that the relationships between the variables, in the regression, are statistically significant, whereas in fact they are contemporaneous correlation rather than meaningful causal relations.

In simple words, unit roots can lead two time series to appear related when they are not. Therefore, if the series is not stationary, we have to transform the variables by differencing to produce a stationary series and then we can conduct the causality test. Verbeek (2004) argues that although non stationarity arises from many sources, an important cause is unit roots or interchangeably stochastic trends. Stock and Watson (2007) state the problem of non stationarity and assert that non stationarity in the dependent variable and/or regressors will result in unreliable conventional hypothesis tests, unreliable confidence intervals, and unreliable forecasts. The spurious results resulting from the existence of unit roots can be avoided by determining the order of integration of the non stationary series and identifying the possible long-term relationships among the integrated variables (Johansen, 1988).

According to Engle and Granger (1987), a non-stationary time series is said to be integrated of order d if it achieves stationarity after being differentiated d times, which is usually denoted by $X_t \sim I(d)$. We should mention here that obtaining the Ordinary Least Square (OLS) regression with high adjusted R- square and very low Durbin-Watson value reveals that the time series is not stationary, i.e. it shows the existence of stochastic trend or unit root. We therefore begin the regression of free trade and economic growth by carrying out a Unit Roots test, which has become very popular recently in this regard, on each of the variables considered in the empirical analysis in both chapters four and five. We examine the time series of Egypt to test if it has unit root and to examine the order of integration of each variable. The Unit Roots test is introduced by considering the following model:

$$Y_t = Y_{t-1} + \varepsilon_t \qquad (1)$$

where ε_t is an error term, a white noise error term, that has the following properties:

1- mean equals zero
2- constant variance σ^2
3- nonautocorrelated

This model represents the simplest model of a variable with a stochastic trend, unit root, which is the random walk. The basic idea of a random walk is that the value of the series tomorrow is its value today, plus unpredictable change. In other words, if Y_t follows a random walk, the best forecast of the value of tomorrow is its value today. It should be noted that the above equation is a first-order, or AR (1) regression where we regress the value of Y at time t on its value at time (t-1). According to the above equation, when the coefficient of Y_{t-1} is equal to 1, we have a unit root problem which means that the time series is non-stationary. Equation (1) can be written as:

$$Y_t = \rho Y_{t-1} + \varepsilon_t \qquad (2)$$

In the above case, the null hypothesis: ρ=1 and so we have a nonstationary situation. Equation (2) is often expressed in an alternative form by subtracting Y_{t-1} from both sides of the equation to get:

$$Y_t - Y_{t-1} = (\rho - 1)Y_{t-1} + \varepsilon_t$$

So,

$$\Delta Y_t = (\rho - 1)Y_{t-1} + \varepsilon_t$$

$$= \delta Y_{t-1} + \varepsilon_t$$

where *δ = (ρ-1) and* Δ *is the first-difference operator*.

As $\Delta Y_t = (Y_t - Y_{t-1})$, so both equation (1) and (2) are the same. However, the null hypothesis is *δ=0* (non-stationary).

Therefore, $Y_t - Y_{t-1} = 0 + \varepsilon_t$

i.e. $\Delta Y_t = (Y_t - Y_{t-1}) = \varepsilon_t$. so the first differences of a random walk time series equals ε_t which is purely random and so, we have a stationary time series and we can say that the original series is integrated of order 1 I(1). A time series is also integrated of order 2 when the original series has to be differenced twice before becoming stationary and so on until a stationary series is obtained. The I(0) process is a stationary process. The Dickey-Fuller (DF) tests are based on testing the hypothesis ρ= 1 and when ε_t is not white noise, we call DF the "augmented" Dickey-Fuller (ADF) and the test involves estimating the following equation:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + \varepsilon_t$$

where,

$i= 1, 2, 3,\ldots\ldots\ldots, m$

$t= 1, 2, 3,\ldots\ldots\ldots, t$

Δ is the first order difference operator; Y is the variable under consideration.

We add ΔY_{t-i} to allow for ARMA error process. Because the DF or ADF tells whether a time series is integrated or not, it is also known as a test of integration.

4.5.2.2. Cointegration test

In the previous step, the Unit Root test, we highlighted the determination of the order of integration of the time series. To complete the analysis and avoid spurious results in the causality testing, we need also to identify the long term relationships among these integrated variables. This is done according to Johansen's (1988) technique. Therefore, the cointegration test represents the next step if the variables under consideration have unit roots, to examine whether there is a long run equilibrium relationship between the variables or not, as while variables in a system may fluctuate in the short run, they are expected to return to their steady state in the long run (Awokuse, 2002). The idea is that if we have two variables, X and Y, we can say that these variables are cointegrated of order one (CI (1,1)) when both of them are integrated of order 1 and there is a stationary I(0) linear combination of the two variables which is given by equation (3) or (4).

$$Y_t = \alpha_0 + \beta_0 X_t + \varepsilon_{0t} \tag{3}$$

$$X_t = \alpha_1 + \beta_1 Y_t + \varepsilon_{1t} \tag{4}$$

Obviously, if $X_t \sim I(d)$ and $Y_t \sim I(d)$, a regression is run, such as $Y_t = \beta X_t + \varepsilon_t$ and if ε_t, the residuals, are I (0), then X_t and Y_t are cointegrated. To test for cointegration, two common tests are used. The first one is Engle and Granger (EG) (1987). This test is subject to many criticisms. For example, in small samples, antithetic conclusions may be obtained, depending on whether equation (3) or (4) is utilized to get the residuals for the unit root test. Another shortcoming comes from the fact that this test is carried out in two steps, the first one to get residuals and the second to use a unit root test for cointegration, so any error in the first step will affect the second step. Also this test is concerned with a single cointegration equation. The other test for cointegration, which can avoid all of these shortcomings of the EG test, is Johansen's (1988) maximum likelihood estimators. Therefore, Johansen's (1988) ML cointegration methodology will be employed, using the trace and maximal eigenvalue test statistics to test the number of cointegrating vectors. In the trace test, we test the null hypothesis which is that there are at most r cointegrated vectors against the general alternative of n cointegrating vectors.

The trace test is shown as below:

$Trace = -T \sum_{i=r+1}^{n} \ln(1-\lambda_i)$ where T is the available number of observations and λ is the eigen value. We test the null hypothesis of cointegrating vectors against the alternative of at least (r+1) cointegrating vectors in the maximum eigenvalue test which computes the null hypothesis that there are exactly r cointegrating vectors in X_t, as shown as below:

$$\lambda_{\max} = -T \ln(1-\lambda_r)$$

According to Ahmad et al. (2004), if the cointegration vector is absent, we can obtain valid results in Granger causality testing by simply first differentiating the VAR model. However, if there are cointegration variables, the Granger causality, to capture the short run deviations of series from their long-run equilibrium path, will further require inclusion of an error term in the stationary model. Consequently, in case of cointegration of the variables, we can use the error correction model to capture short run behavior, which the cointegrating regression can not.

As we will apply VAR or VECM, we should give some details about these two models, but first let us demonstrate what Granger causality means.

4.5.2.3. Granger's Causality test under the VECM

To determine the direction of causality between output and the other variables under study, the Granger causality test will be applied. "Granger causality is only relevant with time series variables" (Koop, 2000, 175). As Koop (2000) notes, time does not run backward in time series data, so if event A precedes event B, event A may cause B, but not vice versa. Past events can cause present events, but future events cannot reflect the concept of Granger causality.

Granger (1969) proposed a test, which Sims (1972) popularised, to determine whether one economic variable can help explain another one, or there is no causality at all between the variables. According to Granger's (1969) approach, causation is attributed to explanatory variables if past values of both dependent and explanatory variables predict the dependent variable better than past values of the dependent variable alone. Granger (-Sims) causality is based on the idea that cause must precede effect, and that a factor can only be said to cause another variable if it contributes to the conditional distribution (or expectation) of the variable given in the past. The above concept of causality contributes in the concept of exogeneity, which means determination of a variable outside the system under analysis, developed by Engle et al. (1983).

According to Hendry (1995, 156), econometric problems frequently involve too many variables for simultaneous analysis to be feasible. Two main issues, causality and exogeneity, arise as a consequence of seeking appropriate reductions. Causality issues arise when marginalizing with respect to variables and their lags, whilst exogeneity issues arise when seeking to analyse a subset of the variables given the behaviour of the remaining variables.

Engle et al. (1983) comment that, causality tests, such as the Granger method, can be used only for testing one component of "strong" exogeneity because they are concerned with sequential marginalizing feedback effects, whereas weak exogeneity is based on contemporaneous conditioning. They define a vector of Z_t variables to be weakly-exogenous for the parameters of interest, if 1- the parameters of interest only depend on those of the conditional model; 2- the parameters of the conditional and marginal models are variation free, i.e. there exists a sequential cut of the two parameter spaces (Florens and Mouchart, 1980). Let λ be the vector of the parameters of interest and DX_t the variable whose exogeneity properties are under examination. According to Engle et al. (1983), DX_t is weakly exogenous for λ if (1) λ is a function of the vector of coefficients alone, and (2) λ, a function of the vector of coefficients alone, and the parameters in the marginal distribution of DX_t are variation free. If in addition to being weakly exogenous for λ, lagged values of DX_t do not Granger cause DX_t, then DX_t is said to be strongly exogenous. Strong exogeneity is defined as weak exogeneity combined with Granger (1969) non-causality to provide a basis for conditional forecasting (Hendry, 1995, 156).

According to Engle et al. (1983), the structure of the model may imply various Granger causal orderings and weak and strong exogeneity conditions. For example, a bivariate cointegrated system must have a causal ordering in at least one direction. Because the cointegrating vectors must include both variables and the coefficient of the error correction can not be equal to zero, they must enter into one or both of the equations. If the error correction term enters into both equations, neither variable can be weakly exogenous for the parameters of the other equation because of the cross equation restrictions.

It is noted that the concept of causality as proposed by Granger (1969) is for one period ahead. Dufour and Renault (1998) generalised this concept for h periods ahead. The original definition of causality of Granger (1969) refers to the predictability of a variable *X(t),* where t is an integer, from its own past, the one of another variable *Y(t),* and possibly a vector *Z*(*t*) of auxiliary variables, one period ahead: more precisely, we say that *Y* causes *X* in the sense of Granger if the observation of *Y* up to time *t* $(Y(\tau):\tau \leq t)$ can help in predicting $X(t+1)$ when the corresponding observations on *X* and *Z* are available $(X(\tau), Z(\tau):\tau \leq t)$. However, Lutkepohl (1993) has noted that, for multivariate models where a vector of auxiliary variables *Z* is used in addition to the variables of interest, *Y* and *X*, it is possible that *Y* does not cause *X* several periods ahead. For example, the values $Y(\tau)$ up to time t may help to predict $X(t+2)$, even though they are of no help in predicting $X(t+1)$. This is due to the fact that *Y* may help to predict *Z* one period ahead, which in turn has an effect on *X* at a subsequent period.

To study short run and long run causality, which are connected to strong exogeneity and weak exogeneity, Dufour and Renault (1998) extended Hsiao's (1987) research and proposed a systematic study and characterization of indirect effects and associated lagged causality relationships. They observed that Hsiao's definitions do not capture all the effects of interest in the general case where more than one auxiliary variable Z appears in the system. They defined more general notions of causality which allowed them to study the issues of interest: causality at a given horizon h, where h is a positive integer, and causality up to any given horizon h, where h can be infinite $(1 \leq h \leq \infty)$. These definitions are based on the concept of projection (linear causality), do not require stationarity of the processes considered, and for the horizon on (h=1) include as a special case the usual definition of causality in the sense of Granger (1969). In this way they studied "short-run causality" (h small) and "long-run causality" (h large) properties. "short-run" and "long-run" refer to forecast horizons defined with respect to a given point in time, not the role played by past observations which may be more or less close to that point.

The concept of causality of Granger (1969) will be employed to test the relationship between trade and output (*GDP*). Our question is, does export Granger-cause *GDP* or is the inverse true or is there feedback or bilateral causality, i.e. causality both from export to *GDP* and in the other direction from *GDP* to exports? Since the cause always comes before its effect, when we say that one variable Granger- causes another variable, we actually mean that the current value of the latter is conditional on the past values of the former. That also means that the former variable helps explain and forecast the latter one. To understand the nature of causation, the Granger causality test is employed.

The hypothesis that the variable, say x, is influenced by y is equivalent to the test that all of the coefficients on the lagged values of y included in the regression are jointly equal to zero. The test statistic used is the F- statistic and rejection of the null hypothesis suggests that the causation runs from y to x. The hypothesis that y is not influenced by x is tested in an analogous fashion. If the null hypothesis is rejected in both cases, it suggests that a feedback relationship exists between the two variables (Baharumshah & Rashid, 1999, 399). In case of the presence of cointegration between the variables, some form of Granger causality must occur.

4.5.2.4. Vector Autoregressive Model

We work with the VAR model for Granger causality testing as it provides a framework to test for Granger causality between each set of variables. According to Koop (2000, 181), “A VAR is the extension of the autoregressive (AR) model to the case in which there is more than one variable under study.” The main difference between AR and VAR is that in the AR model we deal with one dependent variable, say, *Y*. This variable *Y* depends only on its lags. However, there is more than one dependent variable in a VAR, say, *Y* and *X*, so we have more than one equation, as we will have one in which *Y* represents the dependent variable and one where the dependent variable is *X*. The explanatory variables in the two equations will be the same, represented by the lags of all the variables under study.

Verbeek (2004, 322) has another definition for VAR: “A VAR describes the dynamic evolution of a number of variables from their common history.” Let us consider two variables Y_t and X_t. A VAR with the above two variables is constituted by the following two equations:

$$Y_t = \alpha_1 + \delta_1 t + \gamma_{11} Y_{t-1} + \dots\dots\dots + \gamma_{1p} Y_{t-p} + \beta_{11} X_{t-1} + \dots\dots\dots + \beta_{1q} X_{t-q} + e_{1t}$$

and

$$X_t = \alpha_2 + \delta_2 t + \gamma_{21} Y_{t-1} + \dots\dots\dots + \gamma_{2p} Y_{t-p} + \beta_{21} X_{t-1} + \dots\dots\dots + \beta_{2q} X_{t-q} + e_{2t}$$

The first equation tests whether *X* Granger causes *Y* and the second one tests whether *Y* Granger causes *X*. Each of these equations can be estimated by using Ordinary Least Square (OLS) where e_{1t} and e_{2t} are two white noise processes (independent of the history of Y and X) that may be correlated. If, for example, $\beta_{11} \neq 0$ it means that the history of *X* helps in explaining *Y* (Verbeek, 2004). Consequently, a VAR with three variables, *Y*,*X*, and *Z* will be:

$$Y_t = \alpha_1 + \delta_1 t + \gamma_{11} Y_{t-1} + \dots + \gamma_{1p} Y_{t-p} + \beta_{11} X_{t-1} + \dots + \beta_{1p} X_{t-p} + \theta_{11} Z_{t-1} + \dots + \theta_{1p} Z_{t-p} + e_{1t};$$

$$X_t = \alpha_2 + \delta_2 t + \gamma_{21} Y_{t-1} + .. + \gamma_{2p} Y_{t-p} + \beta_{21} X_{t-1} + .. + \beta_{2p} X_{t-p} + \theta_{21} Z_{t-1} + .. + \theta_{2p} Z_{t-p} + e_{2t};$$

$$Z_t = \alpha_3 + \delta_3 t + \gamma_{31} Y_{t-1} + .. + \gamma_{3p} Y_{t-p} + \beta_{31} X_{t-1} + .. + \beta_{3p} X_{t-p} + \theta_{31} Z_{t-1} + .. + \theta_{3p} Z_{t-p} + e_{3t}$$

In an analogous way, we can constitute a VAR in our model which consists of four variables. These variables are real *GDP*, Real exports (*X*), Real Imports (*M*), and Human Capital (*HC*). The VAR of our four variables is written as follows:

$$GDP_t = \alpha_1 + \delta_1 t + \gamma_{11} GDP_{t-1} + .. + \gamma_{1p} GDP_{t-p} + \beta_{11} X_{t-1} + .. + \beta_{1p} X_{t-p} + \theta_{11} M_{t-1} + .. +$$
$$\theta_{1p} M_{t-p} + \lambda_{11} HC_{t-1} + .. + \lambda_{1p} HC_{t-p} + e_{1t};$$

$$X_t = \alpha_2 + \delta_2 t + \gamma_{21} GDP_{t-1} + .. + \gamma_{2p} GDP_{t-p} + \beta_{21} X_{t-1} + .. + \beta_{2p} X_{t-p} + \theta_{21} M_{t-1} + .. +$$
$$\theta_{2p} M_{t-p} + \lambda_{21} HC_{t-1} + .. + \lambda_{2p} HC_{t-p} + e_{2t};$$

$$M_t = \alpha_3 + \delta_3 t + \gamma_{31} GDP_{t-1} + .. + \gamma_{3p} GDP_{t-p} + \beta_{31} X_{t-1} + .. + \beta_{3p} X_{t-p} + \theta_{31} M_{t-1} + .. +$$
$$\theta_{3p} M_{t-p} + \lambda_{31} HC_{t-1} + .. + \lambda_{3p} HC_{t-p} + e_{3t};$$

$$HC_t = \alpha_4 + \delta_4 t + \gamma_{41} GDP_{t-1} + .. + \gamma_{4p} GDP_{t-p} + \beta_{41} X_{t-1} + .. + \beta_{4p} X_{t-p} + \theta_{41} M_{t-1} + .. +$$
$$\theta_{4p} M_{t-p} + \lambda_{41} HC_{t-1} + .. + \lambda_{4p} HC_{t-p} + e_{4t}$$

According to Koop (2000) and depending on the fact that the past may affect the present, whereas the present can not affect the past, the explanatory (independent) variables in the VAR may affect the dependent variable where all of them are dated *t*-1, but the opposite is not true. Therefore, the VAR does not suffer from the problems of simultaneity that arise with the regression of Y_t on X_t.

We should note that it is assumed that all the variables in the VAR (*p*) are stationary and if they have unit roots and are not cointegrated, the variables should be differenced till we get stationary variables and apply VAR. However, if the variables have unit roots and are cointegrated, in order to test for Granger causality, it is recommended that we work with the Error Correction Model (ECM) or Vector Error Correction Model (VECM).

4.5.2.5. Vector Error Correction Model (VECM)

According to Laszlo (2004), a Vector Error Correction Model (VECM) must be used when the series are cointegrated and taking into consideration the non-stationarity of the variables. This is asserted by Toda and Phillips (1993), who argued that once cointegration is detected, causality tests have to be performed by using an error correction model (ECM) or vector error correction model (VECM). This is to investigate the existence and the direction of causality, i.e. whether the explanatory variable (s) Granger causes the dependent variable or the dependent variable causes the explanatory variable (s) or there exists a feedback between the variables (Granger, 1988).

In our model, we are interested in investigating whether exports cause *GDP*, or the opposite causation is true, or there is a long-run reciprocal causality among variables. The *ECM* represents a means of according the short-run behaviour of an economic variable with its long-run behaviour. The difference between this and the standard causality test is that there is an error correction term which allows for the existence of cointegration among the variables. The omission of this error correction term from the standard causality test causes invalid causal information. In particular, when the series are cointegrated and error correction terms are omitted, we can detect no causation, even if it exists. In a VECM, past values help to predict future values. The VECM, like the VAR, has one equation for each variable in the model and is the same as a VAR with differenced variables except for the error correction term. Therefore, in our model the VECM for each variable, *GDP*, *X*, *M*, Human Capital (*HC*), under study will be set as follows:

$$\Delta \log GDP_t = \delta_{GDP} + \lambda_{GDP} ECT_{t-1} + \sum_{i=1}^{m} \beta_{GDPX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{GDPGDP,i} \Delta \log GDP_{t-i} +$$
$$\sum_{i=1}^{m} \beta_{GDPM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{GDPHC,i} \Delta \log HC_{t-i} + \varepsilon_{GDPt}$$

$$\Delta \log X_t = \delta_X + \lambda_X ECT_{t-1} + \sum_{i=1}^{m} \beta_{XX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{XGDP,i} \Delta \log GDP_{t-i} +$$
$$\sum_{i=1}^{m} \beta_{XM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{XHC,i} \Delta \log HC_{t-i} + \varepsilon_{Xt}$$

$$\Delta \log M_t = \delta_M + \lambda_M ECT_{t-1} + \sum_{i=1}^{m} \beta_{MX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{MGDP,i} \Delta \log GDP_{t-i} +$$
$$\sum_{i=1}^{m} \beta_{MM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{MHC,i} \Delta \log HC_{t-i} + \varepsilon_{Mt}$$

$$\Delta \log HC_t = \delta_{HC} + \lambda_{HC} ECT_{t-1} + \sum_{i=1}^{m} \beta_{HCX,i} \Delta \log X_{t-i} + \sum_{i=1}^{m} \beta_{HCGDP,i} \Delta \log GDP_{t-i} +$$
$$\sum_{i=1}^{m} \beta_{HCM,i} \Delta \log M_{t-i} + \sum_{i=1}^{m} \beta_{HCHC,i} \Delta \log HC_{t-i} + \varepsilon_{HCt}$$

where ECT_{t-1} represents the error correction term lagged one period, (since the sample size is relatively small), obtained from cointegration test (Johansen Maximum Likelihood), ε_{GDPt}, ε_{Xt}, ε_{Mt} and ε_{HCt} are uncorrelated white noise residuals. βs describe the effect of the i-th lagged value of variable *GDP* or *X* or *M* or *HC* on the current value of these variables (short run relationship); however, λs capture the long run relationship. For a long- run relationship to hold, at least one of the coefficients λ_{GDP}, λ_X, λ_M and λ_{HC} must equal non zero. In our analysis the Granger test involves specifying a multivariate Vector Error Correction Model (VECM), as discussed in the previous section of this chapter, which allows us to distinguish between long-run and short-run Granger causality. We need to test for the joint significance of the lag in the equations of the VECM to examine the presence of these causal relationships. OLS regressions can be used to estimate ECM. The F-statistics of the explanatory variables demonstrates the short-run causal effect, while the significance of *t*-statistics of the lagged Error Correction Term (*ECT*) indicates the long run causality.

4.6 Empirical Results of causality using time series data:

4.6.1 Augmented Dickey Fuller (ADF) Test Results for Unit Roots

As mentioned earlier in this chapter, when testing for causality, a necessary first step is to test for stationarity, i.e. to determine the degree of integration of each variable. In order to avoid instantaneous causation, all the variables are stationarised. Unit Root test statistics are employed to examine the stationarity of the data series. We carry out the Augmented Dickey Fuller (ADF) unit root test for the four variables included in the causality tests. The ADF test results are reported in Table 4.1 By applying this test we investigate the time series properties of the data. The ADF test is based on containment of the intercept (constant) as well as a linear time trend and without the trend term. The ADF test statistic is applied for the levels and first differences of the log of real *GDP*, the log of real exports *X*, the log of real imports M and higher education attainment ratio *HC*, respectively over the period 1970-2006 (see appendix 3 for details of the data).

Table 4.1
Results of ADF Unit Roots test
Period 1970-2006

Variable	Level		First Difference	
	Constant No trend	Constant trend	Constant No trend	Constant trend
GDP	-1.788	-0.1783	-5.065**	-5.892**
X	-1.286	-1.903	-5.287**	-5.268**
M	-3.388*	-3.473	-4.370**	-4.844**
HC	-2.077	-2.334	-6.672**	-7.196**

Notes:

(1) ***GDP, X, M, and HC are real GDP,*** **real exports, real imports and the proportion of people aged over 15 who have attained higher education, in logarithmic form, respectively i.e. the growth rates.**

(2) *** and ** indicate statistical significance at the 5% and 1% levels, respectively.**

(3) **For level: constant and no trend, the critical values at 5% and 1% significance level are -2.95 and -3.64, respectively.**
Constant+ trend, the critical values at 5% and 1% significance level are -3.55 and -4.25, respectively.
For First Difference: constant and no trend, the critical values at 5% and 1% significance level are -2.95 and -3.64, respectively.
Constant+ trend, the critical values at 5%and 1% significance level are -3.55 and -4.26, Respectively.

Based on Table 4.1 of the ADF test statistics, it is evident that all the variables, with the exception of the *M* variable, have a unit root, i.e. are non-stationary in their levels. The ADF statistics for the levels of real income, real exports, human capital in logarithm form, do not exceed the critical values (in absolute values).

This implies that their series are I(1); however *M* is I(0) in its level without trend. The conclusion after taking the first difference is different, that is, all series are stationary, i.e. the series are I(0) and we can reject the null hypothesis of the existence of the unit root. As shown in Table 4.1, each variable is integrated of order one I(1) and should be differenced to become stationary. Therefore the next step in our analysis is to investigate whether these variables establish a long-run relationship (equilibrium) which means the investigation of the cointegration properties of the variables.

4.6.2. The Cointegration analysis results:

Cointegration analysis, to investigate the possibility of a long-run relationship, for non-stationary variables, I(1), represents the second stage when finding a causality direction. To test whether real *GDP*, real exports of goods and services, real imports of

goods and services, and human capital are cointegrated is one of the main objectives of this chapter. We apply the cointegration technique developed by Johansen, where two test statistics are applied to test the number of cointegrating vectors (the cointegrating rank).
As stated earlier, the first test is the maximal eigenvalue test (λ_{max}), testing the null hypothesis. The null hypothesis is that there are *r* cointegrating vectors, versus the alternative hypothesis that there are *r* +1 cointegrating vectors. The second test is a trace test, which tests the hypothesis that there are at most r cointegration vectors. The trace and the maximal eigenvalue statistics from the cointegration tests are reported in Table 4.2.

Table 4.2

Johansen Cointegration test results

Vector	Rank	Eigenvalue	Null hypothesis	Alternative hypothesis		Critical Value 1%
GDP,X,			Trace tests		Trace value(prob)	
M, HC	0	0.61085	r=0	r>0	59.92(0.002)**	53.792
	1	0.29532	r≤1	r>1	26.89(0.107)	35.397
	2	0.24347	r≤2	r>2	14.64(0.066)	19.310
	3	0.12995	r≤3	r>3	4.87(0.027)	6.936
			Maximal eigenvalue test			
			λ_{max} test		λ_{max} value(prob)	
			r=0	r=1	33.03(0.007)**	31.943
			r=1	r=2	12.25(0.536)	25.521
			r=2	r=3	9.77(0.233)	17.936
			r=3	r=4	4.87(0.027)	6.936

Notes:

1- **critical values are obtained from table A1 (Johansen & Juselius, 1990).**
2- **** indicates rejection of null hypothesis of no cointegration at the 99% critical value.**

The results presented in Table 4.2 indicate that there is at most one cointegrating vector present in the system between the variables, which implies the presence of three independent common stochastic trends in the system of four variables under study. We reached this conclusion from comparing the computed values of the test statistics, both the trace and the maximal eigenvalue, with the corresponding critical values obtained from Johansen and Juselius (1990) to indicate the rejection of the null hypothesis of no cointegration, *r* = 0, at the 1% significance level, since the computed value of the test statistic from the trace test is 59.92, which is greater than the critical value of 53.792. The maximal eigenvalue test provides proof regarding the exact number of cointegrating vectors in the system where the hypothesis r= 0 the computed value (33.03) is greater than the critical one (31.943). We therefore conclude that there is a single cointegrating vector, which means that real *GDP*, real exports, real imports and Human Capital represented by higher education attainment are cointegrated, existing in a long-run equilibrium relationship and are therefore causally related.

After detecting the long run relationship among the variables, we have to determine the direction of the causality. For this, we examine if exports Granger cause the output or the inverse is true or in the long run, the variables *GDP, X, M,* and *HC* cause each other. Therefore, the next step is to apply a Vector Error Correction Model (VECM) as the variables under consideration are non stationary and all of them are integrated of order one, I(1), which was indicated when applying the Unit Roots test. Also, ECM is used as there is a unique cointegrating vector (one cointegrating vector) in the four-variable VAR used in the Johansen cointegration test.

4.6.3. Granger Causality Results based on Vector Error Correction Model

Granger (1988) asserted the invalidity of the standard Granger-Causality tests if time series used are non-stationary as in our case. However, he recommended use of a Vector Error Correction Model to investigate causality when cointegration is established. The existence of this cointegrating relationship among the variables of interest in this study (*GDP, X, M, HC*) suggests that there must be Granger causality in at least one direction. However, the direction of the causality among the variables is not indicated. This direction of causality can only be detected through the Vector Error Correction Model (VECM). The VECM also allows us to distinguish between the short- and long run Granger causality. Table 4.3 below summarises the main outcomes of the test conducted within a VECM specification to examine short-run and long run Granger causality. The F-statistics (test) of the explanatory variables (in first differences) are presented to capture the short-run causal effect, whereas the long run relationship is implied through the significance of Error-Correction Term (*ECT*), derived from the cointegration test, by using the *t*- statistics for the *ECT*s from each of the four equations included as well, to capture this long-run causal effect.

Table 4.3
Granger Causality Results Based on Vector-Error Correction Model for Egypt

Dependent Variable	Independent variable ΔGDP	ΔX F-statistics (Prob)	ΔM	ΔHC	ECT t-statistic(prob)
ΔGDP	-	28.424 (0.002)**	6.0013 (0.050)*	29.945 (0.002)**	-11.2 (0.000)**
ΔX	0.001501 (0.974)	-	12.152 (0.004)**	17.447 (0.003)**	-0.181 (0.886)
ΔM	3.0488 (0.098)	11.0144 (0.004)**	-	63.2084 (0.000)**	-7.97 (0.000)**
ΔHC	0.89876 (0.353)	5.51552 (0.028)*	33.5814 (0.000)**	-	-5.45 (0.000)**

Notes:

1- **The critical values for the adjusted t of the error correction term (*ECT*) are calculated from Ericsson and Mackinnon (2002), (for more details see Appendix 4).**
2- ***and ** denotes statistical significance at 5% and 1% level, respectively.**
3- **The coefficients for ΔGDP equation of ΔX, ΔM, ΔHC are +0.01137, -0.03339, and +0.1443, respectively.**
4- **The basic statistics and diagnostic tests are reported in Appendix 5.**

The diagnostic test statistics show no evidence of misspecification, no serial correlation, nor any problem of heteroschedasticity and no problem of non normality in the residuals (see Appendix 5 for details). The Granger causality results, based on the VECM specification, reported in Table 4.3 suggest that for real exports (growth rate), real imports (growth rate), and Human Capital, there is short-run and long-run unidirectional causality running from these variables to real *GDP* (economic growth) at the 1% significance level, with the exception of real import at 5% in the short-run. The long-run causality is evident depending on a statistically significant error correction term coefficient by using the t-statistic. The t-statistics for the error correction terms are significantly negative. According to Chuang (2000, 717), this implies that without correcting for the long run relationship among variables, the traditional Granger's causality test will be inappropriate. Awokuse (2002, 10) argues that a significant *ECT*, which measures the speed of adjustment to past shocks in equilibrium, coefficient implies that past equilibrium errors pay a role in determining current outcomes. The short-run causal effect is determined through the significance of the F- statistic and probability (in parentheses) for the lagged independent variable term.

A bi-directional (feedback) Granger causality relationship was detected between real exports and real imports. For the real exports equation, a short-run causal relationship was detected at the 1% significance level. However, there is no evidence of a long-run relationship between real imports and real exports. For the real imports equation, both short and long run causality between real exports and real imports was detected by both the significance of *F*- statistics for the lagged independent variable term and the significance of the t- statistic of the *ECT* coefficient at the 1% significance level. Also, bi-directional causality between real exports (growth rate), (*X*), and Human capital (*HC*) was detected. For the real exports equation, there is short-run causality running from human capital to real export growth at the 1% significance level. However, there is no long-run relationship between these two variables in the real exports equation. Both short and long-run relationships between real exports growth and human capital were detected in the human capital equation at the 5% and 1% significance levels, respectively.

Another bi-directional causality was detected between the growth of real imports and human capital in both short run and long run at the 1% significance level, in both the real imports and human capital equations. To sum up, our above findings support the validity of ELG in the case of Egypt for the period of the study (1970-2006), i.e. there is causal relationship between the growth of real exports and growth of real *GDP* (economic growth) in both short and long run. The causality runs in one direction (unidirectional) from growth of real exports to growth of real *GDP*, and so openness (trade liberalisation) will affect economic growth through exports. Another important finding is that besides the effect of exports on economic growth, variables such as imports and human capital also influence economic growth.

4.7. Panel causality test:

Here, we increase the number of observations, and hence the power of the Granger causality test, which was applied using data drawn from an individual country, and test for the robustness of the results obtained for the Egyptian economy. Taking the income of the rural areas into consideration (less than $1000), Egypt is classified as a low-middle income country. We therefore, pool data from 20 developing countries, including low- and middle-income countries for the period 1970-2006 and employ panel unit root tests and panel cointegration technique to establish the long-run relationship between exports and output.

The purpose is to test for Granger causality between the logarithms of real exports, real imports, Human Capital, represented by secondary school enrolment, and real *GDP*. Our data set comprises annual measures of for two groups selected countries. The first group cotains low-income countries, which like Egypt, are members of COMESA. These countries, alphabetically, are Angola, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Tanzania, Uganda, Zambia, and Zimbabwe. The second group consists of middle-income countries selected from all over the world: four Arab countries are selected; Tunisia, Jordan, Algeria, Morocco. Two countries are members of COMESA with Egypt; Mauritius and Swaziland. Two countries are from the south-east Asian economies that achieved high rates of economic growth; Malaysia and Thailand. The final two countries are Iran and Turkey, which have a similar culture to Egypt (see Appendix 10 for details). We apply a method based on recent advances in panel unit root testing and panel cointegration. Our model is the same model, which is a four-variable system of real *GDP*, real exports, real imports, and secondary school enrolment, representing human capital. Then we express these variables in natural logarithm. We obtained real values by the dividing nominal values on consumer price index. Our procedures can be shown as follows:

4.7.1. Panel unit root test:

As shown earlier, when using non-stationary data, invalid inferences are drawn from the Granger causality test. Im, Pesaran and Shin’s (1998), IPS, panel unit root test technique is used to test for stationarity (determining the order of integration). The IPS test allows for heterogeneity in intercepts as well as in the slope coefficients. Im, Pesaran and Shin (1998) have shown that panel unit root tests are more powerful than those applied to individual series, reported in section 4.5, since the information in the time series is enhanced by that contained in the cross-section data. Moreover, in contrast to individual unit root tests which have complicated limiting distributions, panel unit root tests lead to statistics with a normal distribution in the limit (Baltagi, 2001). One of the methods of this technique is the t-bar statistics method, used in our analysis, which involves two steps to test for stationarity: the first one is carrying out a standard augmented Dickey-Fuller unit root test for each country and the second is to compute the average of the t-values obtained from each independent ADF regression. The ADF test using panel data is based on the following model:

$$\Delta Y_{it} = \alpha_i + \beta_i Y_{i,t-1} + \sum_{j=1}^{p} \delta_{ij} \Delta Y_{i,t-j} + \varepsilon_{it}$$

Where, i=1,2,……..,N countries and t = 1,2,………,T which is time period, Δ is the first order difference operator Y_{it} is variable under consideration, $j = 1,\ldots\ldots,p$ ADF lags, p is the number of lag length of ΔY_{it} needed to get white noise residuals, and δ_i is the estimated vector of coefficients on the augmented lagged differences. According to Hsiao (1987) proposed procedure, based on Akaike's minimum Final Prediction Error (FPE) criterion, to get the appropriate lag length of each $\delta_{ij}(g)$ we start with the highest possible lag order and test down to get the optimal lag order which is used in the following tests: cointegration, VECM, and Granger causality. In our analysis and based on the average of the standard ADF test, the test is, independently, calculated for each country allowing for up to 5 lags. The optimal selection of lag length has to be determined based on the properties of the residuals. The null hypothesis is $B_i = 0$, for all i's, while the alternative hypothesis is $B_i < 0$. The IPS statistic is mainly an average of the individual ADF statistics computed as t-bar statistics (for more details about IPS tests see Appendix 8). Any common time effects will be removed and the risk of correlation across countries will be reduced by regressing each variable on a set of time dummies and taking the residuals.

4.7.2. Panel cointegration test:

After investigating the order of integration, the next step is to examine the presence or the absence of cointegration to capture the long-run relationships among the variables. It is noted that if there is no cointegration, the first difference of the data can capture these relationships, but if cointegration is present, they can not. The panel cointegration test can be specified in the context of the following form:

$$Y_{it} = \alpha_i + \beta_t + \delta_i X_{it} + \varepsilon_{it}$$

Where exports (growth) and imports (growth) and human capital are represented by Y_{it}, and GDP (growth) is represented by X_{it}, α_i is country specific representing a fixed effect or individual-specific effect that is allowed to vary across individual cross-sectional units, β_t is a time-specific error term that captures either short-run external effects or long-run effects (both are global effects) that cause the variables of each country to move together over time and ε_{it} denotes an error term.

According to Pedroni (1999), both slope coefficients δ_i and the time effect β_t are modelled heterogeneously like intercept terms. A panel (and group) cointegration test developed by Pedroni (1999) is used to determine whether there is a stable long-term relationship. This technique allows for short run dynamics across countries under study. It also allows for heterogeneity of cointegrating vectors. The technique generates consistent estimates of the parameters in relatively small samples. Also, it controls for potential endogeneity of the regressors and serial correlation. We use the residuals of the above equation to construct an ADF based group mean panel cointegration test.

According to Abadir and Taylor (1999), the cointegration testing principle is to test whether two or more integrated variable deviate significantly from a certain relationship. In other words, if there is cointegration among the variables, they move together over time, correcting short term disturbances in the long term. The ε_{it} (error term) shows deviations from the modelled long-run relationship (Apergis, 2004). If the series are cointegrated, this term will be stationary and we can achieve this stationarity by establishing whether ρ_i in $\varepsilon_{it} = \rho_i\ \varepsilon_{i(t-1)} + \upsilon_{it}$ is unity. The null hypothesis is that $\rho_i = 1$. This implies that the null hypothesis is equivalent to testing the null of no cointegration for all i. In this section we are interested in testing if the no cointegration null holds for the panel as a whole, not for countries individually as in the previous cointegration test for Egypt, i.e. we want to test the null that $\rho_i = 1$ in the previous equation.

While Johansen's procedure (which was used before to test for cointegration) is useful in conducting individual cointegration tests as in case of Egypt, it does not deal with cointegration in panel settings. Pedroni (1995, 1997, 1999) developed many tests for panel cointegration.

Pedroni (1997) developed two types of heterogenous panel cointegration test which in addition to using panel data, thereby overcoming the problem of small samples, allow different individual cross-section effects by allowing for heterogeneity in the intercepts and slopes of the cointegrating equation. Pedroni (1999), enlarging on the results in Pedroni (1997), introduced seven residual-based tests for the null of no cointegration in dynamic panels with multiple regressors which are divided into two groups. The first one, termed "within dimension", includes the panel-v, panel rho (r), panel non-parametric (pp), and panel parametric (adf) statistics. The other group, called "between dimension", includes the group-rho, group-pp, and group-adf statistics. These tests allow for heterogeneity among individual units of the panel and no exogeneity requirements are imposed on the regressors in the cointegrating regressions. The tests consist of taking as null the hypothesis of no cointegration and using the residuals derived from a panel static regression to construct the test statistics and tabulate the distributions.

Pedroni's tests are based on the estimated residuals from the following long run model:

$Y_{it} = \alpha_i + \sum_{j=1}^{m} \beta_{ij} X_{ijt} + \varepsilon_{it}$ where $\varepsilon_{it} = \rho_i \; \varepsilon_{i(t-1)} + \upsilon_{it}$ are the estimated residuals from the panel regression. The Null hypothesis tested is that ρ_i is unity. All the statistics are normally distributed and can be compared to appropriate critical values, and if critical values are exceeded then the null hypothesis of no cointegration is rejected, implying that a long-run relationship between the variables does exist. Using the spirit of Pedroni's cointegration procedure, we can test if $\rho_i = 1$ or not. Two ways, depending on how ρ_i is estimated, are applied in this study. The first one is a panel approach (Panel-ADF statistics) which involves restricting $\rho_i = \rho$ for all i (in each group; low income, middle income, and whole sample) and then using the pooled estimate of ρ as a statistic. The second way is the group mean approach, which involves estimating ρ_i separately for each unit i before combining them into a panel statistic.

The treatment of ρ_i differs in both tests in the sense that it has implications for the way a rejection is interpreted. A rejection by the group mean approach is usually interpreted as that $\rho_i < 1$ for at least one i, whereas, in the panel approach, it is interpreted as $\rho < 1$ for all i. Thus, a rejection of the null has different meanings depending on whether ρ_i is estimated separately or not.

4.7.3. Vector Autoregressive (VAR) test using panel data:

In the absence of cointegration among variables we examine causal relationship between the above four variables using VAR. The VAR can be written as follows:

Denote *V* as a four-component vector where *V*= (*GDP*, *X*, *M*, *HC*) for i= variable and j=country. So,

$$V_{ijt} = \delta_1 V_{ij,t-1} + \delta_2 V_{ij,t-2} + \delta_h V_{ij,t-h} + \mu_{ij} + \eta_{ijt}$$

Or it can be written for our model as follows:

$$\begin{bmatrix} V_{1jt} \\ V_{2jt} \\ V_{3jt} \\ V_{4jt} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \begin{bmatrix} \delta_{11}(g) & \delta_{12}(g) & \delta_{13}(g) & \delta_{14}(g) \\ \delta_{21}(g) & \delta_{22}(g) & \delta_{23}(g) & \delta_{24}(g) \\ \delta_{31}(g) & \delta_{32}(g) & \delta_{33}(g) & \delta_{34}(g) \\ \delta_{41}(g) & \delta_{42}(g) & \delta_{43}(g) & \delta_{44}(g) \end{bmatrix} * \begin{bmatrix} V_{1jt} \\ V_{2jt} \\ V_{3jt} \\ V_{4jt} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix}$$

Where,

V_{ijt} represents our four endogenous variables, $\delta_{i,j}(g) = \sum_{t=1}^{p} \delta_{i,j} g^t$, δ_{ij} (g) polynominal degree , g is the lag operator, index j refers to the country, α_i (i = 1,2,3,4) are constants, ε_{1t}, ε_{2t}, ε_{3t}, ε_{4t} are the error terms following white noise process with zero mean and constant variance, and t refers to the time period ($t = 1,\ldots,p$). The residuals of the model in the above equation reflect the relationships among the above variables. It is concluded that Y_{it} Granger causes Y_{jt} if and only if δ_{ji} (g) $\neq 0$ and Y_{jt} Granger causes Y_{it} if and only if $\delta_{ij} \neq 0$. A bi-directional of feedback relationship occurs if Y_{it} Granger causes Y_{jt} and vice versa happens on the other direction at the same time. Y_{it} Granger causes Y_{jt} indirectly if Y_{it} Granger causes Y_{ht} and if Y_{ht} Granger causes Y_{jt} (Hsiao, 1987).

4.7.4. Vector Error Correction Model (VECM) using panel data:

As shown, once cointegration is detected, we have to determine the direction of causality within the context of a vector error correction model (VECM) (Granger, 1988). VECM represents a special case of VAR which imposes cointegration on its variables to allow distinction between short-run and long-run Granger causality. *ECT*s, included in VAR, enable misspecification to be avoided. For panel data the VECM model is specified as follows:

$$\Delta \log GDP_{it} = \alpha_1 + \psi_1 ECT_{i,t-1} + \sum_{j=1}^{p} \beta_{11j} \Delta \log GDP_{i,t-j} + \sum_{j=0}^{p} \beta_{12j} \Delta \log X_{i,t-j} + \sum_{j=0}^{p} \beta_{13j} \Delta \log M_{i,t-j} + \sum_{j=0}^{p} \beta_{14,j} \Delta \log HC_{i,t-j} + \mu_{1it}$$

$$\Delta \log X_{it} = \alpha_2 + \psi_2 ECT_{i,t-1} + \sum_{j=1}^{p} \beta_{21j} \Delta \log X_{i,t-j} + \sum_{j=0}^{p} \beta_{22j} \Delta \log GDP_{i,t-j} + \sum_{j=0}^{p} \beta_{23j} \Delta \log M_{i,t-j} + \sum_{j=0}^{p} \beta_{24,j} \Delta \log HC_{i,t-j} + \mu_{2it}$$

$$\Delta \log M_{it} = \alpha_3 + \psi_3 ECT_{i,t-1} + \sum_{j=1}^{p} \beta_{31j} \Delta \log M_{i,t-j} + \sum_{j=0}^{p} \beta_{32j} \Delta \log GDP_{i,t-j} + \sum_{j=0}^{p} \beta_{33j} \Delta \log X_{i,t-j} + \sum_{j=0}^{p} \beta_{34,j} \Delta \log HC_{i,t-j} + \mu_{3it}$$

$$\Delta \log HC_{it} = \alpha_4 + \psi_4 ECT_{i,t-1} + \sum_{j=1}^{p} \beta_{41j} \Delta \log HC_{i,t-j} + \sum_{j=0}^{p} \beta_{42j} \Delta \log GDP_{i,t-j} + \sum_{j=0}^{p} \beta_{43j} \Delta \log X_{i,t-j} + \sum_{j=0}^{p} \beta_{44,j} \Delta \log M_{i,t-j} + \mu_{4it}$$

Where, Δ is the first-difference operator, the term $ECT_{i,t-1}$, (disequilibrium of the previous period) = $GDP_{it-1} - \hat{a}_i - \hat{\eta} X_{it-1} - \hat{\beta} M_{it-1} - \hat{\upsilon}\, HC_{it-1}$, is the error correction term derived from the long run cointegrating relationship, i.e. residuals, as the existence of cointegrated relationship in the long run indicates that the residuals from the cointegration equation can be used as ECT, the coefficients of *ECT;* $\psi_1, \psi_2, \psi_3, \psi_4$ capture the adjustments of ΔGDP, ΔX, ΔM, and ΔHC towards long-run equilibrium.

In case of the presence of cointegration, it is found that at least one of the ψ parameters is significant, i.e, at least one of the coefficients $\psi_{1i}, \psi_{2i}, \psi_{3i}, \psi_{4i}$ is non zero when there is a long run relationship among the variables under study. The importance of *ECT* is that while the error term ε_{it-1} (in the VAR equation) represents how far our variables are from the equilibrium relationship (disequilibrium), the error correction term estimates how this disequilibrium causes the variables to adjust towards equilibrium in order to keep the long run relationship intact.

To estimate VECM, two steps need to be followed:

1-Using Johansen's (1988) maximum likelihood procedure to estimate the long run relationship among *GDP, X, M,* and *HC* as formulated in the VAR and then,

2-Using the estimated cointegration relationship obtained from the previous step to construct the disequilibrium term, and then estimating VECM for each variable under consideration depending on the VECM equations stated above. The coefficients besides the *ECT* have to be negative, showing how the system converges to the long-run equilibrium.

4.7.5. Granger causality test using panel data:

The test was described in detail in subsection 4.5.2.3. Here, we will simply specify the equation, as follows:

$$\Delta GDP_{it} = \gamma_h V_{h,t-1} + \alpha_1 \Delta GDP_{i,t-z} + \alpha_2 \Delta X_{i,t-z} + \alpha_3 \Delta M_{i,t-z} + \alpha_4 HC_{i,t-z} + \mu_{it}$$

We can use F-statistics to verify the joint hypothesis that the coefficients of the explanatory variables equal zero. A Joint Wald test, applied to the coefficient of each explanatory variable in the VECM, can examine the Granger causality.

4.8. Empirical results of panel causality test:

We employed the appropriate tests to test for causality using panel data. The results are analysed as follows.

4.8.1. Panel Unit Root test results:

To test for causality between economic (GDP) growth and exports using panel data, we first test for the order of integration in the *GDP*, *X*, *M*, and *HC* series to test whether or not unit root (non stationarity) is present in the panel data. The approach of Im et al. (1997, 1998, 2003) is adopted. The IPS tests are conducted to check for the presence of a unit root for all variables, both in levels and in first differences. For IPS panel unit root, individual ADF regressions (for each country in the group; low-income and middle-income) are performed for *GDP*, *X*, *M*, and *HC*, including a constant and time trend. Then a *t*-bar statistic is computed based on averaging individual ADF statistics. IPS standardise *t*-bar and show that the *t*-bar converges to a standard normal distribution. The results for both levels and first differences of the variables obtained from the panel unit root test are presented in the following table.

Table 4.4
Panel unit root test results (1970-2006)

	Level				First Difference			
	GDP	*X*	*M*	*HC*	*ΔGDP*	*ΔX*	*ΔM*	*ΔHC*
All sample	-1.374	-1.458	-1.651	-1.994	-8.823*	-7.327*	-6.436*	-6.179*
Middle.income	-1.119	-1.524	-1.983	-2.421	-6.359*	-5.763*	-5.496*	-6.281*
Small-income	-2.822	-2.268	-1.979	-1.968	-19.886*	-18.951*	-10.920*	-5.847*

Notes:
(1) *GDP* is real GDP, *X* is real export, *M* is real import and *HC* is human capital represented by schooling (secondary school enrolment).
(2) All data are in logarithmic form.
(3) * signifies the rejection of the unit root hypothesis at 1% level where under the null hypothesis of non stationarity, the test is distributed as N (0,1), so large negative values indicate in favour of stationarity.

Table 4.4 suggests that the real *GDP*, real exports *(X)*, real imports *(M)* and *HC* are integrated of the first order, i.e. are *I* (1). The IPS test results on the level form of the above variables indicate a failure to reject the null of non-stationarity; however they do reject the null as first differenced become stationary at the 1% significance level. Having established that the *GDP*, *X*, *M*, and *HC* are integrated of the first order, the second step in testing the relationship between these variables is to test for cointegration between the four variables in order to determine if there is a long run relationship between these four variables. This test is reported in the next subsection.

4.8.2. Panel cointegration test results:

Since the integration of order one, i.e. *I* (1), for all the variables under consideration was indicated in the previous step and they became stationary when differenced (first difference), they are candidates for inclusion in a long-run relationship. Cointegration is tested based on residual for the null of no cointegration in the spirit of Pedroni's (1997) procedure to detect long-run relationship among the set of integrated variables: real *GDP*, real exports (*X*), real imports (*M*), and human capital (*HC*) represented by secondary school enrolment. If the residuals seem stationary, this suggests that the variables are cointegrated. Allowing for the highest degree of heterogeneity across countries, our cointegration tests are carried out based on examining the stationarity of the error term (ADF for residuals) estimated from the following equation:

$$GDP_{it} = \alpha + \beta_i X_{it} + \gamma_i M_{it} + \psi_i HC_{it} + \varepsilon_{it}$$

Where, $t = 1,\ldots\ldots\ldots,T$, $i = 1,\ldots\ldots\ldots,N$ indexes the time series and cross-sectional dimensions, respectively. The idea is that the error term ε_{it} is stationary when cointegration exists among the variables under study and it has a unit root in case of the absence of cointegration. Thus, testing the null hypothesis of no cointegration for cross-sectional data is equivalent to testing whether ε_{it} possesses a unit root by using the following autoregression:

$$\varepsilon_{it} = \rho_i \varepsilon_{it} + \upsilon_{it}$$

As we are interested in testing if the no cointegration null holds for the panel as a whole, i.e. we want to test the null that $\rho_i = 1$ for all i, two ways to estimate ρ_i are applied: the panel approach (Panel-ADF statistics) and the group approach (Group-ADF statistics) (for more details of the panel cointegration test, see the previous subsection 4.7.2). The following table shows the results of the panel cointegration test.

Table 4.5
Panel cointegration test results

	Panel-ADF statistics					Group-ADF statistics				
	Lag order					Lag order				
	P_i= 1	P_i= 2	P_i= 3	P_i= 4	P_i= 5	P_i= 1	P_i= 2	P_i= 3	P_i= 4	P_i= 5
Full sample	-1.19	-0.97	-1.54	-2.32	-3.88*	-1.25	-1.92	-2.42	-3.76*	-6.62*
Middle-income	-1.57	-0.12	-1.22	-2.18	-3.14	-1.49	-2.10	-2.54	-3.26	-5.06*
Low-income	-4.43*	-4.72*	-5.69*	-6.06*	-11.37*	-5.28*	-6.04*	-7.12*	-9.83*	-13.87*

Notes:
*** signifies the rejection of the unit root hypothesis of the residuals at 1% or (no cointegration hypothesis).**

In computing the test, up to five years lag length was allowed for, as it is notable that evidence of cointegration increases with the order of the lag. The purpose of so doing is to analyse the consistency of the results, with respect to various dynamic structures. The ADF statistics reported in the above table indicate the existence of a long-run relationship (stationarity of the residuals). The results indicate that the variables of interest are cointegrated, especially, the results of the group-ADF statistics which show a higher level of significance (even for lower lags) than those for the panel-ADF test. For the middle-income group, it is notable that unlike the panel-ADF, the group-ADF allows us to reject the null hypothesis of no cointegration for all the estimated groups, indicating that:

1- Panel ADF may lack power for the middle-income group, raising doubt as to the possibility of drawing any inference from these results.

2- There is heterogeneity among the sample countries.

Overall, our estimated panel *t* and group *t* statistics, especially for the low-income group, are much higher than the critical value at the 1% level, indicating stationary residuals in the regression or cointegration among all variables. Hence, we can conclude that there is a cointegrating relationship among the variables. However, the panel ADF results for the middle-income group raise a question as to the power of the test to enable inferences to be drawn, as stated. We therefore continue by employing causality tests based on the Vector Error Correction Model (VECM).

4.8.3. Vector Error Correction Model (VECM) results:

The previous step detected a long-run relationship among the variables in all sample groups (despite the weakness of the cointegration in the middle-income group) verifying the existence of causality in at least one direction. It then becomes important to determine the direction of the causality by examining, in particular, whether exports Granger cause GDP or whether the variables cause each other in the long-run. While the cointegration test gives us an indication about the long-run relationship among the variables, the short-run dynamics can be examined using VECM. The following table presents the short-run coefficients obtained using the VECM described in subsection 4.7.4, which was said to incorporate the short-run interactions and the speed of adjustment towards long-run equilibrium. As the coefficient of *ECT* for every variable under consideration increases, the response of its variable to the previous period's deviation increases. The variable becomes unresponsive to deviation in the equilibrium if its coefficient is insignificant.

Table 4.6
Granger Causality for panel data based on VECM

Dependent variables	ΔGDP	ΔX	ΔM	ΔHC	*ECT*	
	Wald test-statistics		(P-value)		Coefficient	t-ratio
Full sample						
ΔGDP	-	16.286 (0.000)**	33.275 (0.000)**	19.764 (0.000)**	-0.004	5.77
ΔX	12.813 (0.000)**	-	0.853 (0.356)	35.543 (0.000)**	-0.067	0.92
ΔM	2.082 (0.152)	26.823 (0.000)**	-	13.621 (0.000)**	-0.036	5.18
ΔHC	12.463 (0.000)**	9.558 (0.002)**	3.128 (0.141)	-	-0.318	3.29
Middle-income						
ΔGDP	-	15.987 (0.000)**	9.558 (0.002)**	0.760 (0.484)	-0.059	2.21
ΔX	8.302 (0.004)**	-	2.193 (0.161)	3.361 (0.068)	-0.123	6.40
ΔM	13.457 (0.000)**	11.058 (0.000)**	-	1.772 (0.184)	-0.094	-2.51
ΔHC	4.752 (0.112)	0.122 (0.727)	0.568 (0.451)	-	-0.036	2.88
Low-Income						
ΔGDP	-	12.241 (0.000)**	10.344 (0.000)**	8.504 (0.004)**	-0.083	11.13
ΔX	15.412 (0.000)**	-	11.074 (0.000)**	0.817 (0.366)	-0.0912	7.83
ΔM	10.234 (0.000)**	8.968 (0.002)**	-	3.192 (0.075)	-0.0108	-0.988
ΔHC	9.686 (0.001)**	10.199 (0.000)**	1.122 (0.290)	-	-0.016	-1.69

Notes: (1) Δ is the first operator
(2) * denotes statistically at 1% level
(3) The significance of the error correction term (*ECT*) is evaluated with t-statistics
(4) Wald test tests the jointly significance of the lagged values of independent Variables. H_0: a_2 = ………= a_4 = 0 which is verified at 1% 1and 5% significance levels.
(5) Numbers in parentheses are the P-values.

Table 4.6 presents the results of the Granger causality test within the VECM framework using panel data for the middle-income group, the low-income group and full sample countries. The whole sample panel shows, in the short-run, the existence of bi-directional causality between economic growth (*GDP*) and exports (*X*), implying that export performance enhances economic growth and vice versa. Bidirectional causality also exists between economic growth (*GDP*) and human capital (*HC*), and between real exports (*X*) and Human capital (*HC*), confirming the strong causality relationship between these two variables. However, a unidirectional causality running from imports (*M*) towards economic growth (*GDP*) is detected as well as a unidirectional causality running from real exports (*X*) to real imports (*M*). The Wald test null hypothesis, based on the statistics obtained from estimating the VECM, can be summarised for the whole sample as follows:

Table 4.7
Wald test for full sample

For *GDP* equation:	Coefficient sign
H_0: *X* does not Granger cause *GDP*………………………..rejected	(+)
H_0: *M* does not Granger cause *GDP* ……………….............rejected	(+)
H_0: *HC* does not Granger cause *GDP*………………………rejected	(+)
For *X* equation:	
H_0: *GDP* does not Granger cause *X*………………………..rejected	(+)
H_0: *M* does not Granger cause *X*……………...failed to be rejected	(+)
H_0: *HC* does not Granger cause *X*……………………........rejected	(+)
For *M* equation:	
H_0 : *GDP* does not Granger cause *M*………….failed to be rejected	(+)
H_0 : *X* does not Granger cause *M*…………………………rejected	(+)
H_0 : *HC* does not Granger cause *M*………………………..rejected	(-)
For *HC* equation:	
H_0: *GDP* does not Granger cause *HC*……………………....rejected	(+)
H_0: *X* does not Granger cause *HC*…………………………rejected	(+)
H_0: *M* does not Granger cause *HC*…………….failed to be rejected	(-)

Note: the rejection of null is based on the statistics in Table 4.6 obtained from the estimation of VECM

To test for causality between predetermined and dependent variables, we turn to the Wald test. Table 4.6 reported the estimated coefficient for carrying out the Wald test for the null of no causality by calculating F-statistic based on the null hypothesis that a set of coefficients on the lagged values (changes) of the independent variables (the other three variables and the error correction adjustment term) are jointly equal to zero. Accepting the null hypothesis means that the independent variables do not cause the dependent one.

In the *GDP* equation, we have three null hypotheses: ΔX does not cause Δ *GDP*, ΔM does not cause ΔGDP, and ΔHC does not cause ΔGDP. For our most important aim, which is to investigate whether exports lead growth or growth leads exports, the Wald test in this equation indicates that causality runs from exports to *GDP*, as the test rejects the null of no causality at the 1% significance level. On the other hand, the evidence indicates that causality is running from *GDP* to exports in the export equation as well. The Wald rejects the null of no causality at the same significance level. Therefore, we may conclude that evidence indicates a bidirectional causality running between *GDP* and exports.

The same occurred for another important aim, which is to investigate the relationship between exports and human capital. When examining the *ECT* in our results for the whole sample panel, we find that the *ECT* coefficients, except for the *X* equation, are significant and have negative signs, implying that the series cannot drift too far apart and convergence is achieved in the long-run. The negative sign means that the variables react negatively to any deviations in the long-run equilibrium, implying positive deviations from this equilibrium. The *ECT* for human capital is greater, implying faster response to deviations, than for other variables. Each *ECT* coefficient indicates that a deviation from long-run equilibrium value in one period is corrected in the next period by the size of that coefficient. The coefficient for *HC*, which measures the speed of temporal adjustment to long run equilibrium, indicates that 31 percent of adjustment occurs in a year, and it takes about three years to adjust to the long run equilibrium. For -0.004 and -0.036 the coefficients are around .4 percent and three percent, respectively. The coefficient of *ECT* of -0.067 also has a negative sign, but it is not significant. The t-statistic for X is low, suggesting that exports are less responsive to deviations. From the analysis of the coefficients of *ECT*, we can conclude that the adjustments take place within different periods, implying that the system settles down, but not quickly.

Regarding the middle-income panel, Table 4.6 shows that exports and imports Granger cause *GDP* in the short-run, where they have a positive and significant causal effect on *GDP*, while *HC* does not. Economic growth (*GDP*) Granger causes exports and imports as well. A unidirectional causality exists running from exports to imports. Thus, there is a bi-directional causality between exports and *GDP* in the short run and another bidirectional causality between imports and *GDP*. The results reported in Table 4.6 show that there in no causal relationship between *HC* and exports, or between *HC* and imports. It can be seen when looking into the human capital equation, that there is no causality running from *GDP*, *X*, and *M* towards *HC*. When examining *ECT* for the middle income group, we find that all the variables, *GDP*, *X*, *M*, and *HC* react negatively to deviations in the long run equilibrium. While *X* appears to be more responsive to deviations, *GDP*, *M*, and *HC* are less responsive to deviations, since t-statistics are low (insignificant). It is notable that the *X* equation is the only one in the system where *ECT* is statistically significant. This suggests that *X* solely bears the brunt of short-run adjustment to bring about the long-run equilibrium in the middle-income group, i.e. *X* acts as the initial receptor of any exogenous shocks that disturb the equilibrium system. The coefficient of *ECT* for *X* equation indicates 12 percent of adjustment occurs in a year, and it takes about 8 years to adjust to the long run equilibrium. As for the whole sample, the Wald test for the middle-income group is summarised in the following table:

Table 4.8
Wald test for middle-income group

For *GDP* equation:	Coefficient sign
H_0: *X* does not Granger cause *GDP*………………………..rejected	(+)
H_0: *M* does not Granger cause *GDP* ……………….............rejected	(+)
H_0: *HC* does not Granger cause *GDP*………….failed to be rejected	(+)
For *X* equation:	
H_0: *GDP* does not Granger cause *X*………………………..rejected	(+)
H_0: *M* does not Granger cause *X*……………...failed to be rejected	(+)
H_0: *HC* does not Granger cause *X*…………….failed to be rejected	(+)
For *M* equation:	
H_0 : *GDP* does not Granger cause *M*………………………rejected	(+)
H_0 : *X* does not Granger cause *M*…………………………..rejected	(+)
H_0 : *HC* does not Granger cause *M*……………failed to be rejected	(+)
For *HC* equation:	
H_0: *GDP* does not Granger cause *HC*…………failed to be rejected	(+)
H_0: *X* does not Granger cause *HC*…………….failed to be rejected	(+)
H_0: *M* does not Granger cause *HC*…………….failed to be rejected	(+)

Note: the rejection of null is based on the statistics in Table 4.6 obtained from the estimation of VECM

Regarding the low-income panel, it shows that real exports (*X*), real imports (*M*), and human capital (*HC*) seem to Granger cause effects on *GDP*. While this effect of exports is positive, the effects of *M* and *HC* are negative. Both *M* and *GDP* causally affect *X* positively. On the other hand, as in the case of middle-income countries, a positive and significant effect from both *GDP* and *X* on *M* is observed; however *HC* failed to have a significant causal effect on imports, or on *GDP*. Hence, we acknowledge the existence of bi-directional causal relationship between *X* and *GDP*, *X* and *M*, *GDP* and *M*, and *GDP* and *HC*. We further find the existence of unidirectional causality running from *X* to *HC*, implying that export performance positively enhances human capital and the absorptive capacity of technology can play an important role in this regard. It seems that there is no causality effect between real imports (*M*) and human capital (*HC*). By examining *ECT*, for the low-income group, *X*, as in the middle-income group, reacts negatively to the shocks in the system with the highest adjustment speed at 9 percent and it is obvious that the coefficient of *ECT* for the *X* equation is significant. On the other hand, both imports and human capital have insignificant estimated coefficients of *ECT*, which means they appear unresponsive to deviations in the long run. The following table summarises the Wald test results for low-income countries:

Table 4.9
Wald test for low-income group

For *GDP* equation:	Coefficient sign
H_0: *X* does not Granger cause *GDP*………………………..rejected	(+)
H_0: *M* does not Granger cause *GDP* ………………...........rejected	(-)
H_0: *HC* does not Granger cause *GDP*…………………….... rejected	(-)
For *X* equation:	
H_0: *GDP* does not Granger cause *X*………………………..rejected	(+)
H_0: *M* does not Granger cause *X*………………………….. rejected	(+)
H_0: *HC* does not Granger cause *X*…………….failed to be rejected	(+)
For *M* equation:	
H_0 : *GDP* does not Granger cause *M*………………………rejected	(+)
H_0 : *X* does not Granger cause *M*…………………………..rejected	(+)
H_0 : *HC* does not Granger cause *M*……………failed to be rejected	(+)
For *HC* equation:	
H_0: *GDP* does not Granger cause *HC*……………………...rejected	(+)
H_0: *X* does not Granger cause *HC*……………………….... rejected	(+)
H_0: *M* does not Granger cause *HC*…………….failed to be rejected	(+)

Note: the rejection of null is based on the statistics in Table 4.6 obtained from the estimation of VECM

4.9. Concluding Remarks

This chapter addresses whether there are any causal effects between exports and output growth, an important question. First derivations from an endogenous growth theory were presented to show how introduction of human capital makes it possible for economies to grow continuesly without any diminishing retuns to physical captial. Then using up-to-date econometric time series techniques, we explored the possibility of a causal relationship (link) between the expansion of exports due to openness and economic growth as the main objective, and investigated a causal relationship among the two variables, imports and human capital accumulation, as a subsidiary aim. This causal relationship is investigated for the case of Egypt as one of developing economies adopting a trade liberalisation regime with export promotion (outward oriented development strategy).

To increase the number of observations and, consequently, the power of the test, and at the same time to reduce small sample size distortions, a panel data approach has recently become very popular and applied to investigate the causality between export and economic growth. Taking the rural areas into consideration Egypt is classified as a low-middle income country. A panel data approach was therefore used to explore the same causal relationship in the case of both low and middle countries, to give robustness to the time series results. In this chapter we used annual time series data on real exports, real imports, higher education attainment ratio representing human capital accumulation and real GDP over the period 1970-2006 to investigate this causality.

This period represents the most important years of the transformation of Egypt to an open economy and also it includes the year of Egypt's reform programme (1991) which involved an Export-led Growth (ELG) strategy. Our contributions to the literature investigating the causal relationship between exports and economic growth of Egypt are the addition of an important factor affecting and affected by economic growth in Egypt, which is human capital and conducting the Granger test within the Vector Error Correction Model (VECM) framework. Both the integration and cointegration properties of the data are detected. The model of Granger causality within the VECM framework is detected as well. We utilised the unit roots test to test for stationarity, which indicated that the time series data used are integrated of order (1), then applied the Johansen cointegration process (Johansen's maximum likelihood procedure) for testing the long run relationship among the variables. Once this long run relationship was detected, a Granger causality test within VECM was applied to detect the direction of the causality in both short run by using the *F*- statistics of the lagged first difference of explanatory variables and long run by using the t- statistics of the error correction term (*ECT*).

In brief, based on the VECM, the results suggest that , in both short run and long run, there is a significant unidirectional relationship running from real exports (positive coefficient), real imports(negative coefficient) and higher education attainment ratio(positive coefficient) to economic growth but not vice versa, indicating the importance of the effect of trade liberalisation (openness), represented in adoption of export expansion, and the influence of both imports and human capital accumulation on the process of economic development represented by economic growth. However, among these variables themselves (real exports, real imports, and Human Capitan accumulation), a significant bi-directional relationship (feedback) exists in both short run and long run as well. Therefore, we can say that from the Granger causality test based on the VECM, empirical evidence indicates that the causal link between real exports and real *GDP* is significantly positive and unidirectional, running from exports to *GDP*, supporting export-led growth (ELG) in the case of Egypt.

To increase the number of observations, and hence the power of existing tests, we employed panel data from twenty countries, ten low-income and ten middle-income, over the period 1970-2006, to test for causality for the same four variable model applied for Egypt, i.e. using time series data. As for the time series data analysis, it was first necessary to ensure the stationarity of the panel data series, because the use of non stationary data can produce spurious regression (very high R^2 and very low DW). This was done using IPS tests. The data were found to be non stationary at level. The same tests were therefore performed with the first difference level of the data. The test results indicate that all data are stationary at the first difference level.

After establishing stationarity, a cointegration test was conducted to test for the existence of unit root in the estimated error term (residuals) from the following equation: $GDP_{it} = \alpha_i + \beta_i X_{it} + \gamma_i M_{it} + \psi_i HC_{it} + \varepsilon_{it}$ for the null of no cointegrationin the spirit of Pedroni's (1997) procedure. Allowing for up to five years lag length, the results of the computed ADF statistics for the group and panel demonstrate stationary residuals in the regression, i.e. the existence of cointegration or long run relationship (despite the weakness of cointegration in case of middle-income countries).

A causality test was carried out based on the vector error correction model (VECM) to capture this long run relationship. The results obtained from using panel data for low and middle income countries documented that exports affect output growth and vice versa. They gave evidence for both the export-led growth (ELG) hypothesis and growth-led export (GLE) hypothesis in the case of middle-income and low-income countries (bi-directional relationship). However, in the case of Egypt, the relationship is unidirectional, running from export to growth. Unlike Helleiner's (1986), our results support the strength of the relationship between exports and growth in the poorest countries. However our findings regarding GLE are in line with Krugman (1994), who argued that economic growth leads to enhancement of skills and technology, which in turn increases efficiency, thus creating a comparative advantage for the country that facilitates exports.

Thus we may conclude that in order to export more, middle and low income countries must aim at policies that promote economic growth. For the whole sample, another bi directional causality between growth and human capital exists. However, for the middle-income group, this relationship does not exist. The *GDP-HC* causal bi directional relationship exists in the case of the low-income group, with a negative sign of the *HC* significant coefficient. We can attribute this negative causality from *HC* to *GDP* to the argument that human capital, represented by secondary school enrolment, will be a future labour force for any country and in a country with abundant labour and scarce capital, like low income countries, the marginal productivity of labour may be negative (Bhandari et al., 2007). As expected, the error correction term (*ECT*) carries a negative, but not always statistically significant, coefficient, confirming that the variables in the model are indeed cointegrated when their coefficients are statistically significant.

The following table summarises the results of the Granger causality tests applied using time series data of Egypt and using panel data for two groups classified according to their degree of development into middle- and low-income.

Table 4.10
Summary of the causality tests

	Egypt	Full sample	Middle income	Low income
X→GDP	(Y)	(Y)	(Y)	(Y)
M→GDP	(Y)	(Y)	(Y)	(Y)
HC→GDP	(Y)	(Y)	(N)	(Y)
GDP→X	(N)	(Y)	(Y)	(Y)
M→X	(Y)	(N)	(N)	(Y)
HC→X	(Y)	(Y)	(N)	(N)
GDP→M	(N)	(N)	(Y)	(Y)
X→M	(Y)	(Y)	(Y)	(Y)
HC→M	(Y)	(Y)	(N)	(N)
GDP→HC	(N)	(Y)	(N)	(Y)
X→HC	(Y)	(Y)	(N)	(Y)
M→HC	(Y)	(N)	(N)	(N)

Note:

(1) → means Granger causes
(2) (Y) means yes
(3) (N) means no

The table demonstrates that the *GDP* equation is the only one that gave almost the same results, except for the disappearance of a causal relationship between *HC* and *GDP* in the middle-income group. However, for the export equation there is diversity in the results. While we find, in the case of Egypt, that *GDP* does not Granger cause *X*, such a relationship exists in both middle- and low-income countries. The result for Egypt is in line with the result obtained in the low-income group regarding the causal relationship from imports (*M*) to exports (*X*); however, a causal relationship running from human capital (*HC*) to exports (*X*) is found in the case of Egypt and is not found for either low- and middle-income groups.

For equation *M*, while the causal relationship between *GDP* and *M* appeared in the case of middle and low income groups, it disappeared in the case of Egypt. A causal relationship between *X* and *M* was detected in all cases. A causal relationship between

HC and *M* exists in the case of Egypt, but not in the other cases. For equation *HC*, there is agreement between the results for Egypt and the middle-income group regarding the absence of a causal relationship between *GDP* and *HC*. The result for Egypt and the low-income group regarding the existence of a causal relationship between *X* and *HC* is the same. No causal relationship was detected between *M* and *HC* in the case of both middle- and low-income, while such a relationship exists in the case of Egypt.

To sum up, the difference in development levels between middle- and low-income does not appear to affect the impact of exports. We find that the poorest (low-income) countries can benefit from openness. This may be due to the role of trade liberalisation in promoting competition for low-and middle- income countries, including Egypt, in the globalised world. This implies that the subsidy policy of exports of these countries should be restructured and further export allowances offered to investors, especially, in my view, domestic ones.

Chapter 5
A Simultaneous Equation Model of Free Trade and Economic Growth of Egypt

5-1 Introduction

One reason why several empirical studies (reviewed in ch.3) have failed to resolve the issue of the impact of trade on economic growth is that most of them examined only part of the influence. This is because they used a single equation, ignoring the issue of simultaneity associated with trade and growth (as stated in Ch.3 as a conclusion of section 3.4). Indeed, Feder (1983) used a single equation model, even though he acknowledged the existence of a simultaneous relationship. In economic system, it is noted that everything is related to everything else. The simultaneity problem is then created due to the interdependence of all economic variables. Compared with the studies that adopted the single equation approach to investigate the relationship between international trade and economic growth, relatively few have taken account of the simultaneity issue, as was demonstrated in Ch.3. They include Salvatore (1983); Esfahani (1991); Levine& Renelt (1992); Sprout& Weaver (1993); Frankel et al. (1996); and Easterly et al. (1997).

To dealing with simultaneity, the most attractive theoretical approach is to specify a simultaneous equations model that accounts for the hypothesised simultaneous relationships among the model variables (Van de Berg and Lewer, 2007)

In the previous chapter, we used a single equation model to test for causality using recent techniques (cointegration and error correction mechanism). In this chapter, we attempt to provide further evidence on the relationship between trade and economic growth taking the simultaneity issue into account by endogenising one of the basic determinants of economic growth, which is export growth. For simplicity, the potential endogeneity of the other determinants such as FDI and human capital is ignored by using instrumental variables in estimation, as the efficient estimation method for dealing with potential simultaneity bias is to replace variables likely to cause biased estimates with instrumental variables (created from exogenous variables of the model).

Our model tries to investigate whether open economies positively affect economic growth? We will obtain an answer by considering the Egyptian economy, where serious steps have been taken from the 1970s to the present to make the economy outward oriented and open to the world. Almost all empirical growth studies have given an affirmative answer to the previous question (see Yanikkaya, 2003). The reason for the strong attitude in favour of trade liberalisation is partly due to the tragic failures of import substitution or inward-oriented strategies, especially in the 1980s. It is also partly based on the conclusions of the growth studies which proved empirically that outward-oriented economies achieved higher growth rates than inward-oriented ones.

Hahn and Kim (2000) commented on the difficulty facing the specification of growth models, as economic theory does not give us enough guidance for the proper specification of such a model. Around 60 variables that have been suggested to be correlated with economic growth were identified by Sala-I-Martin (1997). However, there is an agreement concerning the association between policies and growth which should be explored more formally with regression analysis (see Collins & Bosworth, 1996). When we come to specify the growth model, concentrating on the indicators of the openness, we find, as Morrissey & Nelson (1998) stated, some elements of economic success or economic growth:

1- High savings and investment (domestic and foreign), low capital flight, physical capital accumulation;
2- Investment in education; human capital accumulation;
3- Total Factor Productivity (TFP) growth; adoption of technology;
4- Macroeconomic management and stability;
5- High growth rate of exports; openness;
6- Dynamic agricultural sector with increasing productivity; relatively low urban-rural income differentials;
7- Relatively equitable income distribution;
8- Relatively low tax disincentives and/or relatively low-cost corruption, extracted rents without imposing high distortionary costs on the economy;

9- Political stability and credibility; “principle of shared growth”. Thirlwall (2000) asserts that since Adam Smith’s time, or maybe before, economic historians and economists have argued that trade with others represents one of the most centrally important ingredients for economic progress or economic growth. The other ingredients are freedom to choose and supply resources, competition in business and source property rights.

5.2. Modelling Trade Liberalisation in Time-series Framework

To investigate the impact of trade liberalisation on the economic growth in Egypt, the period from 1970 to 2006 will be investigated. The importance of this time in Egypt is that it covers two periods, 1974 and 1991, when reform programmes were introduced. Also it covers the establishment of the WTO. This period witnessed a strong shift in economic policy towards a more export growth oriented stance compared with the 1950s and 1960s. A “core” new growth theory model, of the type which has now become standard, will be estimated. Then, liberalisation will be introduced. A time-series model will be estimated to evaluate the long run impact of liberalisation on economic growth. Then, panel data for two different development levels (low-and middle-income) will be applied to investigate the same relationship.

5.2.1. The Simultaneous model:

The model was developed by incorporating and synthesizing earlier partial works related to trade and economic growth. The suggested model consists of two equations. This gives simplicity in carrying out the procedures to get the result, as the data belong to one economy, which is the Egyptian economy. The following simultaneous equation model is developed to capture the contribution of international trade to economic growth by considering some trade liberalization indicators.

$$ {}_{g}GDP_t = \alpha_0 + \alpha_1\, {}_{g}EXP_t + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, LAB_t + \alpha_5\, Sch_t + \varepsilon_1 \tag{5.1} $$

$$ {}_{g}EXP_t = \beta_0 + \beta_1\, {}_{g}GDP_t + \beta_2\, ToT_t + \beta_3\, TPGDP_t + \beta_4\, Xduty_t + \beta_5\, TPTAR_t + \varepsilon_2 \tag{5.2} $$

where:

$_{g}GDPt$ *is the growth rate of GDP per capita*

$_{g}EXP_{t}$ *is export growth*

FDI_{t} *is Foreign Direct Investment/ GDP*

$TARIFF_{t}$ *is import duties*

$_{g}LAB_{t}$ *is labour force growth*

Sch_{t} *is secondary school enrolment as a proxy for human capital investment based on schooling*

ToT_{t} *is terms of trade*

$TPGDP_{t}$ *is trade partners' real GDP growth*

$Xduty_{t}$ *is export duties*

$TPTAR_{t}$ *is trading partners' tariff rate*

$_{t}$ *is the period from 1970-2006*

**Definitions of all these variables are given in Appendix 2.*

The model stipulates the impact of openness on the process of economic growth. More specifically, it enables us to examine whether trade liberalisation is beneficial to the economic growth of Egypt (as a case study) and low-and middle-income countries as well. This is done by estimating the relationship between the *GDP per capita* for 1970-2006 as the dependent variable, taking into consideration that development is often measured as the increase over time in real per capita income (*GDP*) (Salvatore, 1983) and the selected indicators of trade liberalisation.

Equation 5.1 aims at capturing the impact of economic growth determinants and states that economic growth, represented by *the growth rate of GDP per capita*, is a function of export growth, which represents the variable of interest. Export expansion is one of the main determinants of growth. There is a wide body of theoretical and empirical literature analysing the strong positive links between exports and economic growth (Pereira and Xu, 2000). Both international trade theory and development theory suggest that export growth contributes positively to economic growth (Xu, 2000).

As discussed in ch.3, a number of studies have shown significant positive influence of export growth on economic growth through various channels. First, exports generate positive externality effects in the economy, especially to the import sector (see Feder, 1983 for details). Many authors, like McKinnon (1964) and Chenery and Strout (1966), discussed the effect of exports in relaxing binding foreign exchange constraints and allowing increases in imports of capital goods and intermediate goods. Herzer et al. (2006) assert that the increase of capital goods imports in turn stimulates output growth by raising the level of capital formation. Moreover, recent theoretical work suggests that capital goods imports coming from technologically advanced countries that have knowledge and technology embodied in equipment and machinery may increase productivity and consequently growth.

Therefore, these imports are considered as an important way to transfer technology through international trade (Chuang, 1998). Second, exports permit poor countries (small open economies) which are characterised by narrow domestic markets to benefit from economies of scale (Helpman and Krugman, 1985). Third, both Balassa (1978) and Krueger (1980) add that exports enhances efficiency in resource allocation and particularly, improved capital utilisation through international competitiveness. The fourth channel through which exports affect *GDP* growth, was proposed by Grossman and Helpman (1991a). They argued that exports facilitate the diffusion of technical knowledge, in the long run, through foreign buyers' suggestions and learning-by-doing.

Santos-Paulino (2000) discussed all these benefits, stating that the main benefits to economic growth from higher export growth are the positive externalities resulting from greater competition in world markets and consequently greater efficiency in resource allocation, economies of scale, and technological spillovers. Moreover, Edwards (1993) discussed the effect of exports on economic growth, with reference to studies based on neoclassical production functions. At the centre of this approach is the idea that exports contribute to aggregate output in two fundamental ways: first, there is an assumption that the export sector generates positive externalities on non exports sectors through more efficient management styles and improved production techniques. Second, it is argued that there is a productivity differential in favour of the exports sector. Consequently, an expansion of exports at the cost of other sectors will have a positive net effect on aggregate output. Thirlwall (2000) asserted that exports have powerful effects on both supply and demand within an economy and so there is a highly positive effect of export growth on economic growth. Based on the above mentioned benefits to economic growth from exports, it is expected that the coefficient of the export growth variable will have a highly significant positive value.

Another important determinant of *GDP* growth is Foreign Direct Investment. It is assumed that *FDI* affects *GDP* growth by transferring foreign technology from developed countries to less developed countries, as *FDI* has long been recognised as a major source of technology and know-how for developing countries. Balasubramanyam et al. (1996) argue that *FDI* is able not only to transfer production know-how but also to transfer managerial skills, which distinguishes it from all other forms of investment, including portfolio capital and aid. New ideas also are assumed to be transmitted to less developed countries from the advanced ones. Externalities, spill-over effects, are considered as a major benefit accruing to host countries from foreign direct investment.

Shaw (1992) argued that technical progress accounts for a relatively low portion of the growth experienced by developing countries in general, while Balasubramanyam et al. (1996) comment that this is because most of these countries are endowed with a relatively low volume of human capital. However, Wang and Blosmstrom (1992) share in the opinion that *FDI* enhances growth, as they consider that the imported skills enhance the marginal productivity of the capital stock in the host countries and thereby promote growth. In other words, as Borensztein et al. (1998) argue, *FDI* is an important channel that transmits ideas and new technology, facilitating import of high-technology products and acquisition of human capital. They regard foreign direct investment by multinational corporations (MNCs) as a major channel for the access to advanced technologies by developing countries. These corporations are among the most technologically advanced firms, accounting for a large part of the world’s Research and Development (R&D) investment. Findlay (1978) when describing the transfer of technical progress by *FDI* to the host country, expresses this impact as a "contagion" effect from the advanced technology management practice used by the advanced foreign firms. Wang (1990) embodied this idea into a model which retains the neoclassical growth framework. He assumed that foreign direct investment is a determinant of the increase in "knowledge" which is applied to production. The coefficient of *FDI* is therefore expected to have a positive sign.

Another variable that affects *GDP* growth, through affecting *FDI,* is Tariff. As we know, much foreign investment relies on imported goods, whether capital goods, which help in the production process, or intermediate goods. Therefore, if the country levies high rates of tariff on these imported goods, there will be a negative impact on *FDI*. Consequently, it is expected that tariff will have a negative sign. *GDP* is also affected by labour growth. Its importance comes from its being used as an indicator of the basic factor of production, which is Labour. According to Salvatore (1983), the growth function must take into consideration the fact that labour (particularly unskilled labour) is over-abundant, in general, in most developing countries.

The last selected variable directly affecting *GDP* growth is secondary years of schooling in the total population aged 15 or over, which represents the human capital stock. This variable reflects the percentage of the skilled human power in the economy. Kebede (2002) commented that because skilled labour is mainly associated with industrial productivity, which in turn is a sign of development, it is assumed that a high stock of human capital enhances growth. The human capital stock variable is expected to be positive for the following reasons (Hahn & Kim, 2000, 12):

> **"First, as noted by Barro and Lee (1994b), the two-sector model of endogenous growth suggests that imbalances between human capital and physical capital influence the transitional growth rate. That is, an initial ratio of human capital to physical capital induces rapid growth in physical capital and output during the transition.**
> **Second, when human capital is the key input to knowledge-generating activities, then countries with greater initial stocks of human capital tend to grow faster through rapid introduction of new ideas or products, as suggested by Romer."**

We should note that, depending on the causality test, human capital not only works as a cause of economic growth but also grows as a result.

Equation 5.2 posits the determinants of the growth of exports. It indicates that exports growth depends on *GDP* growth, represented by the *growth rate of GDP per capita* of Egypt ($_{g}GDP$), Terms of trade (*TOT*), the growth of *GDP* or economic growth of the main trading partners (*TPGDP*). The main trading partners of Egypt are illustrated in chapter 1. Also, among the main determinants of exports growth are export duties levied on exports (*Xduty*) and finally, the Tariff rate of trading partners (*TPTAR*). Equation 5.2 is also intended to capture the extent to which the export sector is governed by the internal supply factors which are $_{g}GDP$ and *Xduty* and external demand forces, which are *TOT*, *TPGDP* and *TPTAR*. Concerning the first determinant of exports growth which is $_{g}GDP$, there is evidence based on the earlier studies (as stated in equation 5.1) that export growth has a positive impact on *GDP* growth. Here, we consider the reverse, that there is interdependence between $_{g}GDP$ and export growth ($_{g}EXP$). In the traditional view, exports are assumed to be exogenous to domestic output. The work of Kaldor (1993) shows, however, that this assumption could be inappropriate, as economic growth (measured by output growth) can also affect exports. This contributes to the theory of growth. Kaldor indicates the positive impact of output growth on productivity growth, and notes that improved productivity, or reduced unit costs, is expected to stimulate exports. Following this, many empirical studies on the export-output linkage have produced mixed results as to the existence of any causal relationship between export growth and output growth.

For this reason, empirical research has examined the interdependence between *GDP* growth and export growth. Some studies like Michaely (1977) and Chow (1987) supported the export-led growth hypothesis. Also, studies by Harrison (1996) and Dollar (1992) supported the trade effects on growth and export-led growth hypothesis. Nevertheless, Chuang (2000) states that feedback effects from economic growth to trade are also possible, as a positive relationship between productivity growth and output growth was suggested by Verdoorn’s law and this consequently stimulates a comparative advantage for export. Studies by Granger (1969) and Jung and Marshall (1985) have not supported the export-led growth hypothesis. Jung and Marshall (1985) contend that, even if the hypothesis export-led growth is true and export growth can cause economic growth, it is equally possible that economic growth may in turn cause export growth. To support this view, they argue that, for example, in a case of unbalanced growth, it is highly unlikely that the domestic demand for goods from expanding industries will increase as rapidly as their production. Therefore, producers will be forced to seek out foreign markets to sell their commodities. In this case the causality will be from output growth to export growth and the obvious causality between them can not be interpreted as evidence of export-led development.

Subasat (2002) explained that development (economic growth) stimulates export growth as development makes the economy become stronger and consequently, markets will become more efficient. Moreover, fewer bottlenecks will occur. This well-functioning economy will enable the country to penetrate into world markets through exports. The existence of the reverse causal flow from growth to exports, which is described as the growth-led exports hypothesis, was argued with reference to developing countries by, among others, Balassa (1978) and Ram (1987) and for industrialised countries by Marin (1992); Shan and Sun (1998) and Awokuse (2003). For this reason, it is expected that the growth of GDP will have a positive impact on exports growth.

Terms of trade (*TOT*), as one of the most important determinants of export growth, according to the Dictionary of Economics and Business (Oxford reference online premium), is the ratio of an index of a country's export prices to its import prices, which at the same time are the prices of the exports of trading partners (see Appendix 2 for details). The terms of trade are said to improve if this ratio increases so that each unit of exports pays for more imports, and to deteriorate if the ratio falls, so that each unit of exports pays for less imports. The growth of exports is determined by whether the country is capable of competing in the international market. This capability relies greatly on the price of its goods relative to those of the trading partners. As we know, both domestic supply conditions and foreign demand may be reflected by the prices of world markets. If the prices of a country's goods are lower relative to the prices of other competitors, then a greater quantity of these low-priced goods will be exported.

The crucial role of *TOT* in economic growth process comes from their role in strengthening or worsening the competitiveness of any country. Let us assume a wide fall in the exchange rate value of the Egyptian pound against the Euro, which is the currency of the EU, the greatest partner of Egypt. This fall in exchange rate value (devaluation) may result from a deterioration in the trade balance where the value of imports increases faster than that of exports. The effects of this are concentrated in the following:

1- a fall in the Egyptian export prices (cheaper exports)
2- a rise in the Egyptian import costs (expensive imports).

TOT is obtained by the following formula:

$TOT = 100 * \frac{X}{M}$ where X is the average export price index and M is the average import price index. According to this formula, the *TOT* of Egypt will worsen as a result of the devaluation of the Egyptian pound. However, this lower exchange rate will restore Egypt's competitiveness, since the demand for Egyptian exports should grow, providing additional finance to the essential imports of raw materials, components and fixed capital goods. On the other side, demand for imports from Egyptian consumers should slow down. For countries without a diversification in industries, like Egypt, any decrease in producers earnings from each unit of exports has a damaging influence on output, investment, employment and hence economic growth. Since higher values of *TOT* show a greater competitiveness from the trade partners, it is expected that *TOT* will show positive impact on exports growth.

Concerning the trading partners' income or *GDP* and its effect on export growth, it is assumed that, in the long run, trading partners' income largely drives movements in any country's exports by effecting changes in foreign demand. Recent studies conducted in developing countries have identified foreign demand as one of the factors that have a very strong correlation with exports (for more details see Samiei, 1994;Catao and Falcetti, 1999). In this regard, Arora and Vamvakidis (2005) start their work by asking, how much does a country's long-term economic growth depend on economic conditions in the rest of the world? The view is commonly held that with growing economic integration across countries, economic developments in one country are significantly affected by developments abroad. Their paper indicates that economic conditions in trading partners countries matter for growth. They report that after controlling for other growth determinants, a country's economic growth is positively influenced by both the growth rate and the relative income level of its trading partners. Their general result is that countries benefit from trading with fast-growing and relatively richer countries.

Prasad (2000) specifies a model that relates the growth in Fiji's exports to a number of variables including trading partners' income, besides the real effective exchange rate and agricultural supply-sides shocks. In the case of Egypt, it is assumed to be a small open economy from the 1970s and according to its agreements with the WTO (and previously the GATT), as well as its agreements with the USA , the European Union, and the African and Arab countries, it is heavily dependent on world economies for demand for its products. As we know, prices of exports are generally determined by world forces. Therefore the demand for the exports of Egypt traded in the world market is affected by the fluctuations in foreign income. Prasad (2000) illustrates, graphically, that there is strong evidence of a positive correlation between foreign economic activity, represented by *trading partners' GDP*, and export growth. See the following figure.

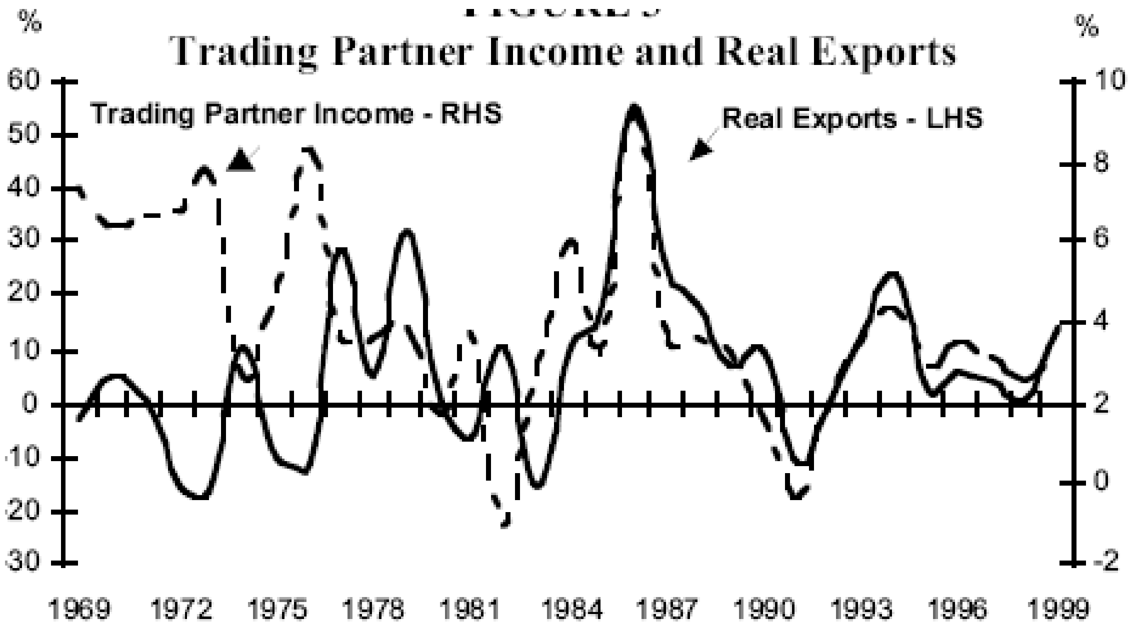

Figure 7: The relationship between trading partners and exports of Fiji

TPGDP is expected to have a positive coefficient. Contrary to the positive effect of trade partners *GDP* on export growth, export duty (*Xduty*) has a negative impact on the growth of exports as it adds more expenses to the original value of exports, making them more expensive. Therefore, it is expected that Xduty will have a negative coefficient.

Concerning the trade partners' tariff rates and their effect on the growth of exports, we can say that, as indicated previously, a tariff makes imported goods more expensive to domestic residents, relative to a situation of trade liberalisation. Therefore, the demand for domestic goods will increase and demand for foreign goods will fall, which in turn will affect growth of exports. However, lowering tariffs stimulates imports (which are exports of other countries), via price reductions because lower tariff rates almost always translate into lower prices, so the quantity and value of imports is likely to rise. Also, eliminating tariffs creates dynamic economic gains through greater trade and thus a more efficient and productive economy (Slaughter, 2003). From another perspective, when high tariffs are levied, the imported goods will be more expensive and so both demand for domestic goods and production increase. Consequently, money demand will also increase, pushing domestic interest rates up (Slaughter, 2003).

Therefore, investors will sell foreign bonds, preferring domestic bonds, resulting in appreciation of the domestic currency. As a result of this appreciation, the value of exports to other countries will rise as the exports of trade partners who levied tariffs will be more expensive and so the growth of these exports will fall. We can conclude that levying of high tariffs by trading partners (*TPTAR*) inversely affects both the growth of exports of a country, as a result of the fall in foreign demand and the growth of exports of trading partners, as the domestic currency will be appreciated, raising the price of exported goods. Therefore, in both cases, for the country and its trading partners, export growth will fall when high tariffs are levied by trading partners and so trading partners' tariff (*TPTAR*) is expected to have a negative impact on export growth, which will be shown as a negative coefficient.

The analytical structure of the model is that the simultaneity originates in growth of export ($_gEXP_t$) contributing to economic growth represented by *growth rate of GDP per capita* ($_gGDP_t$) in equation 5.1, whereas the Growth of Export itself is determined by Economic Growth in equation 5.2. Export growth is assumed to have positive impact on economic growth, while it is determined by various factors as indicated in equation 5.2. Therefore, we hypothesise that economic growth is determined directly by foreign direct investment (*FDI*), export growth ($_gEXP$), *TARIFF*, labour force (annual growth) ($_gLAB$), and human capital (*HC*) represented in secondary school enrolment, and indirectly by various determinants of export growth, which are terms of trade(*TOT*), trading partners' GDP (*TPGDP*), export duties (*Xduty*), and trading partners' tariffs (*TPTAR*). We should note that the appearance of $_gEXP$ in equation 5.1 and the *growth rate GDP per capita* establishes the simultaneity link in the model and consequently, we are not able to solve this model within a single-equation model, the approach adopted in most of the studies in the literature review.

5.2.2. Indicators (measures) of Trade Liberalisation:

In the empirical literature which examines the relationship between free trade and economic growth, many liberalisation indicators are used. Some indicators are used as dummy variables, as a number of authors constructed qualitative indices of trade policy, based on a variety of underlying indicators (Collins & Bosworth, 1996). Sachs and Warner (1995) developed one such measure, as indicated in this thesis earlier. They give a value 1 when the economy is open and 0 when it is a closed one, by comparing with five conditions. Another indicator of liberalisation used as a dummy variable in the growth and trade regressions is activated at the time of a country's first SAL (or equivalent World Bank intervention). This approach has a great advantage as it is extensive in its breadth of coverage of developing countries. Collins & Bosworth (1996) claim that these indicators help to enter growth regressions with large and very significant coefficients compared with direct and trade flow measures.

Besides the qualitative measures which are represented by dummy variables in the regression of growth and trade policy (trade liberalisation), two groups of trade openness measures are used (Yanikkaya, 2003). The first one is calculated using trade volumes. Trade openness (open) is the most basic measure of trade intensity. This measure is the ratio of total trade (exports plus imports) to *GDP*. This is the standard measure used in much of the "new" growth theory literature (Thirlwall, 2000). It is called International Trade, as stated in Frankel and Romer (1999). This trade openness measure ((exports+imports)/*GDP*) can be used when applying time series data in one economy or with cross-sectional data when measuring the trade openness of neighbouring countries. In the second case, it measures how much the neighbours of each country trade, indicating whether or not the proximity to trading partners has an effect on growth. Comparing this variable with the openness dummy, we find that this variable has a great advantage, which is that it varies more within regions than the openness dummy which takes the values 0 or 1. Import penetration ratios and exports shares in *GDP* are used also as measures of openness of the country.

Trade intensity also is represented by two important measures. The first one is trade with OECD countries and the second is trade with non-OECD countries. In this group, U.S trade openness, bilateral exports and imports are used as measures of trade openness. Yanikkaya (2003, 67) defined the so-called U.S. trade openness as "the ratio of each country's total bilateral trade with the U.S to its *GDP*".

Another group of trade liberalisation measures commonly used is based on trade restrictions. Authors have used total export duties and taxes on international trade as measures of trade policy (trade liberalisation). Yanikkaya (2003, 67) defined export duties as a percentage of the value of exports noting that “export duties are comprised of all levies collected on goods at the point of export” and taxes on trade as a percentage of current revenues, noting that “they include import duties, export duties, profits of export or import monopolies, exchange profits, and exchange taxes”. Total import duties are also used to measure the austerity of trade restrictions. They are defined by Yanikkaya (2003, 67) as a percentage of the value of imports which “are the sum of all levies collected on goods at the point of entry into the country”. They are called tariffs. Also, Bilateral Payment Arrangements (BPAs) are used to measure the trade restrictiveness of any country, for example BPAs among IMF members and arrangements of IMF members with non-IMF members. Trade barriers are also used as a measure of trade liberalisation.

Yanikkaya (2003, 67) defined trade barriers as restrictions that exist on payments with respect to current transactions in the form of quantitative limits or undue delay, other than restrictions imposed for security reasons and official action directly affecting the availability or cost of exchange. Leamer (1988) took the differences between predicted and actual trade intensity ratios as indicators of trade barriers. Observed values of variables associated with trade restrictiveness have been used as indicators of openness, such as tariff averages, average coverage of quantitative restrictions and collected tariff ratio. In addition, Levine and Renelt (1992) argued that the black market premium for foreign exchange represents a good proxy for the overall degree of external sector distortions. All of these indicators, based on trade restrictions, have the advantage of being drawn from observed data. Moreover, they allow for intermediate situations where a country is neither totally open nor totally closed.

Also, four indicators which are tariffs, quotas, export impediments and promoters and exchange rate misalignment assess the timing of liberalisation. An important study adopted by Edwards (1998) collected a large number of mixture of quantitative and qualitative indicators of trade liberalization, using the nine indicators of openness stated earlier in ch.3.

In the present study, four trade openness measures are used in the regression to explore the relationship between trade liberalisation and growth. These indicators are based mostly on trade restrictions. Total import duties (*TARIFF*) as a percentage of imports is used to measure the strength of trade restrictions, as is total export duties as a percentage of the value of exports. So long as we are considering the trade liberalisation under the GATT and the establishment of the WTO, it is essential to add trade partners' (importers') tariffs on Egyptian goods as an indicator of openness to measure the commitment of all the countries to the agreements on liberalising international trade. Also, this thesis employs terms of trade to measure the trade openness of the country. The economic rationale for using these indicators is indicated in detail when presenting equations 5.1 and 5.2.

After explaining the theoretical foundation of the model, let us discuss the steps to get the model's results. Many steps will be included to form the complete model. The first step is concerned with forming a reduced form from the structural form of the model then the second step involves estimating the coefficients of the reduced form. This enables achievement of the third step, which is to retrieve the structural coefficients of the model. Finally, the parameters are used to predict and forecast; most econometricians view forecasting the effect of changes in the exogenous variable on the endogenous variables as one of the main purposes of simultaneous equations estimation (Maddala, 2001). However, before starting to estimate the model, it is important to check whether each equation of the model is identified or not, as each equation in a simultaneous equation model needs to satisfy order and rank conditions for identification. The reason for this is that an unidentified equation makes it impossible to retrieve its structural coefficients.

According to Gujarati (1995, 657), the identification problem means "whether numerical estimates of the parameters of a structural equation can be obtained from the estimated reduced- form coefficients. If this can be done, we say that the particular equation is identified. If this can not be done, then we say that the equation under consideration is unidentified, or under identified.” Econometricians use order and rank conditions to identify individual equations. The order condition, which is a necessary but not sufficient condition of identification, tells us if the equation under consideration is exactly, over, or under identified. The order condition includes checking the identifiability condition $K\text{-}k \geq m\text{-}1$ where,

K is the number of exogenous or predetermined variables in the model including intercepts of the model,

k is the number of exogenous variables in an equation including intercept of under consideration equation.

m is the number of endogenous, or jointly dependent, variables in a given equation.

We have three cases:

If $K\text{-}k = m\text{-}1$, the structural equation is exactly identified.

$K\text{-}k > m\text{-}1$, the structural equation is over-identified.

$K\text{-}k < m\text{-}1$, the structural equation is under-identified.

In this system, for the first equation,

$$_{g}GDP_t = \alpha_0 + \alpha_1\, _{g}EXP_t + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, LAB_t + \alpha_5\, Sch_t + \varepsilon_1 \qquad (5.1)$$

K= 10 k= 5 m= 2

By applying the order condition where $K\text{-}k \geq m\text{-}1$ we find that $K\text{-}k > m\text{-}1$ which means that this equation is over-identified.

For the second equation,

$$_{g}EXP_t = \beta_0 + \beta_1\, _{g}GDP_t + \beta_2\, ToT_t + \beta_3\, TPGDP_t + \beta_4\, Xduty_t + \beta_5\, TPTAR_t + \varepsilon_2 \qquad (5.2)$$

K= 10 k= 5 m= 2

Also, by applying the order condition where $K\text{-}k \geq m\text{-}1$ we find that $10\text{-}5 > 2\text{-}1$, i.e. $5>1$ which means that this equation is over-identified. Each of the above equations is over identified. This means it is possible to retrieve more than one structural coefficients from the reduced form of the equation.

However, as said before, this condition is necessary but not sufficient and so the second one, which is rank condition, should be applied. According to Bhattarai (2004, 18), "the rank condition tells us whether the equation under consideration is identified or not." The rank condition is both a necessary and sufficient condition for identification. The model is defined by the rank of the matrix which should have a dimension (M-1)(M-1), where M is the number of endogenous variables in the model. This matrix is formed from the coefficients of both endogenous and exogenous variables, even those that are excluded from that particular equation but included in other equations of the model (Bhattarai, 2004). When discussing which condition should be used, order or rank condition, Harvey (1990, 328) comments that the order condition is usually sufficient to ensure identifiability; however a failure to verify it will rarely result in disaster and this is not true for the rank condition. Gujarati (1995) summarised the expected results of applying order and rank conditions as follows:

1- if K-k> m-1 and the rank of the matrix is M-1, the equation is over-identified.
2- if K-k= m-1 and the rank of the matrix is M-1, the equation is exactly identified.
3- if K-k≥ m-1 and the rank of the matrix is less than M-1, the equation is under-identified.
4- if K-k<m-1 and the rank of the matrix is less than M-1, the equation is under-identified.

But what is the rank condition of identification?

Rank condition: $\rho(A) \geq (M-1)(M-1) \Rightarrow$ order of rank of the matrix where, as noted above, *M is the number of endogenous variables in the model*.

Obtaining the rank condition involves following several steps. Gujarati (2003, 752) summarises that the first step should be to write down the system in a tabular form. After that, we should strike out the coefficients of the row where the equation under consideration appears. The next step is to strike out the columns corresponding to those coefficients in the previous step which are nonzero. Then, the entries left in the table will give only the coefficients of the variables included in the system but not in the equation under consideration. Then all possible matrixes will be formed from these entries, like A, of order M-1 and we should obtain the corresponding determinants, which have to be unequal to zero. Let us apply these steps to our model as follows. As the model is

$_{g}GDP_{t} = \alpha_0 + \alpha_1\, {}_{g}EXP_{t} + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, {}_{g}LAB_t + \alpha_5\, Sch_t + \varepsilon_1$ (5.1)

$_{g}EXP_{t} = \beta_0 + \beta_1\, {}_{g}GDP_{t} + \beta_2\, ToT_t + \beta_3\, TPGDP_t + \beta_4\, Xduty_t + \beta_5\, TPTAR_t + \varepsilon_2$ (5.2)

so,

	constant	$_{g}GDP_t$	$_{g}EXP_t$	FDI_t	$TARIFF_t$	LAB_t	Sch_t	ToT_t	$TPGDP_t$	$Xduty_t$	$TPTAR_t$
$_{g}GDP_t$	$-\alpha_0$	1	$-\alpha_1$	$-\alpha_2$	$-\alpha_3$	$-\alpha_4$	$-\alpha_5$	0	0	0	0
$_{g}EXP_t$	$-\beta_0$	$-\beta_1$	1	0	0	0	0	$-\beta_2$	$-\beta_3$	$-\beta_4$	$-\beta_5$

The matrix of coefficients missing from each of the above equations is:

For the $_{g}GDP_t$ equation: $A_1 = -\beta_2 \neq 0$ or $-\beta_3 \neq 0$ or $-\beta_4 \neq 0$ or $-\beta_5 \neq 0$

For the $_{g}EXP_t$ equation: $A_2 = -\alpha_2 \neq 0$ or $-\alpha_3 \neq 0$ or $-\alpha_4 \neq 0$ or $-\alpha_5 \neq 0$

Thus the rank condition allows each of the above equations to be identified, meaning that the structural coefficients can be retrieved from the reduced form coefficients.

5.2.3. The reduced form of the simultaneous equation model of Growth and Free Trade:

As we saw before, the model is specified as follows:

$_{g}GDP_{t} = \alpha_0 + \alpha_1\, {}_{g}EXP_{t} + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, {}_{g}LAB_t + \alpha_5\, Sch_t + \varepsilon_1$ (5.1)

$_{g}EXP_{t} = \beta_0 + \beta_1\, {}_{g}GDP_{t} + \beta_2\, ToT_t + \beta_3\, TPGDP_t + \beta_4\, Xduty_t + \beta_5\, TPTAR_t + \varepsilon_2$ (5.2)

The solution of the model can be obtained by substituting $_{g}EXP_t$ in the first equation by the second equation.

So,

$_{g}GDP_{t} = \alpha_0 + \alpha_1(\beta_0 + \beta_1\, {}_{g}GDP_t + \beta_2\, ToT_t + \beta_3\, TPGDP_t + \beta_4\, Xduty_t + \beta_5\, TPTAR_t) + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, {}_{g}LAB_t + \alpha_5\, Sch_t + \varepsilon_1$

So,

$_{g}GDP_{t} = \alpha_0 + \alpha_1\beta_0 + \alpha_1\beta_1\, {}_{g}GDP_t + \alpha_1\, \beta_2\, ToT_t + \alpha_1\, \beta_3\, TPGDP_t + \alpha_1\, \beta_4\, Xduty_t + \alpha_1\, \beta_5\, TPTAR_t + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, {}_{g}LAB_t + \alpha_5\, Sch_t + \varepsilon_1$

by putting $\alpha_1\beta_1\, {}_{g}GDP_t$ on the left side and changing its sign to negative.

$_{g}GDP_{t} - \alpha_1\beta_1\, {}_{g}GDP_t = \alpha_0 + \alpha_1\beta_0 + \alpha_1\, \beta_2\, ToT_t + \alpha_1\, \beta_3\, TPGDP_t + \alpha_1\, \beta_4\, Xduty_t + \alpha_1\, \beta_5\, TPTAR_t + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, {}_{g}LAB_t + \alpha_5\, Sch_t + \varepsilon_1$

by taking $_{g}GDP_t$ as a common factor.

$_{g}GDP_{t}\,(1 - \alpha_1\beta_1) = \alpha_0 + \alpha_1\beta_0 + \alpha_1\, \beta_2\, ToT_t + \alpha_1\, \beta_3\, TPGDP_t + \alpha_1\, \beta_4\, Xduty_t + \alpha_1\, \beta_5\, TPTAR_t + \alpha_2\, FDI_t + \alpha_3\, TARIFF_t + \alpha_4\, {}_{g}LAB_t + \alpha_5\, Sch_t + \varepsilon_1$

by dividing both sides of the equation by $(1- \alpha_1\beta_1)$

$_gGDP_t = (\alpha_0 + \alpha_1\beta_0)/(1- \alpha_1\beta_1)+ (\alpha_1\ \beta_2/\ (1- \alpha_1\beta_1))*\ ToT_t + (\alpha_1\ \beta_3/(1- \alpha_1\beta_1))*\ TPGDP_t + (\alpha_1\ \beta_4/(1- \alpha_1\beta_1))*\ Xduty_t+ (\alpha_1\ \beta_5/(1- \alpha_1\beta_1))*\ TPTAR_t+ (\alpha_2/(1- \alpha_1\beta_1))*\ FDI_t + (\alpha_3/(1- \alpha_1\beta_1))*\ TARIFF_t+ (\alpha_4/(1- \alpha_1\beta_1))*\ _gLAB_t+ (\alpha_5/(1- \alpha_1\beta_1))*\ Sch_t+(1/(1- \alpha_1\beta_1))*\varepsilon_1$

So, the reduced form for $_gGDP_t$ is:

$\mathbf{_gGDP_t=\Pi_{10}+\Pi_{11}ToT_t+\Pi_{12}TPGDP_t+\Pi_{13}Xduty_t+\Pi_{14}TPTAR_t+\Pi_{15}FDI_t+\Pi_{16}TARIFF_t+ \Pi_{17}\ LAB_t+\Pi_{18}\ Sch_t + \mu_{1t}}$

where,

$\mathbf{\Pi_{10}} = (\alpha_0 + \alpha_1\beta_0)/(1- \alpha_1\beta_1)$ $\quad$ $\mathbf{\Pi}_{11} = \alpha_1\ \beta_2/(\ (1- \alpha_1\beta_1)$

$\mathbf{\Pi}_{12} = \alpha_1\ \beta_3/(1- \alpha_1\beta_1)$ $\quad$ $\mathbf{\Pi}_{13} = \alpha_1\ \beta_4/(1- \alpha_1\beta_1)$

$\mathbf{\Pi}_{14} = \alpha_1\ \beta_5/(1- \alpha_1\beta_1)$ $\quad$ $\mathbf{\Pi}_{15} = \alpha_2/(1- \alpha_1\beta_1)$

$\mathbf{\Pi}_{16} = \alpha_3/(1- \alpha_1\beta_1)$ $\quad$ $\mathbf{\Pi}_{17} = \alpha_4/(1- \alpha_1\beta_1)$ $\quad$ $\mathbf{\Pi}_{18} = \alpha_5/(1- \alpha_1\beta_1)$

To obtain the reduced form of the second equation, we begin by substituting $_gGDP_t$ in the second equation.

$_gEXP_t = \beta_0 + \beta_1\ \mathbf{(}\ \ (\alpha_0 + \alpha_1\beta_0)/(1- \alpha_1\beta_1)+ (\alpha_1\ \beta_2/(\ (1- \alpha_1\beta_1))*\ ToT_t + (\alpha_1\ \beta_3/(1- \alpha_1\beta_1))*\ TPGDP_t + (\alpha_1\ \beta_4/(1- \alpha_1\beta_1))*\ Xduty_t+ (\alpha_1\ \beta_5/(1- \alpha_1\beta_1))*\ TPTAR_t+ (\alpha_2/(1- \alpha_1\beta_1))*\ FDI_t + (\alpha_3/(1- \alpha_1\beta_1))*\ TARIFF_t+ (\alpha_4/(1- \alpha_1\beta_1))*\ _gLAB_t+ (\alpha_5/(1- \alpha_1\beta_1))*\ Sch_t\ \mathbf{)}\ \mathbf{+}\ \beta_2\ ToT_t + \beta_3\ TPGDP_t + \beta_4\, Xduty_t + \beta_5\ TPTAR_t + \varepsilon_2$

multiplying β_1 in $_gGDP_t$ equation.

$_gEXP_t = \beta_0 + (\alpha_0\,\beta_1+ \alpha_1\beta_0\ \beta_1)/(1- \alpha_1\beta_1) + (\alpha_1\ \beta_1\ \beta_2/(1- \alpha_1\beta_1))*\ ToT_t + (\alpha_1\ \beta_1\ \beta_3/(1- \alpha_1\beta_1))*\ TPGDP_t + (\alpha_1\ \beta_1\ \beta_4/(\ 1- \alpha_1\beta_1))*\ Xduty_t + (\alpha_1\ \beta_1\ \beta_5/(1- \alpha_1\beta_1))*\ TPTAR_t + (\alpha_2\ \beta_1/(1- \alpha_1\beta_1))*\ FDI_t + (\alpha_3\ \beta_1/(1- \alpha_1\beta_1))*\ TARIFF_t + (\alpha_4\ \beta_1/(1- \alpha_1\beta_1))*\ _gLAB_t + (\alpha_5\ \beta_1/(1- \alpha_1\beta_1))*\ Sch_t + \beta_2\ ToT_t + \beta_3\ TPGDP_t + \beta_4\, Xduty_t + \beta_5\ TPTAR_t\ + \varepsilon_2$

by taking common factors and omitting similar coefficients with different signs. So,

$_gEXP_t =(\ \beta_0\ /(1- \alpha_1\beta_1)) + (\alpha_0\,\beta_1+ \alpha_1\beta_0\ \beta_1)/(1- \alpha_1\beta_1) + (\beta_2 + (\alpha_1\ \beta_1\ \beta_2/(1- \alpha_1\beta_1)))*\ ToT_t+ (\beta_3 +(\alpha_1\ \beta_1\ \beta_3/(1- \alpha_1\beta_1)))*\ TPGDP_t + (\beta_4 + (\alpha_1\ \beta_1\ \beta_4/(\ 1- \alpha_1\beta_1)))*\ Xduty_t + (\beta_5 + (\alpha_1\ \beta_1\ \beta_5/(1- \alpha_1\beta_1)))*\ TPTAR_t + (\alpha_2\ \beta_1/(1- \alpha_1\beta_1))*\ FDI_t + (\alpha_3\ \beta_1/(1- \alpha_1\beta_1))*\ TARIFF_t + (\alpha_4\ \beta_1/(1- \alpha_1\beta_1))*\ _gLAB_t + (\alpha_5\ \beta_1/(1- \alpha_1\beta_1))*\ Sch_t + \varepsilon_2$

So,

$_{g}EXP_t = (\beta_0 - \alpha_1\beta_0\ \beta_1 + \alpha_0\ \beta_1 + \alpha_1\beta_0\ \beta_1)/(1- \alpha_1\beta_1) + ((\beta_2 - \alpha_1\ \beta_1\ \beta_2 + \alpha_1\ \beta_1\ \beta_2)/(1- \alpha_1\beta_1))^* ToT_t + ((\beta_3 - \alpha_1\ \beta_1\ \beta_3 + \alpha_1\ \beta_1\ \beta_3)/(1- \alpha_1\beta_1))^* TPGDP_t + ((\beta_4 - \alpha_1\ \beta_1\ \beta_4 + \alpha_1\ \beta_1\ \beta_4)/(1- \alpha_1\beta_1))^* Xduty_t + ((\beta_5 - \alpha_1\ \beta_1\ \beta_5 + \alpha_1\ \beta_1\ \beta_5)/(1- \alpha_1\beta_1))^* TPTAR_t + (\alpha_2\ \beta_1/(1- \alpha_1\beta_1))^* FDI_t + (\alpha_3\ \beta_1/(1- \alpha_1\beta_1))^* TARIFF_t + (\alpha_4\ \beta_1/(1- \alpha_1\beta_1))^*\ _{g}LAB_t + (\alpha_5\ \beta_1/(1- \alpha_1\beta_1))^* \mathrm{Sch}_t + \varepsilon_2$

and So,

$_{g}EXP_t = (\beta_0 + \alpha_0\ \beta_1)/(1- \alpha_1\beta_1) + (\beta_2/(1- \alpha_1\beta_1))^* ToT_t + (\beta_3/(1- \alpha_1\beta_1))^* TPGDP_t + (\beta_4/(1- \alpha_1\beta_1))^* Xduty_t + (\beta_5/(1- \alpha_1\beta_1))^* TPTAR_t + (\alpha_2\ \beta_1/(1- \alpha_1\beta_1))^* FDI_t + (\alpha_3\ \beta_1/(1- \alpha_1\beta_1))^* TARIFF_t + (\alpha_4\ \beta_1/(1- \alpha_1\beta_1))^*\ _{g}LAB_t + (\alpha_5\ \beta_1/(1- \alpha_1\beta_1))^* Sch_t + (1/(1- \alpha_1\beta_1))^* \varepsilon_2$

then the reduced form for the second equation (5.2) is:

$$\mathbf{{}_{g}EXP_t = \Pi_{20} + \Pi_{21}ToT_t + \Pi_{22}TPGDP_t + \Pi_{23}Xduty_t + \Pi_{24}TPTAR_t + \Pi_{25}FDI_t + \Pi_{26}TARIFF_t + \Pi_{27}\ LAB_t + \Pi_{28}\ Sch_t + \mu_{2t}}$$

where,

$\mathbf{\Pi_{20}} = (\beta_0 + \alpha_0\ \beta_1)/(1- \alpha_1\beta_1)$ $\mathbf{\Pi_{21}} = \beta_2/(1- \alpha_1\beta_1)$

$\mathbf{\Pi_{22}} = \beta_3/(1- \alpha_1\beta_1)$ $\mathbf{\Pi_{23}} = \beta_4/(1- \alpha_1\beta_1)$

$\mathbf{\Pi_{24}} = \beta_5/(1- \alpha_1\beta_1)$ $\mathbf{\Pi_{25}} = \alpha_2\ \beta_1/(1- \alpha_1\beta_1)$

$\mathbf{\Pi_{26}} = \alpha_3\ \beta_1/(1- \alpha_1\beta_1)$ $\mathbf{\Pi_{27}} = \alpha_4\ \beta_1/(1- \alpha_1\beta_1)$

$\mathbf{\Pi_{28}} = \alpha_5\ \beta_1/(1- \alpha_1\beta_1)$

The model of Growth and Free Trade presented above has eight exogenous variables and its reduced form can be written as:

$$\mathbf{{}_{g}GDP_t = \Pi_{10} + \Pi_{11}ToT_t + \Pi_{12}TPGDP_t + \Pi_{13}Xduty_t + \Pi_{14}TPTAR_t + \Pi_{15}FDI_t + \Pi_{16}TARIFF_t + \Pi_{17}\ {}_{g}LAB_t + \Pi_{18}\ Sch_t + \mu_{1t}}$$

$$\mathbf{{}_{g}EXP_t = \Pi_{20} + \Pi_{21}ToT_t + \Pi_{22}TPGDP_t + \Pi_{23}Xduty_t + \Pi_{24}TPTAR_t + \Pi_{25}FDI_t + \Pi_{26}TARIFF_t + \Pi_{27}\ {}_{g}LAB_t + \Pi_{28}\ Sch_t + \mu_{2t}}$$

where $\mathbf{\mu_{1t}}$ and $\mathbf{\mu_{2t}}$ are composite error terms.

5.2.4. Estimation of the model:

Our model will be estimated using Full Information Maximum Likelihood (FIML) method on time series data for Egypt as one of the developing countries adopting a trade liberalisation policy. The data are annual, covering the period 1970-2006. The data consist of the following variables:

$_gGDP_{t}$, $_gEXP_{t}$, $_1ToT_t$, $TPGDP_t$, $Xduty_t$, $TPTAR_t$, FDI_t, $TARIFF_t$, $_gLAB_t$, and Sch_t

A more detailed description of these data is provided in Appendices 2 and 3.

However, before estimating the model, we should carry out the ADF test to examine the time series data. According to Gujarati (1995), using this type of data poses many challenges. Gujarati concentrates on the nonstationarity problem, which leads to spurious regression, meaning that we can get an untrue relationship between time series variables by obtaining high R^2 and low DW, which is due to the strong trends of the variables (sustained upward or downward movements), not to the true relationship between time series variables. It is essential for a time series to be stationary; if it is not, how can we make these data stationary?

Stationarity means that the time series (Y_t) should have the following properties:

Mean: $E\ (Y_t)=\mu$

Variance: $Var\ (Y_t)= E(Y_t - \mu)^2=\sigma^2$

Covariance: $Y_k=E((Y_t-\mu)(Y_{t+k}-\mu))$

where Y_k, the covariance (or auto covariance) at lag k, is the covariance between the values of Y_t and Y_{t+k} , that is, between two Y values k periods apart (Gujarati, 1995, 713). We should note that if k=0 so Y_0 which is the variance of $Y = \sigma^2$. In brief, we define a time series as stationary if its mean, variance, and auto covariance (at various lags) are still the same, regardless at what time they are measured. Another challenge for the time series appears depending on the stationarity problem which is the validity of the forecasting, which is considered as the most important aim for any regression model, if the time series are not stationary. Our model will be used to carry out forecasting of endogenous variables which are the growth rate of GDP per capita ($_gGDP_t$) and exports growth ($_gEXP_t$) as a result of changes in exogenous variables. Therefore, the Unit Roots test will be applied first to examine the stationarity.

5.3. Empirical Results

5.3.1. Unit Root Test Results

Our regression analysis, like the causality test, begins with checking the stationarity of the variables included in the model to identify the order of the integration for each time series. Also, the unit roots test is for level and first difference of ADF with trend and without trend of the growth rate of GDP per capita (gGDP), exports growth (gEXP), Foreign Direct Investment as a share of GDP (FDI), import duties (TARIFF), the labour force growth (gLAB), human capital represented by secondary school enrolment (Sch), terms of trade (TOT), trade partners' real GDP growth (TPGDP), export duties (Xduty), and trading partners' tariff rate (TPTAR), respectively over the period 1970-2006. Table 5.1 shows the results of the ADF unit roots test.

Table 5.1
Results of ADF unit roots test
Period 1970-2006

variable	level		First difference	
	Constant No trend	Constant Trend	Constant No trend	Constant Trend
gGDP	-3.328*	-3.710*	-6.591**	-6.546**
gEXP	-3.169*	-3.243	-6.394**	-6.316**
TOT	-0.5944	-2.162	-3.760**	-3.805*
TPGDP	1.733	0.04899	-5.940**	-6.833**
Xduty	-2.935	-4.164*	-6.589**	-6.483**
TPTAR	-1.091	-1.578	-5.823**	-5.700**
FDI	-3.323*	-3.359	-7.900**	-7.841**
TARIFF	-1.744	-2.695	-5.945**	-5.861**
gLAB	-2.063	-2.301	-6.839**	-6.782**
Sch	-1.299	-2.978	-6.901**	-6.993**

Notes:

(1) * and ** indicate statistical significance at the 5% and 1% levels, respectively.

(2) For level:
Constant and no trend, the critical values at 5% and 1% significance level are -2.95 and -3.64, respectively.
Constant and trend, the critical values at 5% and 1% significance level are -3.55 and -4.26, respectively.
For first difference:
Constant and no trend, the critical values at 5%and 1% significance level are -2.96 and -3.65, respectively.
Constant and trend, the critical values at 5% and 1% significance level are -3.65 and -4.27, respectively.

The results obtained in Table 5.1, except for *gGDP*, *gEXP*, *Xduty*, and *FDI*, provide evidence that all the time series are non-stationary, i.e. they are integrated of order one I (1). This means that these variables have a stochastic trend and in this case we can not reject the null hypothesis of the existence of unit roots for any of the variables under study with consideration of the excluded variables stated above. However, all variables are stationary, i.e. I (0) in their first difference at 1% significance except *TOT*, which is significant at 5% for the first difference with constant and trend. According to Engle and Granger (1987), although the individual series may be non-stationary, i.e. I (1), like those examined in this chapter, their linear combination might be stationary, i.e. I (0). However, as we take the first difference making the time series of all variables stationary there is no need to apply a cointegration test and we have to use the stationary variables to estimate our model.

5.3.2. Regression Results

Our simultaneous two-equation model was estimated by Full Information Maximum Likelihood (FIML), using Givewin/PcGive, for Egyptian yearly time series data of the growth rate of GDP per capita ($_gGDP$), Export Growth ($_gEXP$), Foreign Direct Investment/*GDP* (*FDI*), Import Duties (*TARIFF*), Secondary School Enrolment (*Sch*), Terms of Trade (*TOT*), Trade Partners' real GDP growth (*TPGDP*), Export Duties (*Xduty*) and Trading Partners' Tariff Rate (*TPTAR*) from 1970 to 2007. FIML was used in estimating the model to avoid or at least to reduce the simultaneity problem. The estimated coefficients of the reduced form are reported in the following table.

Table 5.2
Full Information Maximum Likelihood Estimates, 1970-2006.

The reduced form coefficient	Estimated coefficient for the reduced form	Standard Error
For $_g$GDP equation		
Π_{10} (constant)	-0.4006	0.1487
Π_{11} (TOT)	0.0289	0.0109
Π_{12} (TPGDP)	0.0437	0.0186
Π_{13} (Xduty)	-0.0865	0.0347
Π_{14} (TPTAR)	-0.0269	0.0114
Π_{15} (FDI)	-0.7243	0.0891
Π_{16} (TARIFF)	0.0285	0.0127
Π_{17} ($_g$LAB)	0.2886	0.1142
Π_{18} (Sch)	0.2185	0.0612
For gEXP equation		
Π_{20} (constant)	-0.7966	0.3322
Π_{21} (TOT)	0.2628	0.1111
Π_{22} (TPGDP)	0.3295	0.1400
Π_{23} (Xduty)	-0.7029	0.1766
Π_{24} (TPTAR)	-0.2683	0.0912
Π_{25} (FDI)	-0.6425	0.0904
Π_{26} (TARIFF)	0.0249	0.0108
Π_{27} ($_g$LAB)	0.2597	0.0991
Π_{28} (Sch)	0.1726	0.0782
R^2	0.68	0.74
AR	0.097	0.104

Note: see Appendix 6 for t- statistics of the variables.

The results show that the R^2 for $_{g}GDP$ equation shows that a reasonable proportion (68%) of the variations in the dependent variable are explained by explanatory variables (Regressors). R^2 for $_{g}EXP$ shows that 74% of the variations in the dependent variable are explained by the Regressors. AR (estimated auto correlation coefficient for each regression) shows its closure to zero (value ranges between -1 and 1) meaning that there is no auto correlation problem in all regressions. The estimated coefficients of the reduced form were retrieved to get the parameters of both equation 5.1 and equation 5.2 to obtain table 5.3.

<u>The Process of Retrieving the Estimated Coefficients of the Reduced Form</u>

The reduced form is as follows:

$$_{g}GDP_t=\Pi_{10}+\Pi_{11}ToT_t+\Pi_{12}TPGDP_t+\Pi_{13}Xduty_t+\Pi_{14}TPTAR_t+\Pi_{15}FDI_t+\Pi_{16}TARIFF_t+\Pi_{17}LAB_t+\Pi_{18}Sch_t+\mu_{1t}$$

$$_{g}EXP_t=\Pi_{20}+\Pi_{21}ToT_t+\Pi_{22}TPGDP_t+\Pi_{23}Xduty_t+\Pi_{24}TPTAR_t+\Pi_{25}FDI_t+\Pi_{26}TARIFF_t+\Pi_{27}LAB_t+\Pi_{28}Sch_t+\mu_{2t}$$

where,

$\Pi_{10} = (\alpha_0 + \alpha_1\beta_0)/(1-\alpha_1\beta_1)$	$\Pi_{20} = (\beta_0 + \alpha_0\beta_1)/(1-\alpha_1\beta_1)$
$\Pi_{11} = \alpha_1\beta_2/((1-\alpha_1\beta_1)$	$\Pi_{21} = \beta_2/(1-\alpha_1\beta_1)$
$\Pi_{12} = \alpha_1\beta_3/(1-\alpha_1\beta_1)$	$\Pi_{22} = \beta_3/(1-\alpha_1\beta_1)$
$\Pi_{13} = \alpha_1\beta_4/(1-\alpha_1\beta_1)$	$\Pi_{23} = \beta_4/(1-\alpha_1\beta_1)$
$\Pi_{14} = \alpha_1\beta_5/(1-\alpha_1\beta_1)$	$\Pi_{24} = \beta_5/(1-\alpha_1\beta_1)$
$\Pi_{15} = \alpha_2/(1-\alpha_1\beta_1)$	$\Pi_{25} = \alpha_2\beta_1/(1-\alpha_1\beta_1)$
$\Pi_{16} = \alpha_3/(1-\alpha_1\beta_1)$	$\Pi_{26} = \alpha_3\beta_1/(1-\alpha_1\beta_1)$
$\Pi_{17} = \alpha_4/(1-\alpha_1\beta_1)$	$\Pi_{27} = \alpha_4\beta_1/(1-\alpha_1\beta_1)$
$\Pi_{18} = \alpha_5/(1-\alpha_1\beta_1)$	$\Pi_{28} = \alpha_5\beta_1/(1-\alpha_1\beta_1)$

α_1 can be obtained by the following:

$\alpha_1 = \Pi_{11}/\Pi_{21} = 0.02893/0.2628=0.11008$ or,

$\alpha_1 = \Pi_{12}/\Pi_{22} = 0.04365/0.3295=0.13247$ or,

$\alpha_1 = \Pi_{13}/\Pi_{23} = -0.08647/-0.702984=0.1230$ or,

$\alpha_1 = \Pi_{14}/\Pi_{24} = -0.02685/-0.2683=0.100075$

In the previous equations α_1 is approximately 0.1.

β_1 can be obtained by the following:

β_1 = $\boldsymbol{\Pi_{25}}$/ $\boldsymbol{\Pi}_{15}$= -0.6425/-0.7243=0.8871 or,

β_1= $\boldsymbol{\Pi_{26}}$/ $\boldsymbol{\Pi}_{16}$=0.02498/0.02853=0.8756 or,

β_1= $\boldsymbol{\Pi_{27}}$/ $\boldsymbol{\Pi}_{17}$=0.2597/0.28855=0.9000 or,

β_1= $\boldsymbol{\Pi_{28}}$/ $\boldsymbol{\Pi}_{18}$=0.1726/0.218483=0.7899

In the previous equations β_1 is approximately 0.9.

Concerning α_2, it can be obtained by using

$\boldsymbol{\Pi}_{15} = \alpha_2/(1- \alpha_1\beta_1)$

-0.7243= α_2/0.923 so, α_2= -0.6535 or by using

$\boldsymbol{\Pi_{25}} = \alpha_2\ \beta_1/(1- \alpha_1\beta_1)$

-0.6425= α_2*0.8871/0.9023 so, α_2= -0.6535

We notice that the value of α_2 in both equations is the same.

Concerning α_3, it can be obtained by using

$\boldsymbol{\Pi}_{16} = \alpha_3/(1- \alpha_1\beta_1)$

0.02853= α_3/0.9023 so, α_3 = 0.0212 or by using

$\boldsymbol{\Pi_{26}} = \alpha_3\ \beta_1/(1- \alpha_1\beta_1)$

0.02498= α_3*0.8871/0.9023 so, α_3=0.254

Both values of α_3 are nearly the same.

Concerning α_4, it can be obtained by using

$\boldsymbol{\Pi}_{17} = \alpha_4/(1- \alpha_1\beta_1)$

0.28855= α_4/0.9023 so, α_4=0.26036 or by using

$\boldsymbol{\Pi_{27}} = \alpha_4\ \beta_1/(1- \alpha_1\beta_1)$

0.2597= α_4*0.8871/0.9023 so, α_4=0.26414

Both values of α_4 are the same.

Concerning α_5, it can be obtained by using

$\boldsymbol{\Pi}_{18} = \alpha_5/(1- \alpha_1\beta_1)$

0.218483=α_5/0.9023 so, α_5= 0.19713 or by using

$\boldsymbol{\Pi_{28}} = \alpha_5\ \beta_1/(1- \alpha_1\beta_1)$

0.1726= α_5*0.8871/0.9023 so, α_5=0.175

Both values of α_5 are the same, nearly 0.2.

Concerning β_2, it can be obtained by using

$\boldsymbol{\Pi}_{11} = \alpha_1\ \beta_2/(\ (1- \alpha_1\beta_1)$

$0.02893=0.11008*\beta_2/0.9023$ so, $\beta_2=0.2371$ or by using

$\boldsymbol{\Pi_{21}} = \beta_2/(1-\alpha_1\beta_1)$

$0.2628=\beta_2/0.9023$ so, $\beta_2=0.23712$

Both values for β_2 are the same.

Concerning β_3, it can be obtained by using

$\boldsymbol{\Pi}_{12} = \alpha_1\beta_3/(1-\alpha_1\beta_1)$

$0.04365=0.11008*\beta_3/0.9023$ so, $\beta_3= 0.358$ or by using

$\boldsymbol{\Pi_{22}} = \beta_3/(1-\alpha_1\beta_1)$

$0.3295=\beta_3/0.9023$ so, $\beta_3=0.297$

Both values of β_3 are nearly the same, equal 0.3.

Concerning β_4, it can be obtained by using

$\boldsymbol{\Pi}_{13} = \alpha_1\beta_4/(1-\alpha_1\beta_1)$

$-0.08647=0.11008*\beta_4/0.9023$ so, $\beta_4= -0.7087$ or by using

$\boldsymbol{\Pi_{23}} = \beta_4/(1-\alpha_1\beta_1)$

$-0.702984=\beta_4/0.9023$ so, $\beta_4= -0.634$

We think that the slight difference between the two values of β_4 will not affect our result analysis.

Concerning β_5, it can be obtained by using

$\boldsymbol{\Pi}_{14} = \alpha_1\beta_5/(1-\alpha_1\beta_1)$

$-0.02685=0.11008*\beta_5/0.9023$ so, $\beta_5= -0.2251$ or by using

$\boldsymbol{\Pi_{24}} = \beta_5/(1-\alpha_1\beta_1)$

$-0.2683=\beta_5/0.9023$ so, $\beta_5= -0.24208$

Both values of β_5 are almost the same.

Concerning α_0 and β_0, they can be obtained by using both following equations:

$\boldsymbol{\Pi_{10}} = (\alpha_0 + \alpha_1\beta_0)/(1-\alpha_1\beta_1)$ $\boldsymbol{\Pi_{20}} = (\beta_0 + \alpha_0\beta_1)/(1-\alpha_1\beta_1)$

$-0.4006=(\alpha_0 + 0.11008\beta_0)/0.9023$

$-0.3613=\alpha_0 + 0.11008\,\beta_0$ (1)

$-0.7966=(\beta_0 + \alpha_0 * 0.8871)/0.9023$

$-0.7187=\beta_0 + 0.8871\,\alpha_0$ (2)

By putting both equations (1) and (2) together

$\alpha_0 + 0.11008\,\beta_0 = -0.3613$

0.8871 $\alpha_0 + \beta_0$ = -0.7187

By multiplying equation (2) by -0.11008 and adding to equation (1)

α_0 + 0.11008 β_0 = -0.3613

-0.09765 α_0 -0.11008 β_0 = 0.0791

0.9023 α_0 = - 0.2824

α_0 = -0.3129

By replacing the value of α_0 in equation (1) we can get the value of β_0

-0.3129 +0.11008 β_0= -0.3615

0.11008 β_0=-0.0486

β_0 =-0.4414

Table 5.3
Retrieved parameters for the regression

Regressors	parameters	Equation 1 for *gGDP*	Equation 2 for *gEXP*
constant	α_0	-0.3129	
$_gEXP$	α_1	0.1101	
FDI	α_2	-0.6535	
TARIFF	α_3	0.0212	
$_gLAB$	α_4	0.2604	
Sch	α_5	0.1971	
constant	β_0		-0.4414
$_gGDP$	β_1		0.8871
TOT	β_2		0.2371
TPGDP	β_3		0.3580
Xduty	β_4		-0.7087
TPTAR	β_5		-0.2251

While Table 5.2 presents the estimated coefficients of the reduced form using FIML method, the retrieved parameters obtained from these estimated reduced form coefficients are reported in Table 5.3.

It should be noted that all the variables are estimated in logarithmic form and so the analysis of the data does not depend on raw coefficients, but depends on elasticities. All the parameters represent elasticities. It is a double log model for economic growth and every variable in the model separately. If $\ln_g GDP = \alpha_0 + \alpha_1 \ln_g EXP$ here, α_1, which is 0.11, = $\frac{\Delta_g GDP /_g GDP}{\Delta_g EXP /_g EXP}$. It is noted also that no over identified problem is found becausae multiple estimates are similar. To avoid the over identification problem when applying panel data, we use over identified restrictions for estimation of instrumental (exogenous) variables. Our analysis of the results depends on these retrieved parameters. First of all we can confirm that these retrieved parameters are statistically significant (see Appendix 6 for details), deriving from the significance of the estimated coefficients of the reduced form at the 5% and 1% levels. The retrieved parameters presented in column 3 for the first equation (5.1), where the growth rate of GDP per capita growth ($_gGDP$) is the dependent (endogenous) variable, indicate that growth of exports ($_gEXP$), growth of labour ($_gLAB$) and human capital represented by secondary school enrolment (*Sch*), as predicted, have positive contributions to GDP per capita growth. Their signs are obviously positive. The growth rate of labour (*gLAB*) appears to have greater effect than both exports growth ($_gEXP$) and secondary school enrolment (*Sch*) as their coefficients are (α_4) 0.26036 for *gLAB*, (α_1) 0.11008 for *gEXP* and (α_5) 0.19713 for Sch. It is notable that the result of the effect of human capital is in line with the result of the effect of human capital in the previous chapter (positive effect on economic growth), although we used secondary school enrolment data to represent human capital in this chapter and higher education attainment was used in the previous chapter to represent human capital. This was to investigate if there are different results in the two cases; however we found no difference. In applying our model on the Egyptian economy, the coefficient of exports growth, our variable of interest (α_1), strongly supports the Exports Led Growth (ELG) arguments. The positive sign of (*gEXP*) implies that a 1% increase in exports growth in Egypt leads to a 0.11 growth in GDP.

However, unexpectedly, *TARIFF* and Foreign Direct Investment have positive and negative signs, respectively. We should note that we dealt with *TARIFF* in this chapter through its effect on *FDI* by affecting the imports of intermediate goods and services for *FDI*. However by connecting these results with the previous results of the causality test, a negative impact of the Egyptian imports on the Economic Growth was estimated. The positive sign of *TARIFF* supports the previous results by confirming that the greatest part of the Egyptian imports is for consumption, which is considered as leakages (withdrawals) of National Income from its inner circular flow, not for production. Consequently, when *TARIFF* is increased, Egyptian imports (for consumption purposes, like food) fall, raising the economic growth (*GDP* per capita growth). Also, by neglecting the indirect effect of *TARIFF* on *GDP* through *FDI* and taking into account that there is a theoretically positive direct effect of *TARIFF* on *GDP*, we find that the positive sign is consistent in this regard, implying that a 1% increase in *TARIFF* leads to a 0.0212 growth of *GDP* per capita in Egypt. This is not consistent with the WTO agreements to reduce tariffs. On the other hand, even if we take the indirect effect through *FDI*, our analysis is in its correct direction as well. According to the positive sign of *TARIFF* and the negative sign of *FDI* impact on *GDP* per capita growth, increasing *TARIFF* makes imports of intermediate and capital goods and services decrease and consequently, *FDI* falls, raising *GDP* per capita growth, relying upon the inverse relationship between *FDI* and *GDP* per capita growth. A 1% decrease in *FDI* leads to a 0.6535 growth in *GDP* per capita.

Concerning the negative (inverse) effect of Foreign Direct Investment (*FDI*) on *GDP* per capita growth, although this is not our focus in this model, as we aim to find out the impact of trade liberalisation policy (exports and indicators of free trade) on the economic growth, the cause of the unexpected sign (negative) of the coefficient of *FDI* (α_2) needs to be clarified as well. It is rare for *FDI*, as an important determinant of economic growth, to have a negative sign, reflecting an inverse impact on economic growth (*GDP* per capita growth). Almost all the studies reported in the economics literature confirmed the highly positive impact of *FDI* on the host country's growth rate, starting from the transferring of technology, where it is argued that *FDI* is a crucial channel to generate technology spillovers for developing countries. According to Borensztein et al. (1998), the effect of *FDI* is conditional on a sufficient level of absorptive capacity. The other important advantages of *FDI* are improvement of efficient use of resources, providing and creating more jobs, opening new markets and consequently, encouraging exports, increasing the revenues for hosting countries from the tax on profits after the end of the tax exemption period. However, it is noticed that mechanisms like transfer pricing give transnational corporations the ability to avoid taxes

(Streeten, 1973). According to Compos & Kinoshita (2002), producing goods to suit the domestic market, replacing imports, is an important advantage of *FDI* as well.

However, contrary to the previous view, the ugly face of *FDI*, represented by the negative sign of the coefficient of *FDI*, appears in the case of Egypt, as one of the developing countries, despite its efforts to attract this investment in some activities such as tourism, banking, telecommunications and construction. Many laws have been passed to increase Egypt's openness to attract foreign investors, as there is almost unanimous agreement that *FDI* acts as an engine of growth in open economies but not in closed ones (Greenaway et al., 2007) as *FDI* in a country is tariff- jumping, that is, foreign investors seek to locate in host economy to be able to avoid high tariffs. Such laws include law 43 in 1974, law 230 in 1989, law 159 in 1981 and law 8 in 1997; sector law No. 203 in 1991, capital market law No. 95 in 1992, and tax laws No. 96 in 1992. A law to regulate the real estate of non-Egyptian ownership and a law to allow the establishment of airport No.3 in 1997 by the private sector were introduced as well, besides cheaper energy, the provision of comprehensive infrastructure services, and measures to facilitate the credit procedures of Banks (loans, expanding tax exemption period). Egypt plans further legal reforms regarding facilitating procedures and treating companies equally favourably, regardless of their country (Kenawy, 2007). Despite all these efforts by Egypt to attract foreign investors, in order to obtain foreign flows to fund the development process, we found this inverse result of *FDI* on economic growth. This result supports the findings of numerous sociology studies like Wimberley (1990) which concluded that *FDI* harms poor nations and the development process as a whole. They confirmed that third world countries benefit less from *FDI* than developed ones. Also, the third world benefits less from FDI than domestic investment. These studies focused on the coefficient of foreign capital stock which had a negative sign, reflecting dependency effects (economically and politically) retarding economic growth. For more details see Firebaugh (1992).

UNCTAD (1999, 17) summarised briefly the aim of the foreign investment in the following words: "The profitability of investments is of primary invest to foreign investors." This means that what attracts these investors are high rates of return and low risk economies regardless of any harm effects on hosting economies. Among the important disadvantages of *FDI* are the directly negative effects on the balance of payment of the hosting country (in the short run), an increase in the imports of the intermediate goods and services, and indirect submissions of the pressures of the foreign countries through the foreign companies invest in host countries leading to a decrease in economic and political independence. Also, it is noticed that foreign investment may be outward looking; i.e. profits flow outward instead of being reinvested in the hosting country; products flow outward as well. The wages to foreign people, who work abroad for the foreign company, are transferred abroad. But what about if there is a transfer of the balance of the host country from a foreign currency like the dollar, as happened at the end of the 90s? To fund their investments, foreign investors exploited the facilities available to them to obtain loans from Egyptian banks and then transferred these loans abroad. There was no investment and no take up of loans, causing bankruptcy for many banks in Egypt (some mainly Egyptian banks are being sold nowadays in the context of the privatisation process). We can conclude from the previous point that the harmful effects of *FDI* can reach the banking sector and financial markets as well. According to De Mello (1997), despite the importance of cash flows from *FDI* for economic development of developing countries, *FDI* can cause financial crises such as the financial crisis of Mexico in 1994 and that of South-East Asia in 1997. The aforementioned disadvantages of *FDI* may be the most logical explanation for the negative α_2 for *FDI*. Finally, we found that it is necessary to recommend, in the section on directions for future research at the end of this study, that the harmful effects of *FDI* on economic growth be discussed in other research.

The retrieved parameters presented in column 4 for the second equation 5.2 where exports growth is the endogenous variable, all have the predicted signs. Unlike the causality results, a highly positive feedback link between *GDP* per capita growth and exports growth is detected. This can be indicated by the coefficient β_1, implying that a one percent increase in *GDP* per capita leads to a growth of 0.88% in exports. We therefore notice that the contribution of growth of *GDP* per capita to export growth is greater than the effect (contribution) of exports growth to *GDP* per capita growth, as it was indicated in the first equation that a 1% rise in exports growth simulates the *GDP* per capita by 0.11%. This indicates that high growth rate of output (*GDP*) enhances the openness of trade between countries. This result differs from the results obtained in the previous chapter using the causality test, which indicates a uni-directional relationship from exports to *GDP*. This may be at least in part due to using different data for exports and *GDP* in both chapters. Whereas we used data for real exports to represent exports and real *GDP* to represent economic growth when applying the causality test, the first difference of growth rates of exports and *GDP* per capita was used when applying the Simultaneous Equation Model.

Our findings, which determine the relationship between exports and growth, support both Exports Led Growth (ELG) and Growth Led Exports (GEL) arguments, confirming the existence of a bi-directional relationship between exports and economic growth in the Egyptian economy. The terms of trade (*TOT*) coefficient (β_2), as expected, indicates a positive relationship with export growth, implying that a 1% increase in *TOT* leads to a 0.23% growth in exports, showing a greater competitiveness of Egyptian exports prices than trading partners' prices. The lower the price of Egyptian exports, the greater the competitiveness of this low price relative to Egypt's trading partners' prices, raising the Egyptian exports growth rate. The coefficient for trade partners' *GDP* growth (β_3) is positively related to the growth rate of exports, as the increase in the income of trading partners causes an increase in the quantity demanded of goods and services and when these goods have lower price abroad (Egypt) than domestically, then the imports of these goods of trading partners (which in turn are exports of Egypt) increase. The positive sign of β_3 implies that a 1% increase of *TPGDP* leads to an increase in the exports of Egypt by 0.36%. As predicted, the sign of the export duty coefficient (β_4) is negative, indicating the effectiveness of adopting the trade liberalisation policy in terms of both *X duties* and *TARIFFs* on the Egyptian economy, where a cut of 1% in Xduty leads to an increase in the growth rate of exports by 0.7%. Like the *Xduty* coefficient sign, the coefficient of trading partners *TARIFF* has, as expected, a negative sign, indicating the importance of implementing the WTO agreements to reduce the international trade barriers between countries. This in turn will lead to an increase in Egypt's exports

(Egypt's trading partners' imports) to penetrate into their markets, as a one percent cut of the tariff of trading partners of Egypt leads to an increase in the growth rate of Egyptian exports by 0.23%.

5.4. Simultaneous Equation Model using panel data:

This section further analyses of free trade and economic growth taking into consideration the existence of simultaneity between the variables associated with trade and growth, using panel data. We estimated the same simultaneous equation model, using time series data for Egypt. The panel data for countries at different levels of development, used in the previous chapter, are used to investigate the robustness of the results obtained using time series data for Egypt to examine the relationship between many indicators of trade liberalisation and economic growth. The simultaneous equation model in the case of using panel data is specified as follows:

$${}_{g}GDP_{it} = \alpha_0 + \alpha_1\, {}_{g}EXP_{it} + \alpha_2\, FDI_{it} + \alpha_3\, TARIFF_{it} + \alpha_4\, LAB_{it} + \alpha_5\, Sch_{it} + \varepsilon_{1it} \qquad (5.3)$$

$${}_{g}EXP_{it} = \beta_0 + \beta_1\, {}_{g}GDP_{it} + \beta_2\, ToT_{it} + \beta_3\, TPGDP_{it} + \beta_4\, Xduty_{it} + \beta_5\, TPTAR_{it} + \varepsilon_{2it} \qquad (5.4)$$

This model examines the impact of free trade within the economic growth process. Moreover, it helps us to investigate whether middle- or low-income countries can benefit from trade openness.

5.4.1. Regression Results:

Our regression analysis using panel data starts by testing for unit root for each variable included in our regression. As in chapter 4, the IPS panel unit root test is followed (for more details on the IPS technique, see Appendix 8). The IPS technique, t-bar statistics method, is used for every group involving two steps:

1- carrying out a standard ADF unit root test for each country and then,

2- computing the average of the obtained t-values.

Then the above Simultaneous Equation model is estimated using panel data for 20 countries representing two stages of development: ten low-income countries, and ten middle-income countries (see appendix 10 for the list and an outline of the trade policy reforms of these countries). The panel data covers the period 1970-2006. We expect that, as found in chapter 4, the impact of trade on economic growth will be strong and not differ due to the difference in degree of development. For all groups, we estimated the regression using an instrumental variables (3SLS) technique. This is a general method for obtaining consistent estimates when the causing variable is endogenous. It is obvious, in our model, that both *FDI* and *HC* are endogenous variables. As we used lagged values of explanatory variables as instruments in each regression, we should make sure that our choice of instruments is valid. We test for the over-identifying restrictions using Sargan's test, which is a common test of the validity of instrumental variables used in estimation (see Appendix 9 for more details about Sargan's test and its results). We carried out this test by estimating the residuals, obtained from the simultaneous equation regression, on the instruments and then used the F-test to determine their validity (for more details see Sargan, 1958).

The results presented in tables 5.5, 5.7, and 5.9 show that, for the whole sample (middle and low income), middle-income, and low-income countries, respectively, when using all lagged values of explanatory variables as instruments for $t = 3$ and earlier, the Sargan test does not reject the validity of this set of instruments in both equations. This implies the validity of the instruments used in estimation, i.e. the null hypothesis of no correlation between the residuals and instruments. White's heteroschedasticity correction, to the t-statistics of the coefficients, was applied to overcome the heteroschedasticity of error terms which represents a problem when using panel data (see White, 1980 for details). Hausman's specification test was applied to test for model misspecification based on F-statistics (for details, see Appendix 9). This section discusses the results obtained from estimating our simultaneous equation model for every group. The estimated regression results are reported for the whole sample in Table 5.5, for middle-income countries in Table 5.7 and finally, for low-income countries in Table 5.9. The results of unit root tests using the IPS technique are reported in tables 5.4, 5.6, and 5.8.

5.4.1.1. Results for full sample:

5.4.1.1.1. Panel unit root results for full sample

The results of the panel unit root for the whole sample using t-bar statistics are presented in Table 5.4.

Table 5.4
Panel Unit Root results for full sample

Variables	Average ADF (level)	Average ADF (First difference)
$_{g}$GDP	-2.33	-19.04**
$_{g}$EXP	-14.96**	-37.82**
FDI	-8.34**	-26.70**
TARIFF	-5.56**	-13.90**
$_{g}$LAB	-2.07	-11.16**
Sch	-1.99	-6.18**
TOT	-5.35**	-11.52**
TPGDP	-2.16	-11.78**
Xduty	-8.11**	-17.62**
TPTAR	-7.66**	-16.07**

Notes:

(1) $_{g}GDP$ is the growth rate of GDP per capita, $_{g}EXP$ is the exports growth, *FDI* is ratio of foreign direct investment in GDP, *TARIFF* is import duty, $_{g}LAB$ is the growth rate of labour force, *Sch* is secondary school enrolment (human capital), *TOT* is terms of trade, *TPTGDP* is the weighted average trading partners'GDP, *Xduty* in export duty, and finally *TPTAR* is the weighted average trading partners' tariff rate.

(2) indicates significance at 1%level, critical value at 1%level is -2.4(as tabulated in IPS)**

For all variables in levels, the results based on t-bar show that the null hypothesis of the existence of unit root (non stationary variables), except for $_{g}GDP$, $_{g}LAB$, *Sch*, and *TPGDP*, is rejected. However, we failed to reject this null hypothesis for the four variables mentioned. By taking the first difference for the variables, we reject the null hypothesis of non-stationarity for $\Delta_{g}GDP$, $\Delta_{g}LAB$, ΔSch, and $\Delta TPGDP$ as well.

5.4.1.1.2. Regression results for full sample

Table 5.5 indicates the results obtained from the estimation of instrumental variables using 3SLS for the full sample (low-middle income group).

Table 5.5
Instrumental variables estimation of full sample (20 countries) (1970-2006)

Regressors	$_gGDP$ equation	$_gEXP$ equation
$_g$EXP	0.198** (2.981)	
FDI	0.235** (3.293)	
TARIFF	-0.007* (-2.431)	
$_g$LAB	0.398* (2.204)	
Sch	0.107** (-2.834)	
$_g$GDP		0.039** (3.453)
TOT		0.002** (-2.735)
TPGDP		0.0005** (-3.251)
Xduty		-0.011* (2.613)
TPTAR		-0.048** (-3.134)
R^2	0.64	0.76
AR	0.129	0.047

Notes:

1- $_gGDP$ is the growth rate of GDP per capita, $_gEXP$ is the exports growth, *FDI* is ratio of foreign direct investment in GDP, *TARIFF* is import duty, $_gLAB$ is the growth rate of labour force, *Sch* is secondary school enrolment (human capital), *TOT* is terms of trade, *TPTGDP* is the weighted average trading partners'GDP, *Xduty* in export duty, and finally *TPTAR* is the weighted average trading partners' tariff rate.
2- explanatory variables lagged values are used as instruments in each regression.
3- heteroschedasticity corrected t-values are in parentheses, ** and * are 1% and 5% significance levels, respectively. The critical values are -2.67 at 1% and -2.01 at 5% significance level.

The R^2 for $_gGDP$ equation shows that a reasonable proportion (64%) of the variation in the dependent variable is explained by explanatory variables (Regressors). R^2 for $_gEXP$ shows that 75% of the variation in the dependent variable is explained by the Regressors. AR (estimated autocorrelation coefficient for each regression) is close to zero, meaning that there is no autocorrelation problem in all regressions. The White test accepts the null hypothesis of homoschedasticity. Hausman's specification test confirms that the fixed effect model is statistically preferable to the error-components model. The

χ^2 statistics of Hausman's specification test is 245 (0.000) for $_g$*GDP* equation and 206.5 (0.000) for $_g$*EXP* equation where (0.000) is the corresponding p-value. Finally, the Sargan test confirms that the model is correctly specified and the instruments used are valid.

It is notable that all the estimated coefficients for the whole sample (low-middle income countries) are significant at the 1% level and 5% level, as indicated in Table 5.5. The results show that the growth rate of export positively contributes to GDP per capita growth, implying that if the growth rate of exports increases by 1%, the growth rate of *GDP* per capita grows by about 0.2%. Unlike the Egyptian case, *FDI* has a positive effect on *GDP* per capita growth supporting the view of the role of *FDI* in increasing the productivity of any country, especially developing ones, through increasing the rate of technological advances. Also, unlike Egypt, *TARIFF*, a related variable affecting *FDI,* through its negative effect on the imports of intermediate goods and machinery as requirements for *FDI*, and consequently *GDP* per capita, has the expected sign which is negative. This implies that a higher rate of *TARRIF* leads to a decrease in the imports required for *FDI* and consequently *GDP* per capita growth. It is worth noting here that *TARIFF* indirectly affects *GDP* per capita through its direct effect on the imports required for *FDI*, indicating that *FDI* should be specified as an endogenous variable and have its own equation, but for simplicity the model contains two equations only. Despite the endogeneity problem for *FDI* and human capital, as well, in case of Egypt, it is corrected here by using instrumental variables. Growth rate of labour force and human capital, represented by secondary school enrolment, have positive effect on *GDP* per capita growth.

Regarding the second equation of $_g$*EXP* as endogenous variable, our results suggest the positive effect of *GDP* per capita growth on export growth, indicating the existence of a bi-directional impact between the two variables. It is apparent that the growth rate of export contributes more to *GDP* per capita growth than the contribution of *GDP* per capita growth to export growth. While a 1% rise in *GDP* per capita growth stimulates export growth by 0.04%, a 1% rise in export growth stimulates *GDP* per capita growth by 0.2%. The *TOT* has a positive contribution to export growth, leading indirectly to growth of *GDP* per capita. A 1% rise in terms of trade results in an increase in export growth by 0.002% (fairly small). The weighted average of trading partners' *GDP* (*TPGDP*) has positive effect on the export growth. If the trading partners' incomes increases, we suggest an increase in demand and so a greater quantity of exported commodities. Representing an important indicator of trade liberalization, export duty, as expected, has a directly negative effect on export growth, and at the same time an indirect negative effect on *GDP* per capita growth (economic growth). A 1% increase in export duty leads to a fall in the growth rate of export by 0.01% and if this is a cut in export duty, it leads to an increase in export growth by the above percentage (0.01%). Another indicator of trade liberalisation, *TPTAR*, has a negative sign, implying that the increase of tariff rates of imported goods (which are exported goods for trading partners) makes these goods more expensive decreasing the demand for imported goods, which at the same time is a decrease in the exports growth of others.

So the results of export and human capital, obtained from the estimated simultaneous equation model for the whole sample (low and middle income countries), are consistent with the results obtained in chapter 4.

5.4.1.2. Regression results for Middle-Income countries:

5.4.1.2.1. Panel unit root test results for middle-income group

IPS panel unit root test was carried out for the middle-income group as well.The results are presented in Table 5.6.

Table 5.6
Panel Unit Root results for Middle-Income group

Variables	Average ADF (level)	Average ADF (First difference)
$_gGDP$	-2.371	-5.492**
$_gEXP$	-5.247**	-8.028**
FDI	-4.441**	-6.697**
TARIFF	-1.699	-5.497**
$_gLAB$	-1.618	-5.152**
Sch	-2.421	-6.281**
TOT	-2.308	-4.858**
TPGDP	-4.022**	-6.303**
Xduty	-2.261	-7.469**
TPTAR	-2.330	-5.434**

Notes:
(1) $_gGDP$ is the growth rate of *GDP* per capita, $_gEXP$ is the exports growth, *FDI* is ratio of foreign direct investment in *GDP*, *TARIFF* is import duty, $_gLAB$ is the growth rate of labour force, Sch is secondary school enrolment (human capital), *TOT* is terms of trade, *TPTGDP* is the weighted average trading partners'GDP, *Xduty* in export duty, and finally *TPTAR* is the weighted average trading partners' tariff rate.
(2) indicates significance at 1%level.**

The results for *t*-bar statistics for the middle-income group indicate that we failed to reject the null hypothesis of the existence of unit root for almost all variables, except $_gEXP$, *FDI*, and *TPGDP*, in levels. However, we reject the null hypothesis for non-stationarity (existence of unit root) for all variables in first difference at the 1% significance level. So the data seem to be stationary at first differences.

5.4.1.2.2. Regression results for middle-income group

Table 5.7 indicates the results obtained from the estimation of instrumental variables using 3SLS for the middle-income group.

Table 5.7
Instrumental variables estimation of Middle-Income group (10 countries) (1970-2006)

Regressors	$_{g}GDP$ equation	$_{g}EXP$ equation
$_{g}$EXP	0.271** (3.722)	
FDI	0.213** (3.589)	
TARIFF	-0.054* (-2.633)	
$_{g}$LAB	0.472** (3.526)	
Sch	0.031** (-2.734)	
$_{g}$GDP		0.168** (2.943)
TOT		0.014** (-3.163)
TPGDP		0.120** (3.821)
Xduty		-0.152* (-2.541)
TPTAR		-0.224* (-2.62)
R^2	0.59	0.56
AR	0.087	0.101

Notes:
1-*$_{g}GDP$* is the growth rate of *GDP* per capita, *$_{g}EXP$* is the exports growth, *FDI* is ratio of foreign direct investment in GDP, *TARIFF* is import duty, *$_{g}LAB$* is the growth rate of labour force, *Sch* is secondary school enrolment (human capital), *TOT* is terms of trade, *TPTGDP* is the weighted average trading partners'*GDP*, Xduty in export duty, and finally *TPTAR* is the weighted average trading partners' tariff rate.
2- explanatory variables lagged values are used as instruments in each regression.
3- heteroschedasticity corrected t-values are in parentheses, ** and * are 1% and 5% significance levels, respectively.

Table 5.7 demonstrates some tests that needed to be carried out for the estimation of our model. The results indicate that the R^2 s, for $_{g}GDP$ and $_{g}EXP$, show that a fair proportion of variations in the dependent variables can be explained by exogenous or independent variables (Regressors). AR, the estimated autocorrelation coefficient, is close to zero, as shown in Table 5.7, indicating the absence of autocorrelation problems. The White test accepts the null hypothesis of residuals homoschedasticity. Hausman's test indicates that the fixed effect model is statistically preferable to the error-components model. The χ^2 statistics of Hausman's specification test exceed 214.34 for the ${}_gGDP$ equation and 187.95 for the ${}_gEXP$ equation, where the corresponding p-value is less than 0.0002%. Sargan's test indicates that the model is specified correctly and the instrumental variables are valid (see Appendix 9 for more details about Hausman's test and Sargan's test). The results of the regression indicate the all the estimated coefficients for middle-income are significant at the 1% level and 5% level as indicated in Table 5.7.

For equation one, the highly positive contribution of export growth to *GDP* per capita growth is indicated, implying that a 1% increase in export growth makes *GDP* per capita grow by 0.27%. Growth of labour force also has a positive coefficient. Human capital, as expected, has a positive sign, implying that a higher stock of human capital is positively related to a higher rate of *GDP* per capita growth. As for the whole sample and unlike the Egyptian case, *FDI* has a positive sign, implying that *FDI* flow introduces new ideas derived from technical progress and improving skills affecting the productivity of the host country and consequently, enhances economic growth. *TARIFF*, as expected, has a negative effect on *GDP* per capita growth through its effect on the requirements imported for both domestic and foreign investment and, as consequence, negatively affecting economic growth.

The results of equation two for *EXP* growth show a positive effect of *GDP* per capita growth on export growth, showing, as for the whole sample and for Egypt, a bi-directional impact between *GDP* per capita growth and export growth. However, the contribution of export growth to *GDP* per capita growth is greater than the effect of *GDP* per capita growth to export growth. A 1% increase in export growth leads *GDP* per capita to grow by 0.27% while a 1% rise in *GDP* per capita growth leads export to grow by (about) 17%. Like the previous results for Egypt and the whole sample, *TOT* is positively related to export growth, implying that competition of the price in the world market positively affects growth among middle-income countries. As expected, *TPGDP* has a positive coefficient, indicating that the greater the *TPGDP*, the greater the demand for middle-income countries' products. Both export duty and *TPTAR*, as expected, have negative coefficients. The first effect of export duty implies the indirect negative effect on *GDP* per capita growth through its adverse direct effect on export growth. The second effect of *TPTAR* implies that middle-income countries' exports are sensitive to changes in the tariff rates of their trading partners. The higher the *TPTAR* is, the lower the rate of growth of exports of middle-income countries will be.

5.4.1.3. Regression results for Low-Income countries:

5.4.1.3.1. Panel unit root results for low-income group

IPS panel unit root test was carried out for the low-income group as well.The results are presented in Table 5.8. (PcGive is used for estimation of all models).

Table 5.8
Panel Unit Root results for Low-income group

Variables	Average ADF (level)	Average ADF (First difference)
$_{g}$GDP	-2.591	-12.45**
$_{g}$EXP	-6.067**	-18.24**
FDI	-5.093**	-15.53**
TARIFF	-4.247**	-13.42**
$_{g}$LAB	-2.055	-10.75**
Sch	-1.968	-5.847**
TOT	-4.098**	-11.05**
TPGDP	-4.894**	-13.61**
Xduty	-4.539**	-12.91**
TPTAR	-7.282**	-19.15**

Notes:
(1) $_{g}$*GDP* is the growth rate of *GDP* per capita, $_{g}$*EXP* is the exports growth, *FDI* is ratio of foreign direct investment in GDP, *TARIFF* is import duty, $_{g}$*LAB* is the growth rate of labour force, *Sch* is secondary school enrolment (human capital), *TOT* is terms of trade, *TPTGDP* is the weighted average trading partners'*GDP*, *Xduty* in export duty, and finally *TPTAR* is the weighted average trading partners' tariff rate.
(2) indicates significance at 1%level.**

The results for *t*-bar statistics for the low-income group indicate that we reject the null hypothesis of the existence of unit root for almost all variables, except $_{g}GDP$, $_{g}LAB$, and Sch, in levels. However, we reject the null hypothesis for non-stationarity (existence of unit root) for all variables in first difference at the 1% significance level.

5.4.1.3.2. Regression results for low-income group

Table 5.9 indicates the results obtained from the estimation of instrumental variables using 3SLS for low-income group.

Table 5.9
Instrumental variables estimation of the poorest countries (10 low-income countries) (1970-2006)

Regressors	$_gGDP$ equation	$_gEXP$ equation
$_g$EXP	0.162** (5.64)	
FDI	-0.313** (3.28)	
TARIFF	0.220** (2.87)	
$_g$LAB	-0.122** (2.71)	
Sch	0.341* (-2.52)	
$_g$GDP		0.154** (3.12)
TOT		0.021** (2.96)
TPGDP		0.11* (2.43)
Xduty		-0.053** (-3.35)
TPTAR		-0.092* (-2.54)
R^2	0.67	0.75
AR	0.183	0.092

Notes:
1-*$_gGDP$* is the growth rate of *GDP* per capita, *$_gEXP$* is the exports growth, *FDI* is ratio of foreign direct investment in *GDP*, *TARIFF* is import duty, *$_gLAB$* is the growth rate of labour force, *Sch* is secondary school enrolment (human capital), *TOT* is terms of trade, *TPTGDP* is the weighted average trading partners'*GDP*, *Xduty* in export duty, and finally *TPTAR* is the weighted average trading partners' tariff rate.
2- explanatory variables lagged values are used as instruments in each regression.
3- heteroschedasticity corrected t-values are in parentheses, ** and * are 1% and 5% significance levels, respectively.

Table 5.9 indicates that the R^2s show that a large proportion of the variation in the dependent variable can be explained by exogenous (independent or explanatory) ones. As in the case of the whole sample and middle-income countries' regressions, AR (estimated autocorrelation coefficient) is very close to zero in both $_gGDP$ and $_gEXP$

equations indicating the existence of no autocorrelation problem. The White test accepts the null hypothesis of residuals homoschedasticity. The statistical preferability of the fixed effect model to the error-components model is confirmed using Hausman's specification test. The χ^2 statistics of Hausman's specification test exceed 316.88 (0.000) for the $_gGDP$ equation and 967.33 (0.000) for the $_gEXP$ equation, where the p-value is in parentheses. In all regressions, the validity of the instruments used and the correct specification of the model are confirmed using the Sargan test. The results indicate that the poorest countries (low-income) presented a fairly similar story for the relationship between export growth ($_gEXP$) and *GDP* per capita growth, but a different one for the other variables.

In the first equation of $_gGDP$, export growth seems to positively contribute to *GDP* per capita growth. This is in line with the findings of chapter 4 that exports have a positive impact on growth among the poorest countries. Although these countries are the poorest, it seems that there may be human capital that may enable them to absorb technical progress (new ideas) from developed countries through open trade transactions in the international market. It is worth noting that, as in the Egyptian economy, *FDI* seems to negatively affect *GDP* per capita growth. The analysis of this effect was discussed in more detail earlier in this chapter when applying the model for Egypt. Also, we find that the result of *TARIFF* is in line with the result obtained in the case of Egypt, with a positive effect on *GDP* per capita growth. As we noted, based on the effect of tariff on the imports for consumption purpose, in the case of Egypt, this is due to the structure or nature of imports of poor countries, which tend to be for consumption not for investment requirements. Logically, the increase of *TARIFF* leads to the decrease in imports for consumption, which in turn negatively affects *GDP* growth, and consequently an increase in *GDP* growth. Labour force growth as well as human capital, seems to have a negative effect on the *GDP* per capita growth. This is because, as Bhandari et al. (2007) stated, for the poorest countries with abundant labour and scarce capital, like low-income countries, the marginal productivity of labour may be negative.

In the second equation of export growth, $_{g}GDP$ shows, as for in middle-income countries, a positive impact. So this indicates the importance of $_{g}GDP$ as a primary engine for export growth in the poorest countries. *TOT*, interestingly, seems to have positive effect on export growth; however we are cautious about this result as we have to consider the composition of the poorest countries' exports, which are mainly dominated by primary goods (raw materials). This means the competition in the international market is concentrated among the poorest countries themselves. *TPGDP*, surprisingly, shows a positive effect on the growth of exports in the poorest countries. This means that export growth in these countries is sensitive to changes in the trading partners' *GDP*. It is worth noting that, as stated, the exports of the poorest countries are dominated by primary exports. It is known that these exports have elasticity less than unity, with respect to the income of developed countries, which represent the major trading partners of the poorest countries. We therefore suggest that the impact of *TPGDP* should be interpreted cautiously, taking into account the income of trading partners and the elasticity of the poorest countries primary export goods. *Xduty*, as expected, negatively affects the export growth indicating that the higher the *Xduty*, the lower the export growth and, indirectly, the lower the *GDP* per capita growth. *TPTAR*, as expected, negatively affects export growth among the poorest (low-income) countries, indicating that high tariffs levied by their trading partners, which are mainly developed countries, result in deterioration of the export growth from the poorest countries.

5.5. Comparative analysis between Egypt, low-middle income (full sample), low-income, and middle-income groups:

Our comparison will be analysed through three relationships:

1- The relationship between exports growth and *GDP* per capita growth.
2- The relationship between human capital and *GDP* per capita growth.
3- The relationship between some traditional trade liberalisation indicators (*TOT*, *TARIFF*, *Xduty*, *TPTAR*) and *GDP* per capita growth through their impact on export growth.

Regarding the first equation of our model, the results for Egypt, the low and middle-income (whole sample) group, the middle-income group, and the low-income group demonstrate a strong positive relationship between export growth and *GDP* per capita growth. The t-values are significant in all cases. However, there are disparities in the size of export coefficient. In the case of Egypt, a 1% increase in exports leads to a 0.11% increase in GDPper capita growth (economic growth). The comparative figures for low-middle income (whole sample), middle-income group, and low-income group are 0.19%, 0.27% and 0.16%, respectively. On the other hand, in the second equation, economic growth represented by *GDP* per capita growth has a significant positive contribution to export growth, implying a bi-directional relationship between both variables in Egypt and in all groups. Except in the case of Egypt, the effect of export growth on economic growth is greater compared to that of economic growth on export growth. On the one hand, for the whole sample, a 1% exports growth leads to economic growth by 0.19%; the comparative figures for middle- and low-income countries are 0.27%, and 0.16%, respectively. On the other hand, for the whole sample, a 1% *GDP* per capita growth leads exports to grow by 0.03%, and 0.15% in low-income and 0.16% in middle-income groups. However, in the case of Egypt, while a 1% increase in exports leads to a 0.11% in *GDP* per capita, a 1% increase in *GDP* per capita leads Egyptian exports to grow by 0.88%. It is notable that the same result is obtained in the second equation for trading partners' *GDP*, which has significant and positive coefficients affecting on export growth directly and *GDP* per capita growth indirectly in Egypt and all groups. This is despite the low income elasiticities of primary good exports of the low-income group.

Regarding the second relationship, between human capital and *GDP* per capita (economic growth), in equation 1 the results suggest that human capital has a positive contribution to economic growth in Egypt and all other groups. It could be argued that human capital (skilled labour force) is important in determining the location of *FDI* and so the effect of human capital on economic growth can be through its effect on *FDI*, implying indirect effect as well. In Egypt, a 1% increase in the stock of human capital induces *GDP* per capita to grow by 0.19%. The comparative figures for the whole sample, middle-, and low-income groups are 0.1%, 0.03%, and 0.3%, respectively. The results suggest that human capital has a direct effect on economic growth; however, we should mention the indirect effect on economic growth through *FDI*, although we did not deal with *FDI* as endogenous variable, for simplicity.

Regarding the last relationship, between trade liberalisation indicators (*TOT*, *TARIFF*, *TPTAR*, *Xduty*) and economic growth through their impact on export growth, the results in equation 2 show that the terms of trade (*TOT*) have a significant positive effect on export growth, in Egypt and in all groups. Their highest impact is in Egypt, where the coefficient reflects price 0.23 competitiveness of Egypt in international market. Egypt may have a more stable exchange rate and price level than the full sample, middle-income, and low-income group. Trading partners' tariff rates (*TPTAR*), like *TARIFF*, have a negative impact on export growth and consequently, on economic growth. The results show that *TPTAR* have greater influence on export growth in Egypt than that on the full sample, middle-income and low-income groups. If Egypt's trading partners reduce their tariffs by 1%, Egypt's exports grow by 0.2%. The comparative figures for the full sample, middle-income, and low-income groups are 0.0005%, 0.12%, and 0.11%, respectively.

Tariffs, except in the cases of Egypt and the low-income group (the poorest countries), appear to have a negative impact (in case of the low-middle income group and middle-income group) on economic growth through their impact on the requirements (machinery and intermediate goods) imported for investments, both domestic and foreign. In the case of Egypt and low-income countries, we explained the positive effect of tariffs on economic growth through their impact on imports for consumption purposes. The rise in tariffs reduces the imports for consumption, decreasing withdrawal from the national income. The lowest estimated coefficient of tariffs is for the full sample, implying that tariffs seem to have least impact on the full sample.

Export duties (*Xduty*), in all cases, have the expected sign (negative), supporting the arguments about the inverse relationship between export duties and export growth, indirectly having a negative effect on economic growth. The results show that the negative effect on export duties is greater in Egypt. A 1% rise in export duties leads export growth to fall by 0.7%. The comparative figures for the full sample, middle-income, and low-income groups are 0.011%, 0.152%, and 0.053%, respectively. The lowest effect appears in the full sample, implying that export growth in the full sample is determined largely by poor productivity efficiency (the effect of *GDP* per capita, 0.039) and the duties levied on exports, 0.011, but not by a lack of adequate demand (the effect of *TPGDP*, 0.0005) for their products.

Finally, we see that it is essential to look at the results of both foreign direct investment as a ratio of *GDP* (*FDI*) and the growth rates of labour force (rate of return to labour) ($_{g}LAB$). The results of *FDI* show adverse impact on economic growth in the cases of both Egypt and the low-income group, supporting the findings of many sociology studies (as stated earlier) such as Wimberley (1990) about the harmful effect of *FDI* on poor countries. On the other hand, in both the full sample and middle-income groups, *FDI* seems to have a positive impact on economic growth, supporting the argument that *FDI* flow introduces new ideas derived from technical progress and improved skills of the host country, enhancing economic growth. The results for labour growth rate, the rate of return to labour, show that it has a positive significant effect on the growth of Egypt and all groups, except low-income countries. The negative sign in low-income countries reflects the argument that in the poorest countries, with abundant labour and scarce capital, the marginal productivity of labour may be negative. The estimated coefficients of this variable in Egypt and all groups vary. It is worth noting that for middle-income countries, the estimatd coefficient for $_{g}LAB$ is the highest compared to Egypt and the full sample. This is because the rate of return to labour is high in countries characterised by higher income. Here, income is higher in the middle-income group than the other groups, where labour is fairly abundant, so the rate of return of labour is the highest in the middle-income group.

5.6. Concluding Remarks

It is argued that the long run growth of any developing country relies upon the steady and strong expansion of its exports. Statistically significant positive relationships between international trade and growth have been found by many empirical studies (see the literature review in Chapter 3). The primary aim of this chapter was to evaluate this relationship for Egypt, as one of the developing economies adopting an outward-oriented trade policy (trade liberalisation). To capture the most important quantitative aspects of the relationship between international trade and economic growth, we developed a simultaneous equation model. Our model has two equations of two endogenous variables: *GDP* per capita growth ($_{g}GDP$) and exports growth ($_{g}EXP$).

The first equation states that economic growth, represented by GDP per capita, is determined by export growth, foreign direct investment as a share of *GDP*, labour force growth, human capital represented by secondary school enrolment, besides an important trade liberalisation policy indicator affecting *GDP* indirectly, which is *TARIFF*. The second equation states that export growth is determined by *GDP* per capita growth, *GDP* growth of trading partners and indicators of trade liberalisation which are terms of trade, Xduty, and trading partners' tariff. Our model contains variables affecting *GDP* per capita growth either directly, as in the first equation where export growth has direct effect on *GDP* per capita growth, or indirectly by affecting export growth, as in the second equation. For instance *X* duty negatively affects *GDP* per capita growth indirectly through its adverse direct effect on exports growth. The model was estimated using the Full Information Maximum Likelihood (FIML) method for time series data of Egypt for the period 1970-2006.

It was found that there is a major direct contribution of exports expansion to *GDP* per capita growth. On the other hand, *GDP* per capita growth has a greater impact on exports than exports have on *GDP* per capita growth. Export growth is a determinant of economic growth represented by *GDP* per capita growth and economic growth is a determinant of export growth. The results indicate a bi-directional positive relationship between exports growth and *GDP* per capita growth.

The results of this chapter also shed more light on trade liberalisation indicators affecting *GDP* per capita growth: *Xduty*, *TARIFF*, Terms of Trade and Trading Partners' TARIFF. We found that cutting *Xduty* raises export growth and consequently leads to increased *GDP* per capita growth. The effect of *Xduty* on *GDP* per capita growth is indirect through its direct effect on export growth, as indicated earlier. In this regard we can confirm the importance of export promotion policies in Egypt which are necessary in supplying foreign exchange. Concerning *TARIFF*, we found that its effect on *GDP* per capita growth is indirect also, through imports. High tariffs can increase the *GDP* per capita growth by decreasing imports for consumption purposes. This result is not in line with the agreements of the WTO to decrease tariffs between countries. The terms of trade variable has a positive effect on export growth, as expected, as it enhances the competitiveness of Egyptian exports. Tariffs levied by trading partners have an adverse impact on export growth and consequently, adverse impact on *GDP* per capita growth. It is notable that the results of the effect of *HC*, *TARIFF* and export growth on *GDP* per capita growth are consistent with the results obtained from the estimation of causality test in Chapter 4.

Finally, we can say that by operating on the previous exogenous variables (as policy instruments) for both equations 5.1 and 5.2, the Egyptian government can try to increase its growth rate. Also, we should notice that the most important aim of the Egyptian government nowadays is to attract *FDI* and taking our results into consideration, we can confirm that the policy of increasing exports to promote growth of Egypt is more effective than the policy of attracting *FDI*. This can be done by reducing *Xduty* to make the price of exports lower, increasing the competitiveness of Egyptian exports and consequently increasing the growth rate of exports.

The same simultaneous equation model has been tested, to analyse quantitative features of free trade policy and economic growth, using a panel of 20 countries having different degrees of development. The panel data cover, as for Egypt, the period 1970-2006. Our analysis began by estimating the model for full sample which represents a mixture of low-and middle-income countries. We proceeded to examine the model for the low-income group and middle-income group separately, to find out whether the results obtained differ between Egypt, the full sample, low-income and middle-income groups. For Egypt, unlike the results obtained in chapter 4 for exports and growth, there is strong evidence of a significant positive impact (feedback) between export growth and economic growth. Export duties and tariffs (trade policy instruments) have significant negative indirect and significant direct positive impact, respectively, on economic growth. Export duties indirectly affect economic growth through their effect on export growth. The tariffs the trading partners levy on Egypt's exports have an adverse direct impact on these exports and consequently on economic growth. The human capital of Egypt seems to contribute positively to economic growth. Our final conclusion for Egypt is that trade openness is positively associated with economic growth, implying that Egypt benefits from trade openness (trade liberalisation).

For the full sample (low-middle income group), as for Egypt as one of the low-middle income countries, strong evidence exists to indicate that there is positive significant impact (feedback) between exports growth and economic growth. Export duties and tariffs (trade policy instruments) have, also, a significant negative impact on economic growth. Export duties have indirect impact through their effect on export growth. Trading partners' tariffs levied on the low-middle income group, like those on Egypt, have adverse indirect impact on economic growth through their adverse direct impact on export growth. Human capital, for the low-middle income group, contributes positively to economic growth. Our conclusion for the full sample (low-middle income countries) is that, as in Egypt, trade liberalization is positively associated with economic growth of the selected countries, implying that they benefit from trade openness or liberalisation.

For low-income and middle-income groups, the effect of trade (trade growth) and trade-related variables (terms of trade, export duties, tariffs, and trading partners tariffs) on economic growth was estimated using the same simultaneous equation model considering the direct and indirect effect through export growth. The effect of export growth on economic growth does not seem to differ in the two groups, despite their different degrees of development. Both groups give us the same strong evidence, as in the case of Egypt and the full sample, of the positive feedback relationship between export growth and economic growth. Export duties, as in the case of Egypt and the full sample, are indirectly negatively associated with economic growth through their direct impact on economic growth. As in Egypt, the low-income group results show that tariffs seem to have a positive effect on economic growth through their effect on imports for consumption purposes. However, as in the full sample, they have significant adverse effect on economic growth through their adverse effect on imports for investment purposes. As with both Egypt and the full sample, human capital in low-income and middle-income groups contributes positively to economic growth. For low-and middle-income groups, trading partners' tariff rates, like those in Egypt and the full sample, have adverse indirect impact on economic growth through their direct impact on export growth.

To sum up, by attempting to solve the simultaneity problem in the economic growth equation with respect to human capital endowment of Egypt and countries with different degrees of development (low-and middle-income), the results are consistent with the findings in chapter 4 that Egypt, the full sample (low-middle income), low-income, and middle-income groups benefit from trade liberalization. Moreover, the results for Egypt and all groups including the poorest countries (low-income) demonstrate that export growth does not vary with different degrees of development.

Chapter 6
Conclusions

6.1 Summary and principal findings

Each chapter will be summarised and concluded separately to enable discussion of the policy implications of this research, and to make recommendations in this Chapter.

In brief, chapter 1 presented an introduction to the thesis. It explained some basics that need to be known to enable the reader to acknowledge the importance and value of the Egyptian economy when studying free trade and economic growth. A brief overview of the experience of the gang of four, Hong Kong, South Korea, Taiwan, and Singapore, (as a motivation for our research) was presented. The economy of Egypt was discussed, highlighting the turning points regarding the promotion of free trade policy from the time of Mohammed Ali (the beginning of the economic revival) to the present. The trade policy of Egypt was highlighted concerning export performance, demonstrating the most important trading partners of Egypt, and patterns of trade (by sectors). Trade indicators were stated depending on the World Development Indicators (2002) of the World Bank. The foreign trade of Egypt with free and preferential agreements and the trade of free regions (both exports and imports) were also highlighted.

The evidence provided in chapter 1 indicates the importance of the Egyptian economy and its value as an object of study regarding the issue of free trade policy and its impact on Egypt's economic growth.

Both chapters 2 and 3 surveyed the theoretical and empirical literature on the relationship between trade openness and economic growth. It was noted that most of the literature, especially empirical literature, concentrates on explaining this relationship with reference to the miracle of the East Asian countries, especially the gang of four: South Korea, Singapore, Taiwan, and Hong Kong. Most of the empirical literature indicates that the openness of the trade of the East Asian countries was one of the main factors contributing to the great increase in the economic growth of these countries in terms of GDP. Researchers such as Greeaway (1998) argue in favour of free trade, especially for the developing countries. However, there is controversy in the views of the researchers concerning the imposition of trade barriers like tariffs. Some argue that the purpose of trade restrictions is to protect the home economy by keeping money inside the country and that they work for national defence against dumping of goods within a country by foreign exporters and promote infant industries.

On the other hand, other researchers have another view, favouring free trade. They support their stance by considering the experience of the East Asian countries adopting an outward oriented strategy (export-promotion policies) and the impact of this strategy on increasing the economic growth of these countries, by contrast with the failure of the policy of import substitution adopted by developing countries in Latin America, which have experienced lower growth rates. Some empirical studies conducted in the East Asian countries found evidence to support the outward oriented strategy to increase economic growth (Sachs, 1987; Dollar, 1992; Noureldin, 1995; Drahmbhatt and Dadush, 1996; Winters, 2004 and many others reported in chapter 3). However, authors such as Helleiner (1986) and Michaely (1977) argued that there is no significant correlation between openness and economic growth. Michaely (1977) argued that as exports are themselves part of the national product, it is logical for an autocorrelation to be present. Helleiner (1986) found no association between the degree of export orientation and growth. Also, Rodrik (1995), with reference to the East Asian economies, did not agree with the view that economic growth in these economies was sustained by the rise in investment nurtured by exports created by outward oriented policies. Moreover, Rodriguez and Rodrik (2000) argued that the empirical studies could not provide strong evidence for the free trade and economic growth relationship.

It was concluded that, from analysis of the theoretical and empirical literature, controversy remains as to the nature of the relationship between trade policy (free trade) and economic growth. The prevailing uncertainty is reflected in the number of studies which express their titles in question form. Greenaway (1998) asks, does trade liberalisation promote economic development? Krueger (1998) also asks, why is trade liberalisation good for growth? Frankel and Romer (1999) ask, does trade cause growth?

Subasat (2002) asks, does export promotion increase economic growth? Even the World Bank (1987) asks whether outward orientation leads to the better economic performance or superior economic performance paves the way for outward orientation. In order to help in resolving this controversy and unconfirmed relationship between free trade policy and economic growth, this study applied various methodologies to investigation of the Egyptian economy, as a developing transitional economy, in an attempt to find support for any of the above views.

When analysing theoretical and empirical literature in the field of free trade and economic growth relationship, some challenges appeared, which this study attempted to address. The most important one is the problem of causality, which poses an unsolved question: do exports (under free trade policy) result in or from economic growth? Another shortcoming observed in previous studies was the relative lack of use of time series data and simultaneous equation models to deal with this issue. Analysis of the literature revealed the widespread use of cross-sectional data with application of a regression model (mostly single equation) to investigate the relationship between outward oriented trade policy (promoting exports) and economic growth, focusing on the economies of the East Asian countries. These two challenges were addressed in chapters 4 and 5, respectively.

The first challenge, that of causality, was addressed in chapter 4, which provided evidence of the benefits Egypt, as a developing economy, gets from the outward oriented policy (trade openness) or free trade. We began our analysis by testing the causality between economic growth and exports, under the outward-oriented strategy of Egypt, from the period when it adopted the open-door policy in 1970, through the following periods of joining the GATT/WTO and regional free trade agreements. The aim was to answer the question, whether there is empirical evidence that exports and economic growth have a long run relationship and, if so, to investigate, its direction.

An important variable taken into consideration when specifying our model was Human Capital. To the best of our knowledge, very few empirical studies have considered this in the line of their research. Chuang (2000) is one of these few studies. The majority of empirical studies testing the causality between trade openness represented by exports and economic growth used cross-sectional data – for example, Feder (1982), Edwards (1992) and Ngoc et al. (2003), although a few used time series data. Both types have been subject to criticism. However, in view of the many problems of cross-sectional data identified by Herzer et al. (2006), together with the comparative dearth of time series studies, we used the latter in this study, while taking care not to ignore the characteristics of time series data, such as stationarity and cointegration, and using a recent technique to test causality. In this study we sought to avoid the risk noted in Balassa's (1978) study, of misleading results due to the use of non-stationary data (Hatemi-J& Irandoust, 2000).

On the basis of the theoretical framework of endogenous growth, we specified a four-variable model to test causality. The four variables are real GDP to represent economic growth (as the dependent variable), and real exports (X), real imports (M) and Human Capital represented by higher education attainment ratio over the period 1970-2006, as explanatory variables. Time series data were used for Egypt, as well as for a panel of 20 countries at different levels of development. To investigate the time series properties of the data, first, Augmented Dickey Fuller (ADF) test statistics were applied for the levels and first differences of the logarithmic form of the four variables included in the causality test to test for stationarity and determine the degree of integration of each variable.

The ADF test is based on containment of the intercept (constant) as well as a linear time trend and without the trend term. The results of the ADF test indicated that all the causality test variables, except import, have unit roots. They are non stationary in their levels, implying that their series are I(1) (see Table 4.1). The first differencing made all series stationary I(0). As each variable, except M, was integrated of order I(1) and had to be differenced to become stationary, therefore we had to investigate the cointegration properties of the variables, i.e. whether these variables establish a long run relationship. Johansen's cointegration technique was applied to test cointegration. The results of the cointegration test indicated that there is at most one cointegrating vector present in the system among the variables, implying the presence of three independent common stochastic trends in the four-variable system under study (for more details, see Table 4.2). Our conclusion is that as a single cointegrating vector exists (unique cointegral relationship), a long run equilibrium relationship exists between the four variables, real GDP, real exports, real imports and human capital, indicating that these variables are causally related.

In our analysis we used the Error Correction Mechanism (ECM) and Granger causality to examine the causality between Exports and GDP and its direction among our variables as a whole. We applied the Vector Error Correction Model (VECM), not the Vector Autoregressive Model (VAR) to investigate causality, as cointegration was established, i.e. there is a unique cointegrating vector (one vector) in the four-variable VAR used in the Johansen cointegration test, as recommended by Granger (1988). While a short run causal effect is captured by using F-statistics of the explanatory variables (in their first differences), the long run relationship is implied through the significance of ECTs from each of the four equations using t-statistics.

For the Egyptian economy, basically, Granger causality results suggest the presence of short and long run unidirectional causality running from Real Exports (*X*), Real Imports (*M*) and Human Capital (*HC*) to real *GDP* at the 1% significance level. Other relationships between the variables themselves were detected. For example, we detected bidirectional Granger causality between (*X*) and (*M*) in the short run, although no evidence of a long run causality was found regarding the *X* equation, where *X* is the dependent variable; in contrast, evidence of causality appeared regarding the *M* equation, where *M* is the dependent variable (for more details see chapter 4). Concerning the human capital equation, we detected both short and long run relationships between exports and human capital, while no long run relationship was detected between the two variables in the real export equation. We detected another bi-directional causality between the growth of real imports and human capital in both short and long runs at the 1% significance level in both the real import and human capital equations.

We conclude that these findings support the validity of ELG in the case of Egypt for our study period, 1970-2006. However, the causality is in one direction, from the growth of real exports to growth of real *GDP*, and so trade liberalisation positively affects economic growth, benefiting Egypt's economic development process. Also, for the Egyptian economy, our findings indicate that the other variables, which are the growth of real imports and human capital, affect economic growth negatively and positively, respectively. For the full sample (mixture of low-and middle-income countries), the results show bi-directional causality between real *GDP* and real exports. For both low- and middle-income countries, also, this bi-directional causality exists, providing evidence that, like Egypt, both low-and middle-income countries seem to benefit from openness. The results provide further evidence of the importance of human capital to sustain economic growth in all groups, regardless their degree of development.

In Chapter 5 we make a further contribution to the literature in the field of trade liberalisation and economic growth, by specifying a Simultaneous Equation Model (SEM) as well as selecting unusual free trade indicators, to investigate the nature of the relationship between these indicators and economic growth, taking into consideration the endogeneity of economic growth. In this way we sought to overcome the limitation of previous studies, almost all of which were based on a single equation model using cross sectional data, ignoring the simultaneous relationship between trade and growth. In attempting to answer the question whether openness of Egyptian trade positively affects economic growth, our SEM considers two endogenous variables (two equations), the growth rate of *GDP* per capita ($_gGDP$) and Exports growth ($_gEXP$). The first equation states that the growth rate of *GDP* per capita is a function of exports growth ($_gEXP$), foreign direct investment/*GDP* (*FDI*), import duties (*TARIFF*), labour force growth ($_gLAB$) and secondary school enrolment representing human capital (*Sch*). The second equation posits the determinants of exports growth ($_gEXP$), which is a function of economic growth represented by *GDP* per capita, terms of trade (*TOT*), trade partners' real *GDP* growth (*TPGDP*), export duties (*Xduty*) and trading partners' tariff (*TPTAR*).

Our four indicators of trade liberalisation or trade openness measures are *TARIFF*, as a percentage of imports, which measures the strength of trade restrictions; total export duties as a percentage of the value of exports, which serves the same purpose; trading partners' tariffs on Egyptian goods as an indicator of openness to measure the commitment of all countries to liberalise international trade; and finally, terms of trade. To carry out our regression analysis we applied order and rank conditions to test the identification problem and found that the order and rank conditions allow each of the two equations to be identified. Hence, the structural coefficients could be retrieved from the reduced form coefficients. We estimated our model using time series annual data for Egypt covering the period 1970-2006. ADF was applied to test for the unit roots and first difference was taken for the data, making these data stationary to be used in carrying out regression analysis. We estimated our simultaneous two-equation model by using Full Information Maximum Likelihood (FIML) to avoid or at least reduce the simultaneity problem. The estimated coefficients of the reduced form were retrieved to obtain the parameters on which analysis of the results was based.

As in the previous empirical chapter, our results provide strong evidence supporting the positive influence of openness (trade liberalisation) on economic growth. Moreover, the relationship between exports growth and economic growth represented by *GDP* per capita is shown to be bi-directional. Our findings support both Exports-Led Growth (ELG) and Growth-Led Exports (GLE) arguments for the Egyptian economy. It is obvious that this result differs from the results obtained in chapter 4 and this may be at least in part due to the use of different data for exports and *GDP* in the two chapters. While, in ch.4, real export was used to represent exports and real *GDP* to represent economic growth, we used first difference of export growth and *GDP* per capita growth to represent exports and economic growth, respectively, when applying our SEM.

Concerning the liberalisation indicators, we found, unexpectedly, a positive impact of TARIFF on economic growth. It should be noted that we dealt with *TARIFF* in this chapter by considering its effect on *FDI* through the imports of intermediate goods and services for *FDI*. However, if we review the results of the previous chapter, which indicated a negative relationship between imports as a whole and economic growth, it can be argued that the unexpected positive sign of *TARIFF* supports the results obtained in chapter 4, taking into consideration that the greatest part of Egyptian imports is for the purpose of consumption and so constitutes a leakage of national income. Therefore, when *TARIFF* rises, Egyptian imports (for consumption purposes) fall, raising the economic growth. This result challenges the agreements of the WTO aiming at eliminating tariffs among countries.

A negative impact of export duties on the exports growth, as predicted, was captured affecting *GDP per capita* indirectly. In this regard we can confirm the importance of the export promotion policies adopted in Egypt. Terms of trade (*TOT*), as expected, has a positive impact on exports growth, enhancing the competitiveness of Egyptian exports and thereby enhancing economic growth. Also, as expected, the adverse impact of trading partners' tariffs is reflected in exports growth and consequently, there is an adverse influence on *GDP* growth or economic growth. Finally, we can conclude that the results of the effect of human capital, *TARIFF* and exports growth on *GDP* are consistent with the results obtained from the estimated causality test in chapter 4.

Our conclusion here is that the government of Egypt can increase the growth rate by operating on the exogenous variables as policy instruments and it should increase its concentration on the export promotion policy to enhance the economic growth of Egypt instead of concentrating on the policy of attracting *FDI*, which indicates an adverse impact on *GDP* of Egypt. The export promotion policy is more effective in this case.

To make sure of the robustness of the results, we estimated the same model using panel data. We used an instrumental variable estimator for 20 low-and middle- income countries over the period 1970-2006. For the full sample of countries, there is strong evidence supporting the positive impact of trade liberalisation on economic growth. The results indicate that the trade liberalisation variables, export duties (*Xduty*) and import duties (*TARIFF*) have negative effect on *GDP per capita growth* (economic growth), either indirectly for *Xduty* or directly for *TARIFF*. Trading partners' tariff rates have adverse effect on export growth and hence on economic growth. Human capital, on the other hand, contributes positively and directly to economic growth (*GDPper capita growth*).

Once again, the results for full sample show that trade openness (liberalisation) has a significant impact on *GDP per capita growth* and the results of both low-income and middle-income countries show that this impact does not vary from one group to another. For middle-income countries, *FDI* indicates a positive contribution to economic growth; however it indicates a negative impact, as in the case of Egypt, in low-income countries. Export duties (*Xduty*) and import duties (*TARIFF*) seem to have negative impact in the middle-income group. However, in the low-income group *TARIFF*, as in the case of Egypt, they have positive impact on economic growth through their negative impact on imports for consumption purposes. More importantly, human capital contributes significantly and positively to economic growth in both low-and middle-income countries.

Tariffs levied by trading partners have a significant adverse impact on export growth in both low-and middle-income groups. Finally, we can confirm our contribution by taking the simultaneity problem between trade and growth into consideration. Using panel data, after using the time series data for Egypt, helped to increase the power of the tests as well as examine the robustness of the results. We used different techniques for the empirical work in dealing with the relationship between trade policy (liberalisation) and economic growth with respect to a country's level of human capital.

6.2 Trade policy implications and recommendations

Freer trade relations have become an important issue in both trade and development literature since the 1950s. The economy in Egypt was protected as a result of the adoption of import substitution policies and government intervention in every activity for next two decades. From 1970, when the open-door policy was adopted, until now, Egypt has made great strides to liberalise its markets to support favourable economic growth rates by encouraging greater trade.

Law 43 of 1974 established free zones in Egypt. The seven main free trade zones are Nasr city in Cairo, Alexandria, Ismalia, Suez, Port Said, Damiette, and Sixth of October city. The other zones are in North Sina and the Red Sea (see figure 8 in appendix 1).

Port Said's duty-free system was phased out from 2002 over five years. Free zones are subject to investment law 8 and are open to investment in any activity. Eighty percent or more of the production of these zones is for export. The establishment of both the General Agreement on Tariffs and Trade (GATT) in 1947 and the World Trade Organisation (WTO) in 1995, as a successor, supported the idea of adoption of free trade for enhancing economic growth. The decades after the 1950s until now, under the control of the GATT/WTO agreements, have witnessed an increased trend towards liberalising trade by eliminating tariffs and bounding non tariff trade barriers.

Through accession to the WTO the role of developing countries, like Egypt, in international trade policy increases day by day. LDCs as a whole account for over three quarters of the WTO membership, and are changing from protectionist policies (import substitution or inward oriented) to open trading regimes (export promotion or outward oriented). As a result of the trade liberalisation experience (openness) of the East Asian countries and the subsequent benefits of higher growth, almost all economists and policy makers have welcomed this result, as reflected in both theoretical and empirical studies. In this respect we find that the Egyptian economy represents one of the most promising developing (low-middle income) economies growing on average rate of 7 percent in recent years and deserves to be studied in establishing relationship between trade liberalisation and economic growth and in studying implications of free trade.

Egypt was one of the first countries in the Middle East and North Africa region (MENA), to announce its adoption of an export promoting and open market policy as a strategy for economic development. During recent years, Egypt has given the utmost priority to the liberalisation of trade and the promotion of exports, which it views as the foundation for sustainable economic growth generating employment opportunities and reducing poverty. It has moved from the import substitution policies adopted in the 1950s and 1960s to an outward oriented (export promotion) strategy based on a series of trade policy reforms aiming at liberalising trade. According to Lord (2000), three types of measures are adopted to apply these reforms, namely, reducing import tariffs, replacing the quantitative import measures with replacement with tariffs and non-tariff barriers (NTBs) which have been greatly reduced as well and finally promoting exports through the easing of administrative procedures or “red tape”.

The Egyptian government issued a new law for export promotion No. 155 in June 2002 to promote export and consequently aim at limiting trade deficit (8.1% GDP). The main provision of this law is the establishment of an export promotion and development fund.It has allocated some funding for enhancement of exports, although Egypt does not provide any kind of subsidies to exports, especially agricultural ones. This law aims at reducing bureaucratic obstacles to exporting. It gives the General Authority for Export and Import Control (GAEIC), together with the customs authority, responsibility for administering the duty drawback and temporary admission schemes. To improve market access conditions and increase competition in world markets, Egypt decided to become an active member of the global economy, undertaking commitments as a member of the WTO in 1995 and entering into regional and bilateral trade agreements in three main directions, Africa, EU and the Arab world. It is in the largest and most ambitious agreement is COMESA. All these agreements have in a sense locked in Egypt's commitment to freer trade. To enhance Egyptian exports' competitiveness by making them cheaper and increasing integration with the world markets, the exchange rate system was liberalised. Devaluations have been enacted since 2001, leading to a more than 40% decline of the Egyptian pound vis-à-vis the US dollar. These devaluations culminated in free float of the Egyptian pound in January 2003.

The economy of Egypt is dominated by the service sector (as stated), which accounts for about half of GDP. However, agriculture remains an important activity, amounting to 16% of GDP and has about a third of total employment. Besides, Egypt is still a substantial net food importer. All of these factors give a special interest to the agricultural sector of Egypt, encouraging discussion of some points of the agricultural agreement of the WTO regarding the implementation in Egypt, although the Egyptian agricultural sector's economic reform was initiated in 1987.

Our thesis has investigated the effect of openness on economic growth of the Egyptian economy. The most important finding -of Chapter 5- is the strongly positive, bi-directional relationship between exports of Egypt, throughout the period in which Egypt has adopted openness or outward orientation as a trade policy, and its economic growth. This finding is in line with the theoretical argument of the ability of developing countries, including Egypt to benefit from the free trade movement, which helps to introduce these countries to the knowledge spillover.

The role of human capital cannot be ignored in this regard. Our findings proved the contribution of human capital to Egyptian economic growth. Based on this finding, Egypt needs to improve labour productivity and skills by education and training, the pillars of human capital development. We can confirm that our result, the positive relationship between exports and economic growth, is in line with the export promotion policy, as an economic development strategy, adopted by the government of Egypt, which has used a series of trade policy reforms to move successfully from import substitution policies in the 1950s and 1960s to an export-oriented policy aiming at liberalising trade. Some of these reforms have been unilateral and others have been linked to commitments made by Egypt as a member of the WTO.

Trade policy reform, to move towards more liberalisation, has eliminated many quantitative restrictions and lowered tariff rates and with the continuing trend to make the Egyptian economy less protected (increasing the movement to liberalise trade), both exports and imports can be expected to increase. We cannot deny the efforts of the Egyptian government in adopting a strategy of export promotion to eliminate the impediments exporters face to maintaining reasonable competitiveness in the world markets. Moreover, it has made efforts to develop and strengthen the investments of export finance via the Egyptian Export Development Bank, the Egyptian Company for Export Development and Export Guarantee, commercial banks and insurance companies. However, most Egyptian exporters are still suffering from some obstacles, such as the lack of the capacity for meeting the standards of quality required by the world markets, marketing weakness and low awareness of world demand developments.

Many facilities are still needed to support the desire of Egypt to integrate in the global economy and expand foreign markets to its exports. The Government of Egypt needs to improve and upgrade its infrastructure, especially by improving its transportation systems, ports and airports and generating additional power. The foundation of a private sector has to be prepared, administrative procedures and regulatory controls should be simplified. Marketing systems and prices should be free and removed from the intervention of the Egyptian government. Improvement of the efficiency of the foreign exchange market and increased tax incentives are needed. Also, institutions and policies, especially privatisation policy and export oriented policy, should be upgraded. We have to mention the role that U.S aid plays in this regard. If the aforementioned facilities are achieved successfully, Egypt can compete in the international market. On the other hand, attention should be drawn to the responsibility of the Egyptian exporters, as well, to meet the requirements of the foreign market and improve their responsiveness to its needs. Quality standards should be met. Exports need to develop their export culture and build effective channels for marketing.

The results of the present study strongly indicate that Egyptian exports would benefit from freer trade, whether as a result of unilateral action or multilateral, regional and bilateral arrangements Egypt has already undertaken. Egypt has to work continuously to maintain its effective role as a member of the GATT/WTO (WTO can provide technical assistance) and reform its legal regime to be consistent with its agreements regionally or multilaterally. Overall, it is recommended that it is important for Egypt as well as the countries selected for the panel analysis, to adopt trade liberalisation policies to sustain economic growth as suggested by our results.

A major concern appears regarding the inconsistency of the regional versus the global approach to achieving trade liberalisation. Egypt must ensure the consistency of any regional free trade agreements of which Egypt has membership, with the multilateral free trade agreements with the GATT/WTO. Regarding the regional agreements, more attention should be paid to the negotiations with the European Union (Egyptian Euro-Med agreement) to get greater access to EU markets (the first trading partners of Egypt as a region) in the fields in which Egypt has significant comparative advantage, which seems to lie in low cost labour or natural resources.

We can say that to underpin any regional role, Egypt has to achieve an increased rate of economic growth. With this in view, it is important for Egypt to maximise its benefits from trade liberalisation. In order to do so, Mc Calla and Nash (2007) point out, policy makers must take into consideration how to design, sequence, and implement trade reforms. For Egypt, as a developing country, policy makers have to design trade policy reforms depending on the size of every sector in the Egyptian economy, the pattern of protection, effects on labour markets, a realistic assessment of the degree of protection needed to compensate for global distortions, fiscal implications where tariff reductions may need to be more gradual and coordinated with fiscal adjustments policies and the characteristics of the production structure. Also, for future trade agreements, Egypt's policy makers need to know about the effects of any trade policy actions on the domestic economy.

In order to strengthen the validity of our conclusions regarding Egypt, this thesis, also, examined the effect of trade liberalisation on growth for selected low-and middle-income countries, and investigated whether this effect varies according to the degree of development. Our findings, in both chapters 4&5, give clear evidence on the significant growth-enhancing impact of trade liberalisation in both low-and middle- income countries, suggesting that the impact is not determined by the level of development. These findings are in line with theoretical arguments about the potential benefits for less-developed countries of exposure to the global knowledge stock. Furthermore, for all groups, human capital was found to contribute positively to economic growth, providing strong support for a policy regime aiming at combining trade policy reforms and increasing public investments in education. Expansion of education will increase the capacity of these countries to absorb new technologies from the developed countries.

6.3 Study limitations:

Despite our contribution to the analyses of the relationship between free trade policy and economic growth appeared through study findings in both chapters 4&5, there are a few limitations that should be acknowledged, and should be overcome by subsequent studies. The first limitation is that our results using panel data need to be accepted with caution, as we classified the panel countries based on their income per capita (average in the 2000s). Using the same basis of classification in another period or an alternative method of classification may lead to a different level of development for the same country, altering the results. For example, based on GDP growth, which has been among the highest in the world, 10% year, Mozambique can be classified as high-income country while based on per capita income, which is (average) US$210, Mozambique is still one of the world's least developed countries.

In chapter 4, we can find another limitation, which is the aggregate nature of the production function. In future research, disaggregated data may be used. The last limitation appears in chapter 5, and concerns the use of the variable schooling (secondary school enrolment) to represent human capital accumulation. Despite the importance of this indicator, we find that it is not perfect, as it ignores teachers as input and ignores both primary and high education in panel data. An attempt was made to overcome this limitation when using time series data for Egypt by using higher education as the variable to represent human capita in chapter 4 for the causality test and using secondary school enrolment to represent human capital in chapter 5. I actually found no difference in the results. However, further studies may use a better measure of human capital accumulation.

6.4 Proposed directions for prospective research

Many aspects of the relationship between trade openness and economic growth of Egypt have been investigated in this thesis, as the first attempt to use modern techniques in this investigation. Through expansion of exports to economic growth, we stated that Egypt has participated in more regional integration agreements, global trade liberalisation agreements besides unilateral liberalisation. But the question is, can Egypt employ more than one of these approaches? Or is there any contradiction between these approaches, especially regionalism and multilateralism? Until now there is an argument about the uncertainty surrounding the strategic trade and development interests of regionalism adopting countries.

We suggest the next step is to focus on the regional agreements of Egypt and investigate whether there is any conflict with the global agreements based on bilateral and multilateral bargaining under WTO commitments. It is recommended that Egypt should concentrate on enhancing its domestic economy and thereby its attractiveness for both regional trade and investment and it is argued that international trade and investment represent engines of economic growth. However, our findings reveal, surprisingly, the negative impact of foreign direct investment (*FDI*) on the economic growth of Egypt. This finding suggests a need for future research on the Egyptian economy to investigate the implications of *FDI*, free trade and economic growth in Egypt.

Appendix 1
Historical background and Geography of Egypt

- **Historical background:** The Egyptian civilization is one of the world's great civilizations developed as a result of the regularity and richness of the annual flooding of the River Nile, coupled with semi- isolation provided by deserts to the East and West. A unified kingdom arose about 3200B.C. The last native rulers fell to the Persians in 341 B.C. After that the Persians were replaced by Greeks, Romans, and Byzantines. From the 7^{th} to the 13^{th} centuries the Arabs ruled Egypt, introducing both Islam and the Arabic language. A local military caste, the Mamluks, took control in about 1250 and continued to govern after the conquest of Egypt by the Ottoman Turks in 1517. In 1869 the Suez Canal was completed, plunging Egypt into debt; however Egypt became an important transport passage. The Egyptian share in the Suez Canal Company was sold to Britain in 1875 (El Din, 1986, 10). In order to protect its holdings and investments, Britain controlled the government of Egypt in 1882, but rule ostensibly remained with the Ottomans until 1914. Full independence from the United Kingdom was acquired after the Second World War in 1952, although Egypt had enjoyed partial independence from 1922. In 1971, Egypt completed the greatest project to regulate the water of the Nile River for agriculture and to generate electricity: the Aswan high dam. In 1973, came the victory in the October war and the defeat of Israel. After a peace agreement with Israel in 1979, the government focused its efforts on adapting the Egyptian economy to the new era through economic reforms and massive investment in improving communications and infrastructure. These efforts were all the more necessary as a result of the problems caused by a rapidly growing population, which is considered the largest population in the Arab world, about 77,505,756 (July 2005 est.) , limited arable land and concentration of people on the borders of the Nile.

- **Geography:** Egypt lies in north-east Africa, bordering the Mediterranean Sea, between Libya and the Gaza strip, and the Red Sea north of Sudan, and includes the Asian Sinai peninsula. "Its area in total is 1,001,450 sq Km divided between 995,450 sq Km of land and 6000 sq Km of water" (See www.CIA.gov). Its coastline is 2,450 Km. The land boundaries total 2,665 Km and the border countries are Gaza strip 11 Km, Israel 266 Km, Libya 1,115 Km, Sudan 1,273 Km. Its climate is characterised as desert, with hot, dry summers and moderate winters. Egypt is a vast desert plateau interrupted by the Nile valley and delta. The natural resources are petroleum, natural gas, iron ore, phosphates, manganese, limestone, gypsum, talc, asbestos, lead, and zinc. Arable land accounts for 2.87% and permanent crops for 0.48%, with other uses accounting for 96.65 % (2001). Irrigated land was estimated at 33,000sq Km in1998 (See www.CIA.gov). There are many natural hazards, including periodic droughts; frequent earthquakes, flash floods, and landslides; a hot, driving windstorm called the Khamsin that occurs in spring, dust storms, and sand storms. Egypt is strategically located with the Sinai Peninsula the only land bridge between Africa and the remainder of the eastern hemisphere, and the Suez Canal forming a sea link between Indian Ocean and Mediterranean Sea. The country's size and juxtaposition to Israel give it a major role in Middle Eastern geopolitics. Key political issues include dependence on upstream neighbours; the issue of dominance of the Nile basin; and proneness to influxes of refugees (see the following chart for Egypt)

Figure 8: The chart of Egypt
Source: CIA

Appendix 2
Definitions

Basic definitions included in the thesis in brief

1- The process of Economic Development

The basic objectives of Economic Development are to overcome hunger, to provide adequate health care, to provide safe for water and environment and enable citizens to obtain modest housing, and in general, to enjoy a reasonable standard of living.

> **"Economic Development must be conceived of as a multidimensional process involving major changes in social structures, popular attitudes and national institutions, as well as the acceleration of economic growth, the reduction of inequality, and the eradication of poverty."**
> **(Todaro &Smith, 2003, 17)**

2- Economic growth

is usually measured as the annual percentage rate of growth in one or another of the country's major national income accounting aggregates, such as Gross National Product or Gross Domestic Product (almost always with appropriate statistical adjustments to discount the potentially misleading effects of price inflation) (Johnson, 2005).

3- Globalisation

This concept appeared in the late 1990s and is still prevalent today. It means that our world becomes a single market where goods and services, and also labour and capital, are traded internationally. Therefore, information and innovations flow between countries faster than before. "In its core economic meaning, globalization refers to the increased openness of economies to international trade, financial flows, and direct foreign investment" (Todaro and Smith, 2003, 510).

4- Welfare

This means that all a country's inhabitants can enjoy the necessary resources of the country. The welfare state requires us to try to concentrate on organisation of society to the degree which permits all of the inhabitants to acquire utility from at least minimum income and public services. Here we cannot forget to give a few words about welfare economics, which it is the part of economics which is concerned with the impacts of economic activities on welfare and this implies the modeling of household behaviour by utility functions.

5- Free trade

It is a policy aiming at unrestricted foreign or international trade, where the removal of tariffs or subsidies on exports and imports means that there are no trade barriers between the countries and there are no kinds of restrictions on trade in most goods, although there may be some exceptions.

6- Gains from trade

It means that there will be an improvement in welfare if the countries are able to trade with one another, compared with the autarky. Free trade and certain restricted trade will be better than autarky by yielding welfare gains which arise from things like the differences in factor endowments.

7- Drawback

It means paying back a duty previously paid on exporting excisable articles or on re-exporting foreign goods. Its object is to let commodities, subjecting to taxation, be exported and sold in a foreign country on the same terms as goods from countries where they are untaxed. We can, as well, say it is a refund of duties especially on an imported product subsequently exported or used to produce a product for export.

8- Effective Protection Ratio

it is a measure of the total effect of the entire tariff structure on the value added per unit of output in each industry, when both intermediate and final goods are imported. This statistic is used by economists to measure the real amount of protection afforded to a particular industry by import duties, tariffs or other trade restrictions (Greenaway and Milner, 1993).

All of the definitions of the variables of the empirical analysis are based on the definitions of the World Development Indicators, WDI, CD-ROM (2002) of the World Bank.

9- Shadow Price

In the context of maximization problem with a constraint, is the change in the objective value of the optimal solution of the optimization problem obtained by relaxing the constraint with one unit. The value of a Lagrangian multiplier is a shadow price at the optimal solution, meaning that infinitesimal change in the objective function arising from an infinitesimal change in the constraint. The idea comes from the fact that at the optimal solution the gradient of the objective function is a linear combination of the constraint function gradients with the weights equal to the Lagrange multipliers.

10- GDP, Gross Domestic Product.

GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used. This definition is applied also on the trade partners' GDP (TPGDP).

11- GDP growth (annual %)

Annual percentage growth rate of GDP at market prices based on constant local currency. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

12-Exports of goods and services

Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude labour and property income (formerly called factor services) as well as transfer payments. Data are in current U.S. dollars.

13- Exports of goods and services (annual % growth)

Annual growth rate of exports of goods and services is based on constant local currency. Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude labour and property income (formerly called factor services) as well as transfer payments.

14-Foreign direct investment, net inflows (% of GDP)

Foreign direct investment is net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments.

15- Labour force, total

Total labour force comprises people who meet the International Labour Organization definition of the economically active population: all people who supply labour for the production of goods and services during a specified period. It includes both the employed and the unemployed. While national practices vary in the treatment of such groups as the armed forces and seasonal or part-time workers, in general the labour force includes the armed forces, the unemployed and first-time job-seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector.

16- Labour force (annual %)

Labour growth is calculated by the author. It is the annual growth rate of labour force. Total labour force comprises people who meet the International Labour Organization definition of the economically active population: all people who supply labour for the production of goods and services during a specified period. It includes both the employed and the unemployed. While national practices vary in the treatment of such groups as the armed forces and seasonal or part-time workers, in general the labour force includes the armed forces, the unemployed and first-time job-seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector.

17- School enrolment, secondary (% gross)

Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.

18-Import duties (% of imports)

Import duties comprise all levies collected on goods at the point of entry into the country. The levies may be imposed for revenue or protection purposes and may be determined on a specific or ad valorem basis, as long as they are restricted to imported products. This definition for tariff is the same for defining the tariff for any country of trading partners (TPTAR). However, we should note that TPTAR is used as an average of TARIFF as there are 11 importers of Egypt as shown in chapter 1.

19-Terms of trade (TOT)

The terms of trade (TOT) measures the exchange rate of one good or service for another when two countries trade with each other. TOT must lie within the opportunity cost ratios for both country to be beneficial for each country as argued in basic Microeconomics. With caution, the economists, particularly in international economics and international trade use TOT as a proxy for the relative social welfare of a country. An improvement in TOT means that the prices of export are increasing faster than import prices resulting in a fall in exports and an increase in imports causing the balance of trade becomes worse, if the deficit has already existed. The fluctuation of TOT is in line with changes in export and import prices. Also, TOT can be influenced by both exchange rate and inflation rate that affect the direction of any change in the TOT. A reduction in real living standards is signified by a large fall in terms of trade as one of the most important causes for this reduction of living standards.

20-Export duties (% of exports)

Export duties include all levies collected on goods at the point of export. Rebates on exported goods which are repayments of previously paid general consumption taxes, excise taxes, or import duties are deducted from the gross amounts receivable from the respective taxes, not from amounts receivable in this category. Data are shown for central government only.

Appendix 3
Methodology

- Introduction

Methodology refers to the overall approach to the research process, from the theoretical underpinning to the collection and analysis of the data. “Like theories, methodologies can not be true or false, only more or less useful.” (Silverman, 1994, 2). The methodology is concerned with the following main issues:

- Why the researcher collected certain data.
- What data the researcher collected.
- From where the researcher collected data.
- When the researcher collected data.
- How the researcher collected data.
- How the researcher will analyse data.

The purpose of this section is to describe the methodological procedures. In this section, three issues are to be clarified:
-The study’s paradigm,
-Sources of data,
-The construction of the model.

- Study Paradigm

The study adopts a positivist (quantitative) research paradigm as it aims to test the relationship between free trade and economic development or more precisely the effect of free trade on economic growth or performance, taking Egypt as an empirical case.

The objective of this study is to test this relationship by applying it to the Egyptian economy by measuring the impact of trade liberalisation on the economic development process of Egypt. Therefore, the methodology of this study was designed to answer the question whether Egypt will gain or lose from free trade. Consequently, in this context the empirical work examined the following central hypothesis: Trade liberalisation is economic growth enhancing and Egypt was taken as an empirical case**.** This hypothesis suggests that countries where trade liberalisation occurs on a smooth path are expected to have better growth performance than nations which observe a volatile trade liberalisation policy.

- The Sources of the data

Our data are obtained from both national and international sources. The principal national sources were the data available from the Central (national) Bank of Egypt, the Ministry of Planning, and the Ministry of Foreign Trade & Industry. The principal international source of data was the data available from the World Development Indicators (WDI), CD-ROM 2002 of the World Bank. The data set consists of trade liberalisation measures and other selected variables affecting economic growth. These data are available on a yearly basis (annually) from 1970 to 2006. The variables used in the empirical analyses can be specified in more detail as follows:

1-GDP_t: real GDP, is used as log differences. Data were obtained using the international national accounts data of the (WDI) CD-ROM 2002 of the World Bank. This source provides data from 1970 to 2000 only. The data for the period 2001-2006 were obtained from the various annual reports of the Central Bank of Egypt and Market profiles- Egypt. For panel data, we updated the data with reference to the WDI database.

2-$_gGDP_t$: the growth rate of GDP per capita, which represents economic growth. It was calculated using the above variable, GDP, divided by the population and then by using the transformation $(Y_t - Y_{t-1})/Y_t *100$ where Y_t is the GDP per capita of Egypt in year t and Y_{t-1} is the GDP per capita of Egypt in year t-1. Note that we added GDP data for 1969 to get $_gGDP_t$ in 1970. For panel data, we carried out the same procedure for every country, as for Egypt, to calculate the growth rate of GDP per capita.

3-X_t: exports of goods and services (based on local currency), data for the period (1970-2000) were obtained from the (WDI) CD-ROM 2002 of the World Bank, for the period 2001-2004. The data were obtained from the International Trade Centre UNCTAD/WTO, and were updated for 2005, 2006, and 2007 from the annual reports of the Ministry of Foreign Trade and Industry Website at: www.mofti.gov.eg. For panel data, we updated the data with reference to the WDI database.

4-$_gEXP_t$: annual growth rate of exports of goods and services, like $_gGDP_t$, is calculated using the above variable, X_t, by the transformation $(X_t-X_{t-1})/X_t*100$ where X_t is the export of goods and services in year t and X_{t-1} is the export of goods and services in the year t-1. Also, here we obtained data for X_t by adding the data for 1969 as they are necessary for obtaining the growth of exports for 1970. The same was done for panel data.

5-FDI_t: foreign direct investment/GDP, data were obtained from the World Development Indicators, WDI, CD-ROM 2002 of the World Bank. This source, as stated previously, gives data up to 2000. The data were updated by using the World Development Indicators data base and Ministry of Planning of Egypt. For panel data, we updated the data using the IMF's International Financial Statistics.

6- $TARIFF_t$: the import duties as a percentage of imports; they are levies collected on goods at the point of import (by the country that receives the goods). The data were obtained from the WDI, CD-ROM 2002 of the World Bank. The data for the period 1970-1974 and 1998-2000 were completed from the tariff schedule of the Ministry of Finance of Egypt and also the data for TARIFF were updated from the same source. We updated the panel data using the IMF's International Financial Statistics.

7-$_gLAB_t$: labour force growth rate, which is used as a proxy of Labour, employment, was calculated using the national accounts data of labour force (total) from the WDI, CD-ROM 2002 of the World Bank for the period 1969-2000. The data were updated using the annual reports (various) of the Central Bank of Egypt. Growth rate of labour force, which indicates the annual decrease or increase in employment, was calculated using the transformation $(LAB_t- LAB_{t-1})/LAB*100$. For panel data, we updated the data from ILO.

8-Sch$_t$: secondary school enrolment (% gross), which represents the human capital stock. This variable, as stated in Appendix 2, is the ratio of total secondary school enrolment, regardless of age, to the population of the age group that corresponds to the level of education. This measure of educational attainment is the one most significantly correlated with growth (Barro & Lee, 1994). The data were obtained and updated mainly from the Central Agency for Public Mobilisation and Statistics (CAPMS). The WDI, CD-ROM 2002 here are not satisfactory as there are a lot of missing data, such as for the periods 1971-1974, 1976-1979, 1981-1984, 1986-1989, 1997, and 1999-2000. We updated the panel data using the IMF's International Financial Statistics and WDI database.

9-TOT$_t$: terms of trade, data were obtained from the World Development Indicators, WDI, CD-ROM 2002 of the World Bank and updated from the World Development Indicators database, April, 2006 and the Ministry of Foreign Trade and Industry of Egypt Website at: www.mofti.gov.eg. For panel data, we updated the data using the WDI database.

10-Xduty$_t$: export duties as a percentage of exports. Data were mainly obtained from the World Development Indicators, WDI, CD-ROM (2002) of the World Bank. However, the data for the period 1970-1974 are missing and it was very difficult to obtain them as this was the period of the war with Israel (October 1973) in which Egypt achieved the victory. The data for the above period and also the missing data for the period 1998-2000 and updated data were obtained from the Ministry of Foreign Trade and Industry of Egypt. For panel data, we updated our data using the IMF's International Financial Statistics.

11-TPGDP$_t$: trade partners' real GDP growth; this variable is used as the average of the real GDP growth of trading partners of Egypt (the importers of Egyptian goods) based on the Accumulative Report of Foreign Trade (2005) of the Egyptian Ministry of Industry and Foreign Trade. The most important partners or markets for Egyptian exports (importers) are Italy, U.S., Spain, India, Holland (Netherlands), Saudi Arabia, France, U.K., Germany, Libya, and Japan. (for more details see chapter 1). The data for all of these countries were obtained from the World Bank's World Development Indicators CD-ROM (2002) for the period up to 2000 and were updated from the World Development Indicators database. For panel data, we obtained the data using the same sources used for Egypt and the panel data were weighted average real GDP growth of the top four trading partners (see Appendix 6).

12-TPTAR$_t$: trading partners' tariff rate (% imports). This variable was dealt with like the previous one, TPGDP$_t$, as the data for all the importers of Egypt were collected and the average for the 11 countries' data was calculated. The data were obtained from the World Development Indicators, WDI, CD-ROM (2002) of the World Bank and updated from the Ministry of Foreign Trade and Industry. For panel data, the data were obtained from the WDI, CD-ROM (2002) of the top four trading partners (see Appendix 6) and updated using the IMF's International Financial Statistics and calculated by taking the average tariff rates.

13- Consumer Price index: it reflects changes in the cost to the average consumer of acquiring a fixed basket of goods and services, which may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. The data were obtained from the World Development Indicators, WDI, CD-ROM (2002) of the World Bank and updated from the World Development Indicators database.

- The construction of a model for Egypt to examine the effect of trade liberalization on economic growth

This thesis is an empirical investigation of the effect of international trade policy on the economic development process, by focusing on the effect of free trade on economic growth. Economists who are interested in investigating the standards of living resulting from the growth in developing countries have also been interested in trade, from the discussion of Adam Smith about specialization and the extent of the market, to the arguments about import substitution versus export promotion (growth), to recent work on increasing returns and endogenous technological process. According to Frankel and Romer (1999), the basic difficulty in trying to estimate trade's impact on income can be seen by considering a cross-country regression of income per person on the ratio of exports or imports to GDP (and other variables).

Such regression typically finds a moderate positive relationship; see for example, Michaely (1977), Feder (1983), Kormendi and Meguire (1985), Fischer (1991,1993), Dollar (1992), Levine & Renelt (1992), Edwards (1993), Edwards (1995), Rodrik (1995b), Harrison (1996), and Frankel & Romer (1999). However, this relationship may not reflect an effect of trade on income. According to Frankel and Romer (1999), the problem is that the trade share may be endogenous as Helpman (1988), Bradford and Chakwin (1993), Rodrik (1995a) found. Using measures of countries' trade policies instead of the trade share in the regression does not solve the problem; see Sachs & Warner (1995), Harrison (1996), Hong-Whalee (1993) and Fischer (1991, 1993). Sala-i-Martin (1991) showed that the countries that adopt free-market trade policies may also adopt free-market domestic policies and stable fiscal and monetary policies. Since these policies are also likely to affect income, countries' trade policies are likely to be correlated with factors that are omitted from the income equation and thus they can not be used to identify the impact of trade. Kaldor (1993) listed a number of stylised facts that he thought typified the process of economic growth:

4- Per capita output grows over time, and its growth rate does not tend to diminish with the real per capita gross domestic product (GDP).
5- Physical capital per worker grows over time.
6- The rate of return to capital is nearly constant.
7- The ratio of physical capital to output is nearly constant.
8- The shares of labour and physical capital in national income are nearly constant.
9- The growth rate of output per worker differs substantially across countries.

Kuznets (1981) adds other characteristics of modern economic growth. He notes the rapid rate of structural transformation, which includes shifts from agriculture to industry to services. This process involves urbanisation and an increasing role for formal education and he argues that modern growth involves an increased role for foreign commerce and that technological progress implies reduce dependence on natural resources.

Therefore we find that per capita output or income per person represent a fact that typifies the process of economic growth. Two models were constructed; the first one attempted to deal with the causality problem by re-examining the causality between exports and economic growth in the context Egyptian economy. The second model was developed to deal with the endogeneity problem and investigate the impact of selected openness indicators on the economic growth in Egypt. These quantitative techniques are estimated in detail in chapters 4&5.

Appendix 4
MacKinnon critical values

The formula used to estimate the critical values is as follows: (see Ericsson & Mac Kinnon, 2002). K=4

$CV = \Theta_\infty + \Theta_1 /T + \Theta_2 /T^2 + \Theta_3 /T^3$ Where,

Θ_∞ = estimated asymptotic critical values.

Θ_1 = coefficient in T^1 in response surface regression.

Θ_2 = coefficient in T^2 in response surface regression.

Θ_3 = coefficient in T^3 in response surface regression.

T = total number of observations. Therefore, the critical values for our case are as follows: (from table 3, Ericsson & MacKinnon, 2002)

1- at the 1% level of significance:

$CV = -4.3555 - (8.90/30) – (6.7/(30)^2) – (31/ (30)^3)$

$= -4.3555 - 0.2967 – 0.00744 – 0.001148$

$= -4.661$

2- at the 5% significance level:

$CV = -3.7592 – (2.92/30) – (3.7/(30)^2) + (5/(30)^3)$

$= -3.7592 – 0.09733 – 0.00411 + 0.001852$

$= -3.858788$

3- at the 10% significance level:

$CV = -3.4412 – (0.53/30) – (4.5/ (30)^2) + (4/(30)^3)$

$= -3.4412 – 0.0177 – 0.005 + 0.001482$

$= -3.46242$

Appendix 5
Basic Statistics of Causality test

Dependent variable	ΔGDP	Δ X	Δ M	Δ HC
Basic Statistics (Goodness of fit)				
Sigma	0.02107	0.14774	0.07319	0.04105
RSS	0.01377	0.67667	0.16607	0.05224
R^2	0.91469	0.86479	0.82208	0.77455
Diagnostic tests (F-statistics)				
AR	0.3132[0.2845]	0.2944[0.7472]	0.8453[0.4397]	0.3118[0.2848]
ARCH	4.2827[0.0475]*	0.0132[0.9092]	0.3999[0.5321]	2.8787[0.1163]
Normality test: Chi^2	34.044[0.0000]**	23.723[0.0000]**	13.782[0.0010]**	12.5077[0.0030]**
hetero test:	3.3063[0.0124]*	2.3306[0.0555]	0.2604[0.9723]	1.1387[0.3774]
hetero-x test:	4.6744[0.0021]**	4.5976[0.0023]**	0.4937[0.9043]	1.4298[0.2445]
RESET test: (Ramsey regression Specification Error Test)	51.708[0.0000]**	71.516[0.0000]**	5.0882[0.0349]*	13.362[0.0010]**

Appendix 6
The significance of the reduced form coefficients

The reduced form coefficient	t-statistics
For $_g$GDP equation	
Π_{10} (constant)	-2.694
Π_{11} (TOT)	2.642
Π_{12} (TPGDP)	2.349
Π_{13} (Xduty)	-2.490
Π_{14} (TPTAR)	-2.359
Π_{15} (FDI)	-8.129
Π_{16} (TARIFF)	2.246
Π_{17} ($_g$LAB)	2.526
Π_{18} (Sch)	3.570
For gEXP equation	
Π_{20} (constant)	-2.398
Π_{21} (TOT)	2.365
Π_{22} (TPGDP)	2.354
Π_{23} (Xduty)	-3.980
Π_{24} (TPTAR)	-2.942
Π_{25} (FDI)	-7.107
Π_{26} (TARIFF)	2.305
Π_{27} ($_g$LAB)	2.621
Π_{28} (Sch)	2.207

Appendix 7
Trading Partners of the Panel Countries (Export partners)

Based on the World Fact Book (2008), the trading partners (for both TRGDP and TPTAR variables of empirical work) of the selected countries are as follows:

For Low-income countries:

Angola: US 34.8%, China 32%, France 6.4%, Taiwan 6.1% (2006)

Ethiopia: Germany 8.3%, Saudi Arabia 7.1%, US 7%, Djibouti 6.7%, Italy 6.5%, China 6.4%, Japan 5.9%, Netherlands 4.8% (2006)

Kenya: Uganda 16.9%, UK 9.7%, Tanzania 8.2%, Netherlands 8.1%, US 6.4%, Pakistan 5.2% (2006)

Madagascar: France 31.9%, US 26.7%, Germany 6.1%, UK 4.9%, Italy 4.4% (2006)

Malawi: South Africa 12.4%, Germany 12%, Egypt 9.4%, Zimbabwe 8.3%, US 7.5%, Russia 4.7%, Netherlands 4.5% (2006)

Mozambique: Italy 19.6%, Belgium 18.6%, South Africa 16.5%, Spain 12.6%, China 4.1% (2006)

Tanzania: China 9.6%, India 9.2%, Netherlands 6.1%, Germany 6%, UAE 4.6% (2006)

Uganda: Netherlands 10.1%, Belgium 9.7%, Germany 7.9%, France 7.2%, Rwanda 5.6% (2006)

Zambia: Switzerland 34.1%, South Africa 20.4%, China 8.4%, Tanzania 6%, Italy 5.6%, Thailand 4.7% (2006)

Zimbabwe: South Africa 16.4%, Democratic Republic of the Congo 11.6%, Japan 11.5%, Botswana 10.4%, Netherlands 7.4%, China 6.9%, Italy 5.8% (2006)

For Middle-income countries:

Algeria: US 29.4%, Italy 13.8%, Spain 9.6%, Canada 8.2%, France 7.4%, Netherlands 5%, Brazil 4.2% (2006)

Iran: Japan 14.2%, China 14%, Turkey 7.4%, Italy 6.4%, South Korea 6.3%, South Africa 4% (2006)

Jordan: US 22.4%, Iraq 12.9%, India 8.3%, UAE 7.8%, Saudi Arabia 7.5%, Syria 4.9% (2006)

Malaysia: US 15.6%, Singapore 14.6%, Japan 9.1%, China 8.8%, Thailand 5%, Hong Kong 4.6% (2006)

Mauritius: UK 28.4%, UAE 14.2%, France 13.2%, US 7.9%, Madagascar 5.7%, Italy 4.4%, Belgium 4% (2006)

Morocco: Spain 21.2%, France 19%, UK 4.9%, Italy 4.9%, India 4.2% (2006)

Swaziland: South Africa 59.7%, EU 8.8%, US 8.8%, Mozambique 6.2% (2006)

Thailand: US 12.6%, Japan 11.9%, China 9.7%, Singapore 6.3%, Hong Kong 5.7%, Malaysia 5.1% (2006)

Tunisia: France 30.7%, Italy 20.6%, Germany 8.4%, Spain 5.4%, Libya 5.1% (2006)

Turkey: Germany 11.2%, UK 8.1%, Italy 7%, France 5.6%, Russia 4.4%, Spain 4.3% (2006)

Sources: CIA, 2008, The World Fact Book, Washington, D.C, The Central Intelligence Agency.

Appendix 8
Panel Unit Root Tests

To improve the power of the unit root tests compared to those applied to single time series, the augmented Dickey-Fuller (ADF) test for stationarity has been extended to panel unit root tests. These are more powerful, since they combine information from time series as well as cross-sectional data, under various degrees of heterogeneity models such as Levin and Lin (1992) (LL) and Im, Pesaran and Shin (1997, 1998, 2003) (IPS). According to Luintel (2000, 170), IPS tests are more powerful than the widely applied LL as they have many features which are: (1) they allow for heterogeneity of the dynamics and error variances across groups; (2) even if errors in different regressions contain common time specific components, the tests of IPS (LM-bar and t-bar) based on cross-sectional regressions are valid; (3) these tests are consistent under a general class of fixed alternatives that allows for a fraction of individual groups to have a unit root and this is more general than the alternative hypothesis of stationarity across all groups which is tested under (LL) and (4) these tests have better small sample properties since their asymptotic validity only requires N/T→k where k is any finite positive constant when both N (cross-section) and T (time periods) tend to infinity compared to the more stringent condition, N/T→0, needed for the LL test.

The logic beyond the popular use of IPS is that it allows, for all panel members, for heterogeneity in the dynamics of the autoregressive coefficients. It is reasonable to allow for such heterogeneity in choosing the lag length in ADF tests. Moreover, in the case where cross-country data is used, slope heterogeneity is more reasonable. This heterogeneity arises resulting from the differences in the degree of development and economic conditions of each country. IPS begins by specifying ADF regression for each cross section (country) as follows:

$$\Delta y_{i,t} = \alpha_i + \beta_i y_{i,t-1} + \Sigma^{pi}_{j=1} \gamma_{i,j} \Delta y_{i,t-j} + \varepsilon_{i,t}$$

where,

$y_{i,t}$ (i=1,2,…..,N; t = 1,2,……, T) is the series for panel member (country) i over period t,

p_i is the number of lags in the ADF regression, both β_i and the lag order γ are allowed to vary across sections(countries), Δ is the first order difference operator, and $\varepsilon_{i,t}$ are the error terms which are assumed to be independently and normally distributed random variables for each i and t with zero means and finite variances σ^2_i. The IPS evaluates the null hypothesis as H_0:$\beta_i = 0$ for all i where each series in the panel contains a unit root against the alternative that all series are stationary, H_1: $\beta_i < 0$ for all i, in IPS, the alternative may be that at least one of the individual series in the panel is stationary. The null hypothesis is tested with t statistics, constructed from the average ADF t-statistics. This statistic can be converted into a standard normal statistic called the $\psi_{t'}$ statistic. Two methods of unit root tests were proposed by IPS: t-bar and LM bar statistics. The t-bar statistic is simply defined as the average of the individual Dickey-Fuller τ statistics:

$$\bar{t} = \frac{1}{N}\sum_{i=1}^{N}\tau_i \quad , \qquad \tau_i = \frac{\hat{\beta}_i}{\hat{\sigma}_{\hat{\beta}_i}}$$

IPS propose the use of the standardised t-bar statistic when assuming that the cross-sections are independent as follows:

$$\Psi_{\bar{t}} = \frac{\sqrt{N}\left\{\bar{t}_{iT}(p_i,\rho_i) - \frac{1}{N}\sum_{i=1}^{N} E\left[t_{iT}(p_i,0)\right]\Big|\beta_i = 0\right\}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N}\operatorname{var}\left\{\left[t_{iT}(p_i,0)\right]\right\}\Big|\beta_i = 0}}$$

For the alternative method, the method LM-bar statistic, for series i, is defined as :

$$LM_i = \frac{T\Delta y_i' P_i \Delta y_i}{\Delta y_i' M_i \Delta y_i}$$

where, $M_i = I - Q_i(Q_i'Q_i)^{-1}Q_i'$,

$$P_i = M_i y_{i,-1}(y_{i,-1}' M_i y_{i,-1})^{-1} y_{i,-1}' M_i,$$

$Q_i = (c, t, \Delta y_{i,-1}, \ldots\ldots\ldots, \Delta y_{i,p_i})$, c is a vector of ones, t is the time trend, $\Delta y_i = (\Delta y_{i1}, \Delta y_{i2}, \ldots\ldots\ldots, \Delta y_{iT})$ and $y_{i,-1} = (y_{i0}, y_{i1}, \ldots\ldots\ldots, y_{i,T-1})$.

IPS proposes to base the test on the standardised cross-section average $L\overline{M}$ of the individual LM statistic as follows:

$$\Psi_{\overline{LM}} = \frac{\sqrt{N}\left\{ L\overline{M}_{iT}\left(p_i, \rho_i\right) - \frac{1}{N}\sum_{i=1}^{N} E\left[LM_{iT}\left(p_i, 0\right)\right] \middle| \beta_i = 0 \right\}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N} \operatorname{var}\left\{\left[LM_{iT}\left(p_i, 0\right)\right]\right\} \middle| \beta_i = 0}}$$

where i= 1,2,……….N (number of countries), N is the number of panels, $\bar{t}_{iT}(p_i, \rho_i)$ is the average of the ADF test for each series across the panel. Values for $E(t_{iT})$, var (t_{iT}), $E(LM_{iT})$ and var (LM_{iT}) are tabulated by IPS obtained from Monte Carlo simulations (for more details, see Luintel, 2000).

Appendix 9
Hausman, Sargan, and White tests and results

Let us first demonstrate the tests

Hausman's specification test:

The purpose of the Hausman test is to test for model mis-specification where we are testing the null hypothesis H_0: our model is correctly specified against the alternative that the model is mis-specified (see Gelbach, 2005 for details). Holly (1982, 749) comments, this test is an interesting general form of specification proposed by Hausman. In the model procedure, we can use Hausman's specification test to determine if it is necessary to use an instrumental variables method, as in our study, rather than a more efficient OLS estimation. Also, we can use this test to compare two stage least square (2SLS) with three stage least square (3SLS), used to estimate our simultaneous equation model, for a class of estimators for which 3SLS is asymptotically efficient.

We used Hausman's test to determine whether to use fixed or random effects models when applying panel analysis. Hausman's test is used as a kind of Wald χ^2 test with k-1 freedom degrees where k is the number of regressors. The fixed effects model (least squares dummy variable model) refers to a type of panel model which has constant slopes but different intercepts according to the cross-sectional (group) country; however, it may or may not differ over time. There is another type of fixed effects model where intercepts differ according to time. In this case, the model might have autocorrelation owing to time-lagged temporal effects, despite there being no significant country differences. The residuals may have autocorrelation in the process and so, the variables are homogenous across countries. Another fixed effects panel model is where slope coefficients are constant, but the intercept varies over country as well as time. There is a fixed effects model that has differential intercepts and slopes according to the country and the final kind indicates that both intercepts and slopes vary according to country and time. The random effects model, according to Greene (2003), is a regression with a constant term.

One way to handle the ignorance of error is to assume that the intercept is a random outcome variable which is a function of a mean value plus a random error. Random error is heterogeneity specific to a cross-sectional country but constant over time. Because of the separate cross-sectional error term; these models are called one way random effects models. However, if the random effects model depends on the cross-section and the time series within it, the error components (variance components), we refer to the model as a two-way random effects model. In this case the error term should be uncorrelated with the time series components and the cross-sectional country error.

The Hausman test has faced many criticisms; the first is that when a Hausman test rejects, we know only that the model is mis-specified, but we do not know why. Gelbach (2005), however, defended the Hausman test, arguing that it can be quite informative, in the sense that it tells us when the model is not justified; the fact that this knowledge does not always suggest a better approach is not the fault of the test. Another criticism is that the Hausman test makes the null correct specification. So before we reject the correct specification, we insist on very powerful evidence, whereas we usually start with the assumption that a parameter equals zero, insisting on powerful evidence before we drop that assumption (Gelbach, 2005, 5). A reasonable question appears, why should it be assumed that our model is correctly specified without some theory-based reasons?

Sargan test:

The Sargan test is defined as a test of validity of instrumental variables. It is a test of the overidentifying restrictions. The hypothesis being tested with the Sargan test is that the instrumental variables are uncorrelated to some set of residuals, and therefore they are acceptable to be used in estimation (see Sargan, 1958 for more details). The statistic is asymptotically distributed (chi-squared) if the null hypothesis is true. According to Dahlberg et al. (2008), the Sargan test, for over-identifying restrictions, has become the standard one to use. The Sargan test is only possible if we have more instruments than we have potentially endogenous vaiables. It can be carried out by regressing the residuals on all exogenous variables and then we obtain the R^2. The test statistic is

S = nR^2, where n is the number of observations under the null hypothesis that all instruments are exogenous. S is distributed as $\chi^2_{i.e}$ where i is the number of instruments and e is the number of endogenous variables.

White's test:

White's test, a test for heteroscedasticity, is a test used in statistics as well as econometrics to establish whether the residual variance of a variable in a regression model is constant, i.e. homoscedasticity exists (see White, 1980 for more details). This constant variance can be tested by regressing the squared residuals from a regression model onto the regressors, the cross-products of the regressors and the squared regressors, then inspecting R^2. We can use a GARCH model if homoscedasticity is rejected. There is one way to correct for heteroscedasticity is to compute the weighted least squares estimator using a hypothesised specification (one of the regressors or its square) for the variance.

The results of Hausman's, Sargan's, and White's tests for our model are:

	$_g$GDP equation	$_g$EXP equation
Hausman test		
Full sample(low-middle income)	1.87	1.62
Middle-income	1.65	1.47
Low-income	1.37	1.58
Sargan test		
Full sample(low-middle income)	0.07	0.03
Middle-income	0.01	0.14
Low-income	0.002	0.016
White test		
Full sample(low-middle income)	17.6	14.3
Middle-income	15.4	17.5
Low-income	18.3	21.1

Notes: 1- Hausman test is the Hausman F-statistic to test for model misspecification.

2- Sargan test tests the validity of the instruments based on the F-statistic.

Appendix 10
Panel countries

Our panel includes twenty countries classified into ten low-income and ten middle-income. This is because, taking the income of rural areas in Egypt which is less than$1000, Egypt is classified as a low-middle income country. These sample countries are divided into middle- and low-income groups based on their real per capita income (as an average during the late of 1990s and the 2000s for each country). The first group represents the low income countries, which are selected based on their membership in the COMESA with Egypt. Let us introduce COMESA before we highlight the trade reforms policy for liberalisation in these countries. The Common Market for East and South Africa (COMESA), the third direction, after European and Arabic directions, for the regional agreements of Egypt is connected to Africa. COMESA, as a free trade area, includes 22 countries, namely, Angola, Botswana, Burundi, the Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe, besides Egypt. Egypt was admitted to membership in COMESA in June 1998, representing the only Middle East/North Africa (MENA region) nation joining COMESA. According to the final report on Egypt's strategy for economic integration (1998, 53), COMESA established a preferential trade area involving trade liberalisation through tariff reduction and customs duties leading to a customs union with a common external tariff by 2004 for dealing with third party trading, establishment of rules-of-origin to determine the eligibility of products for internal tariff preferences, adoption of common tariff classification and valuation methods and simplification and harmonisation of customs procedures and documentation. Egypt has another free trade agreement in Africa with the Economic and Monetary Union of West Africa (EMUWA).

Trade reforms policy for the selected countries

We can confirm that the features of the trade reforms of the African countries are almost the same. The key feature of the most trade policy reforms in Africa is that trade reforms are an integral part of macroeconomic and structural reforms, often supported by multilateral institutions like the IMF and the World Bank (for more details see Santos-Paulino, 2000). The main reason for adopting trade liberalisation by many African countries is access to external finance and the imposition of structural adjustment programmes. It is obvious that due to the different economic, social and political contexts, the experiences of trade liberalisation vary from one country to another. The low-income countries selected are:

Angola
Ethiopia
Kenya
Madagascar
Malawi
Mozambique
Tanzania
Uganda
Zambia
Zimbabwe

1- Angola:

Angola, a lage, resource-rich, least developed country (LDC), has made a great strides in fostering growth and stabilising its economy by achieving significant progress in economic and trade policy reforms since the end of the 30-year civil war in 2002 (WTO, 2006). Angola tries to give trade central role in its development strategy. While trade liberalisation is viewed as a means to secure the foundations for sustainable economic growth and support the ongoing reform programme aimed at reducing poverty, at least in the short to medium term, the government regards substitution as a necessary stage in promoting reconstruction of its agriculture and industry. It tries to revitalise the non-oil sectors of the economy and avoid inward-looking trade policies as a long term solution. Angola's dominant export product is oil, facing few barriers (weighted average applied tariff of 0.3 percent with the rest of the world and an average tariff of zero in the agricultural sector (since it exports no agricultural products). MFN duty-free exports constitute over half of all exports. Non oil exports benefit from Generalised System of Preferences (GSP) schemes with a number of industrialised countries. The customs tariff is Angola's main trade policy instrument. Both Angola's 2007 MFN applied simple (7.3 percent) and import-weighted (6.4 percent) tariff averages are much lower than average for a Sub-Saharan Africa or lower-middle income country, at 30 percent maximum MFN tariff rate. Angola has six tariff bands ranging from 2 to 30 percent, but no duty-free lines. Moreover, Angola does not implement any quantiative restrictions on its imports. In 2007, for agriculture tariff escalation was relatively low at 3.1 percent and for manufactures it was, unlike most countries in the region, negative (-5.3 percent) (WTO, 2008). Mostly due to export growth, Angola's real growth in total trade of goods and services accelerated from an average of -0.6 percent per year in the early 2000s to 18.4 percent in 2007 representing Angola's 17.5 percent growth in world trade share (this share in high income OECD is 2.4 percent). Angola is an original member of the WTO, Southern African Development Community (SADC), COMESA, and the Economic Community of Central African States (ECCAS). Plans to join the interim Economic Partnership Agreement (EPA) with EU, the African Caribbean and Pacific group States (ACP), and the Community of Portuguese-Language Countries (CPL) are being considered.

2- Ethiopia:

Ethiopia, a LDC, designed and implemented its policy reforms in the context of the globalisation process. These reforms aimed at enhancing Ethiopia's integration to the global economy. This integration is through increased openness as envisaged by major donors and international agreements of the WTO. It is assumed that the openness process provides Ethiopia with opportunities to be exploited. To be cconsistent with structural adjustment policies of the World Bank and IMF, far-reaching reforms began in 1992, including trade liberalisation as one of the key components of policy reforms in Ethiopia (Fekadu, 2007). The main characteristic of trade liberalisation is export oriented and outward looking policies. Ethiopia's development strategy is labelled as an "export led development strategy" (FDRE, 2002). This attitude of export orientation is to increase foreign currency, productivity, and consequently promote growth reducing poverty. The trade liberalisation ways by which Ethiopia stimulates economic growth are developing the private sector and reiforcing competitiveness among private investors, implementing trade rules compatible with those of the WTO and, as stated, supporting processes of regional integration. Also, trade liberalisation creates opportunities for expanding markets and scale economies. Ethiopia's trade liberalisation restructured the economy by reducing tariff and non-tariff barriers. According to Firemarkos (2005), Ethiopia's average import tariff and average agricultural tariff are fixed at 17.5 and 15.5 percent, respectively making Ethiopia one of the most liberal traders in the world. To take advantage of mulltilateral trade liberalisation and special and differential treatment (SDT), Ethiopia requires domestic capacity and marketing skills.

3- Kenya:

As in most of the African countries, the World Bank and IMF have been key players during Kenya's episodes of trade policy reforms. Many internal and external factors have shaped trade reforms in Kenya in the context of multilateral and regional negotiations taking place under the current framework of the WTO. Kenyan development policies and strategies are represented in a range of documents, including the national development plans, national export strategy, national poverty eradication, poverty reduction strategy paper, and the economic recovery strategy paper. Kenya gave special attention to trade in its poverty reduction strategy paper and economic recovery strategy for wealth and employment creation. The main assumption for trade policy is that increased trade openness will drive improved resource allocation efficiency, supporting faster economic growth and consequently Kenya's major goal which is poverty reduction.There is an awareness of the need to participate in the international trading system in terms of its effect on the poor. Kenya's commitments under bilateral, regional, and multilateral trade strongly influence the formulation of trade policy. Kenya has joined the East African Community (EAC). Also, it is a member of COMESA whose main objective is to form a free trade area. Its exports to COMESA grew by 7.7% in 2002. Benefiting from having land-locked neighbours, its key COMESA trading partners are fellow EAC member states: Uganda and Tanzania. Kenya has used duty exemptions/drawback schemes. It is argued that effective trade policy of Kenya should rely on inputs by specialists with technical knowledge in trade analysis, international and trade laws (see IDS, 2007 for details)

4- Madagascar:

Since the beginning of 1987, Madagascar has begun to implement far-reaching changes in its long-standing socialist economic policy. A least developed country, Madagascar, at the request of the World Bank and the IMF has made these changes to achieve a more liberalised economy. Since 1996, Madagascar has intensified its economic reform efforts and its rate of growth has increased more than 5 percent in the 2000s (it was less than 2 perecent in 1995). Increased trade liberalisation undertaken since 1996 contributes greatly to this growth. Services trade is particularly important, representing 57 percent of GDP in 2006. Madagascar has abolished licensing and prior authorization and importers are able to obtain foreign currency freely. Tariff structure was simplified into four bands in 1999 when the average tariff rate was reduced by two percent. The valuation method based on the transaction value for imports was used in Madagascar in 2000. In 2001, Madagascar made further progress with the liberalisation of its trade regime. Since 2001, Madagascar has eliminated many import taxes and simplified, reduced and bound tariffs. In 2005, other import taxes collected at the custom cordon were eliminated. In 2008, all Malagasy tariff rates are *ad valorem,* with the exception of petroleum products, and the simple average rate is 13%, 3 points lower than in 2000. Exports benefit from the zero rate VAT regime, which gives entitlement to the refund of the duties and taxes levied on the inputs used to produce them. Overall, the main objective of Madagascar's trade policy is to contribute to poverty reduction by allowing the commerical and private sectors to be the driving force in economic growth. However, its participation in the multilateral trading system remains limited.

5- Malawi:

It represents one of the members of COMESA. Under the influence of three structural adjustment loans from the IMF, a foreign trade promotion policy in the period 1981-1999 was implemented by Malawi to liberalise imports. Import liberalisation occurs through tariff reduction, reduction of duty rates and removal of import licensing (non-tariff barriers). Malawi concentrated, in its reforms, on reduction of import duties. The objective of the trade reform of Malawi of imports liberalisation is to promote efficiency and expand exports. Santos-Paulino (2000) suggests that Malawi will be deprived from fully experiencing the expected dynamic benefits from economic liberalisation due to the lack of a competitive environment and inappropriate laws of trade and investments. Malawi's incentives for exports are adopting export promotion as development strategy, facilitating export financing, adjusting the exchange rate from one period to another and reducing export licensing.

6- Mozambique:

Mozambique, a least developed country, implemented a trade liberalisation regime integrated with economic reform programmes in the late 1980s, making Mozambique one of the more open countries in the world. These economic reforms have focused on macroeconomic stabilisation supported by international financial institutions (IMF, 2008). Mozambique's economic reforms seek to create an attractive commercial environment, to govern trade and trade-related issues and to provide incentives for inward investment. The signs of success of these reforms appeared after the end of the civil war in 1992. The reforms have significantly liberalised the trade regime, based on tariffs, of Mozambique. The tariff rates of Mozambique, currently, range from 0 to 30%. By simplifying the structure of its customs duties, the simple average applied MFN tariff of Mozambique is 13.8%, among the lowest import duties in Southern Africa. The outcomes of trade have been significant, particularly in the early 2000s. Following market oriented reforms; Mozambique has witnessed strong growth in trade averaging, in the early 2000s, 29.5 percent. As a result, the trade integration ratio (share of GDP) of Mozambique is doubled from an average of 48% in 1995-99 to 96% in 2007 (IMF, 2008). The main trading partners are South Africa, the European Union, Japan, and Zimbabwe.

The exports of Mozambique are mainly agricultural commodities, as its economy is dependent on agriculture which is more than two fifths of GDP. The major imported products are transportation equipment, machinery and mineral products. Regarding the agreements to integrate with the world, we find that external trade policies are designed to create an environment to promote Mozambique's products in international markets, especially those of developed countries of Europe, America and

Asia, without any prejudice to the promotion of intra-African trade. These trade policies are coupled with speeding up Mozambique's industrialisation process. In pursuing these objectives, Mozambique is a signatory of the WTO, World Bank, IMF, Lome Convention, SADC, COMESA, GSP, IOR-ARC (Indian Ocean Rims Association for Regional Cooperation), AGOA (African Growth and Opportunity Act), and trade preferential agreement with South Africa. It is notable that Mozambique's GDP growth has been among the highest in the world since 1996, 10% a year. However, Mozambique is still one of the world's least developed countries, with GDP per capita (average) US$ 210 since 1998. Our classification is based on GDP per capita, not GDP growth. As one of the most heavily indebted countries in the world, whose large debt burden has been an obstacle to economic development, Mozambique still needs continued reform to improve its international competitiveness (WTO, 2007).

7- Tanzania:

Tanzania, a least developed country and a member of COMESA, followed a socialist model of economic development from independence in 1961. Since 1985, Tanzania has implemented a series of economic reforms. Tanzania, by means of the trade policy reforms adopted during the 1990s, has moved away from a centrally planned to a market-determined and private-sector-led economic development with limited government intervention (Kweka, 2006). These reforms led to a more open trade regime. Tanzania limited its export restrictions and foreign exchange controls. Tanzania participates in the Integrated Framework (IF) for trade-related technical assistance to LDCs from the WTO and pursues a regional integration strategy. It is a signatory of the COMESA, SADC, and the East African Cooperation (EAC) with Kenya and Uganda. The gradual recovery in Tanzania's exports led to a steady relaxation of foreign exchange constaints and facilitated the liberalisation of imports. Tanzania's reform of customs duties resulted in a simplified five-tier structure with a simple average of applied import duties of 16.2%. Today, the central objective of development strategy of Tanzania is reducing the import tax burden with further improvement in export incentives and increased allocative efficiency to achieve further trade liberalisation.

8- Uganda:

Uganda is a land locked country. As a result, trnsport costs represent a major part of Uganda's exports. Uganda's access to and from seaports depends on Kenya and Tanzania. Uganda is privileged to be in the EAC and COMESA. The effective burden of exporters due to costs of overland transportation is high. Over the last decades, Uganda initiated trade policy reforms aiming at reducing the anti-export bias associated with policies of protection, inducing resource allocation into the export sector and improving trade performance. As a result, export earnings have increased and the composition of commodity exports (coffee, cotton, tea, and tobacco) has changed, falling from 86 percent in 1992 to 38 percent in 2003. The major trading partner, as with almost all African countries, is the EU. According to Rudaheranwa (2005) , the trade position of Uganda tends to be eroded by many factors, including the slow of world demand growth for agricultural products and raw materials (the main exports of Uganda) and the developing of substitutes for the commodity produced. Costs of transportation for export represent a major impediment to exports of Uganda.

9- Zambia:

This less developed country is described as a land-locked country. It has undergone by two liberalisation periods. The first one was from 1983 to 1987 when the new economic reform programme was announced. The suspension of financial relations with the IMF represented one of the most dramatic measures affecting the trade regime and the reforms undertaken in the previous period. The second liberalisation period was from 1989 onwards. According to Musonda and Adam (1999), import liberalisation, represented in reducing tariff and administrative barriers, and the stimulation of the non traditional export sector were the main measures undertaken. To apply the reforms, Zambia decontrolled prices, privatised many state companies and abolished exchange rate controls. Regarding free trade agreements, Zambia is affiliated to the Southern African Development Community (SADC) besides COMESA and the General Agreement of Trade in Services (GATS). Zambia was pressed to renew negotiations with the IMF and the World Bank group, and a new reform programme was introduced in which the liberalisation policies consisted of the re-establishment of the measures implemented in the first liberalisation period (Santos-Paulino, 2000, 8). The export incentives of Zambia are a liberalised export retention scheme, promotion of non-traditional exports and reformation of the duty drawback scheme to premit drawback as a credit against import tax liabilities. Zambia's Value Added Tax (VAT) is zero-rated.

10- Zimbabwe:

Zimbabwe is one of the last Sub-Saharan Africa countries to embark a trade liberalisation. Trade policies of Zimbabwe made up a large part of policy in the nineties. These policies contributed significantly to changes in growth, employment and ownership of resources (Chitiga, 2004). The Unilateral Declaration of Independence (UDI) in 1965 and independence in 1980 made Zimbabwe relatively isolated from the rest of the world. International sanctions against Zimbabwe reduced the earnings of exports and made imports more expensive. As a result, import-substitution industrialisation (ISI) was adopted as a strategy of development. In the post independence period, both the private sector and the public sectors had deficits. In most of the eighties, the Zimbabwean government followed a system of tight import controls as a result of foreign currency shortages. By the end of eighties, pressure from Breton Woods institutions forced Zimbabwe to open up trade. The Economic Structural Adjustment Programme (ESAP) introduced in 1991 was aimed at restoring macroeconomic stability through reduced government expenditure, trade liberalisation, and deregulation. This programme changed the strategy of development from ISI to a liberalised export oriented industrial development strategy.

According to Chitiga (2004), the trade liberalisation policies implemented within the ESAP introduced an export retention scheme as well as open general import licence. The programme introduced an export support facility for those with no export retention scheme. An import processing rebate scheme was introduced in 1992. In that year, export subsidies were removed and the Zimbabwe dollar devalued by 20%, which became 17% in 1994. At the beginning of 1994, export schemes were abolished and at the end of the same year import surtax was reduced to 10%. A new tariff regime was introduced in 1997 and the squeeze on Zimbabwe controlled excgange rate. Surtax on almost all imports was increased from 10% to 15% by 1999. In 2000, some tariff lines and some maximum tariff rates were reduced but in March 2001, the government raised tariffs on certain processed items having domestically produced substitutes, such as foods. There are a few non-tariff barriers in the agricultural sector. The trade policy of Zimbabwe is linked to exports to Zambia, South Africa, Malawi, and Botswana, the members of SADC. Currently, the European Union has 40 percent of the Zombabwean exports; South Africa has 20 percent and the rest of the exports for the African countries of COMESA and SADC.

The second group is the middle-income countries, selected from all over the world:

Algeria
Iran
Jordan
Malaysia
Mauritius
Morocco
Swaziland
Thailand
Tunisia
Turkey

1- Algeria:

Algeria, the largest country of the Mediterranean sea, is among the biggest EU trading partners in the Mediterranean region and member of the Euromed partnership. It successfully completed its fund-supported adjustment and reform programmes in 1998. Algeria's financial and economic indicators improved during the mid-1990s, in part because of policy reforms supported by IMF and debt rescheduling from the Paris club. The increase in oil prices and the light fiscal policy of the Algarian government resulted in a trade surplus in early 2000s. The trade administration system in Algeria is mainly regulated by the customs law, the trade law, and the trademark law. Despite the continuous progress in trade liberalisation and the attitude of Algeria to pursue a free trade policy in import administration, a temporary additional duty, according to the 2001 complementary Finance Act, is imposed on nearly 500 import items to protect domestic industry. The average tariff rate of Algeria is 18.7%. High rates of 30% are applied to food, beverages, tobacco, and consumer goods. Currently, Algerian customs continue to apply three levels of basic tariff rates which are 5% levied on all raw materials, pharmaceuticals and equipment for investment; a 15% rate is on semifinished products, dried vegetables and low emission cars, and a 30% rate on finished products.

In 2006, some adjustments to tariffs on certain products were made when Algeria lowered the tariff on computer hardware and software products. Also, at a level of US$ 209 per ton, tariffs on imported petrol, lubricate and other refined oil were imposed. Regarding exports, Algeria took a series of measures to encourage the exportation of non petroleum and non gas production to diversify exports and to change the situation of reliance on petroleum and natural gas products exports. To encourage exportation, in general, Algeria simplified registration procedure for business enterprises. In 2006, Algeria strengthened efforts to better serve business enterprices, crack down on informal markets and protect the rights and interests of consumers, which are considered as the major tasks in foreign trade. The external position of Algeria continues to strengthen where the current account surplus rises sharply due to booming hydrocarbon exports. Official reserves have increased to US$ 30.4 billion (22 months of imports) (IMF, 2007).

2- Iran:

Iran has the potential of being the world's 20th strongest economy (Khajehpour, 2007). This is due to its rich reserves of hydrocarbons as well as other natural resources, alongside the country's geo-strategic position. Since the 1979 revolution, the first policy document declared outward orientation as one of the objectives of the third five-year plan, moving away from inward oriented economic structure, that is, to integrate with the rest of the world. The Hydrocarbons sector is the main source of government revenue and foreign exchange. Export earnings, which have been doubled, in recent years, since 2004, due to the high prices of oil, have enabled Iran to amass nearly US$ 65 billion in foreign exchange reserves. Iran committed itself to the use of market mechanisms as a means of regulating foreign trade with the passage of the law of the Third Five Year Development Plan in April 2000 (article 115) (Jensen and Tarr, 2003). Iran started its reform process from a highly distorted trade and exchange rate regime represented in non-tariff barriers on all products, a dual exchange rate system, and highly subsidised petroleum product prices; domestic energy product subsidies of about 90%. Despite Iran's low tariff rates, its non tariff barriers in the form of import licences restrained imports of all goods. A dual exchange rate system prevailed in which the black market rate was more than four times the official rate. Reforms have been proposed and implemented in all these areas. Iran plans to eliminate non tariff barriers to foreign trade and substitute tariff barriers at their equivalent level.

3- Jordan:

The economic policy strategy adopted by Jordan was inward oriented depending on import substitution facilitated by high tariffs. Since 1989, Jordan has changed its strategy to an outward oriented are to stimulate exports. Jordan cut import tariffs and removed several import quotas, and reduced fisical deficit. During the 1990s, Jordan had undertook significant economic reforms and continued to pass economic reform legislation (Chomo, 2004). In 1995, Jordan passed a new sales tax law, to compensate the government revenues lost under trade liberalisation policies by expanding the tax base and increasing tax rates. To provide incentives encouraging capital inflows for inductrialisation to Jordan's capital scarce economy, an investment promotion law was passed in 1995. Other reforms were prepared to improve transparency, market efficiency and the business climate.

These reforms are: the insurance law, the mutual funds and trust law, the secured financing and leasing law, the safeguard law, the competition (antitrust) law, the companies law, the customs law, and intellectual property rights legislation (Chomo, 2004). All of these laws aim at enabling Jordan to capture welfare gains from multilateral and bilateral trade liberalisation. Jordan has bilateral trade liberalisation agreements are with U.S.A and EU, and multilateral agreements with the WTO. Jordan has, also, a regional free trade area with Egypt, Morocco, and Tunisia. Jordan aims by slashing tariffs to provide a suitable environment for foreign direct investment to inflow to Jordan. Jordan has loosened some of its chocking domestic controls as well. According to the

WTO, Jordan is one of countries which enjoy Most Favoured Nation (MFN) status and national treatment for exports in the markets of the WTO members. The small domestic market and the lack of investment capital may slow the economic development process in Jordan.

4- Malaysia:

Malaysia's economy represents one of the most important economies opened to trade and foreign investment. The experience of Malaysia, a trading nation, in economic development is considered as one of the most successful development experiences among the developing countries, achieving about 9 percent growth rates in the 1970 and early 1980s. Even during the Asian financial crisis of 1997, strong export growth helped Malaysia rebound from this crisis (WTO, 2002a). Rapid export orientation was the hallmark of industrial transformation in Malaysia. By the mid-1990s, Malaysia had become the sixth largest exporter of manufactured goods, 80 percent of total exports, among the developing countries after the gang of four; South Korea, Taiwan, Hong Kong and Singapore, and China. It is noted that Malaysia, like many other developing countries, adopted import substitution industrialisation (ISI) as its development strategy in the 1950s and 1960s (Alavi, 1996). However, the policy makers in Malaysia never resorted to non-tariff protection and direct government involvement in manufacturing through setting up of public sector enterprises as means of promoting industrialisation.

The tariff represents the main border measure on imports. Malaysia started to reduce tariffs between 1988 and 1992, especially on food, clothing, household goods, electrial and electronic goods. Its tariff average is low (about 14 percent) and it has a liberal exchange system. Tariffs account for 5.8% of total tax revenues. Outflows of funds have limited restrictions; however funds' inflows are completely free. Malaysia's exports incentives are represented in a duty drawbacks scheme, and tariff concessions for raw materials and components used in manufacturing (Santos-Paulino, 2000). Export taxes and subsidies, and export duties in the early 2000s contributed about 2% of tax revenues. There are no export duties on manufactured products. Manufactured exports are assisted through import tariff concessions, tax exceptions, export credit, export insurance and export credit guarantees, export promotion and marketing assistance. Malaysia is a member of the association of South East Asian Nations (ASEAN).

5- Mauritius:

Mauritius, a sovereign democratic state, has undertaken reforms aiming at liberalising its trade regime and boosting competitiveness. Trade policies, which are outward oriented, in Mauritius, are mainly an integral part of economic policies aiming at improving living standards, securing full employment and further openning up the economy. According to the WTO Secretariat report about the trade policies and practices of Mauritius, these reforms have provided 5.1% real GDP growth on average per year since 2003 and due to these reforms, Mauritius has been able to diversify its economy away from sugar as the only pillar of its economy. The four pillars of Mauritius's economy are now textiles and clothing, tourism, financial services, and sugar.

To move from its partial openness to complete openness, Mauritius, as a small island country, participates in various regional and multilateral trade agreements. Regarding regional agreements, Mauritius, an export-oriented economy with advantages in a few products, sugar, textiles and clothing, is a member of, *inter alia*, COMESA, SADC, the Indian Ocean Commision (IOC), and Regional Integration Facilitation Forum (RIFF). Its participation in these regional agreements has represented a step to full integration into the world economy. Regarding multilateral agreements, Mauritius is an original member of the WTO and is granted MFN treatment. Under these agreements, Mauritius's trade regime includes elimination of non-tariff barriers and harmonised differing customs duty based on source. Mauritius has bound nearly of all its tariff lines. From the second half of the 1990s until now, the international trade of Mauritius has witnessed an increase in the total value of trade (exports and imports) achieving an increase from Rs 61.7 billion in 1995 to an average of Rs 95.8 billion in the 2000s. The average growth of trade for this period was a nominal 9.5%. Presently, Mauritius continues to implement structural reforms with an emphasis on manufactured exports, reducing dependence on sugar and stimulating the service sector. Also, it benefits from preferential tariff treatment granted under the GSP schemes of, *inter alia*, Canada, Japan, New Zealand, Norway, and Switzerland, although the use of these preferences is still limited due to limited production and product converage.

6- Morocco:

According to WTO (1996), pushed by macroeconomic crises and balance of payment difficulties, Morocco started its trade liberalisation programme reform in 1983-1989 by embarking a series of adjustment programmes and continued to develop the reform process during the period 1990-1994. The trade liberalisation programme was carried out, for Morocco, unilaterally by Morocco over a period of more than 10 years, in the face of economic difficulities. However, under the WTO agreements, Morocco has had the chance to extend its trade liberalisation policy. The objectives of reforms are to reduce import duties, abolish import licensing, and reduce exchange rate policy distortions. According to a WTO Secretariat report on Morocco's trade polices and practices, these reforms have led to some developments, which include a significant push to liberalise service areas, especially banking.

As a member of the WTO, Morocco has undertaken to bind all tariff lines. It is also committed to converting all quantitative measures affecting imports of agricultural products to tariffs. In 1993, tariff equivalents of between 100 and 365 percent for live animals, meat, dairy products were introduced. In 1995, the simple average tariff across all items was 23.5 percent. Morocco uses incentive instruments for exports, including abolishing the taxes levied on agricultural and mining exports by the 1995 Finance Act, abolishing the export duties except for the hydrocarbons, and operating free trade zones (Santos-Paulino, 2000). Moroccan exports are promoted by means of tariff and tax concessions, especially on goods with a high level of local processing.

7- Thailand:

As one of the East Asian countries, Thailand adopted liberal trade policy from the mid-1980s onwards. Since this period it has moved towards an outward-oriented trade regime. In the second half of the 1980s, Thailand improved its international competitiveness based on the gradual depreciation of the currency (Thai baht) against US$ in both nominal and real terms. This gradual depreciation in the currency results from adoption of a more flexible exchange rate policy in 1984. Thailand's competitiveness in international markets helps to attract more inflow of FDI. The most important foreign direct investors are from Taiwan and Hong Kong. Thailand has adopted a broad reducing regulation and promoting private sector development strategy. To promote exports, Thailand uses export incentives through adoption of tariff reduction programme to reduce tariffs and business taxes on inputs used in exports. Also, processing zones were developed. Export taxes on major agricultural commodities were removed. Marketing and promotion of exports were assisted by the government of Thailand.

8- Tunisia:

Trade reforms in Tunisia started in 1987 and continued to 1996. This reform aimed at promoting exports to improve economic growth and external payments. Also, it aimed at liberalising imports to promote the vitality of domestic production, and consequently strengthen competition to increase economic efficiency. The reform dealt with a number of agricultural products as well. Regarding the trade agreements of Tunisia, we find the most important one is its agreement with Egypt, since Tunisia is a member of the Arab world agreement called the Greater Arab Free Trade Area (GAFTA), which represents the second direction for Egypt. The agreement is a successor to the Common Market for Arab trade and economic integration. GAFTA aims at gradually eliminating all tariff and non tariff barriers over a 10-year, transitional period by 10% annually for agricultural and animal products (primary form or processed), mineral and non-mineral raw materials (primary or processed). GAFTA includes 14 countries including Egypt and the countries which have bilateral trade agreements with Egypt are Lebanon (1999), Syria (1991), Morocco (1999), Tunisia (1999), Libya (1991), Jordan (1998), and Iraq (2001) and the six Gulf Economic Cooperation Council countries (Ministry of Foreign Trade, 2003).

The Arab countries that did not sign are Algeria, Mauritania, and Djibouti. The Arab countries subsequently decided to end the transitional period in 2005 instead of 2007. It is noteworthy that Egypt together with Jordan, Morocco and Tunisia (countries that have also signed the Association Agreement with the EU) have created a free area (Rabat, 1999) which, it is argued, represents a step towards the 2010 target of removing all trade barriers between the two regions (Jordan Times, 2002). Under the commitments of Tunisia with the WTO, telecommunication sector liberalisation played an important role in economic growth expansion. According to Central Bank of Tunisia (1996), the World Bank structural adjustment loan programme resulted in macroeconomic stabilisation and helped in executing privatisation in many sectors, contributing to economic growth expansion as well. To promote exports, Tunisia restructured the centre, reinforced the intervention of the Fund for Promotion of Exports, amended the law on international trade companies to widen the scope of their activities and liberalised and eased the system of export insurance (Santos-Paulino, 2000).

9- Swaziland:

Swaziland, land-locked by South Africa and Mozambique, has an open trade policy. This trade policy is largely determined by its membership in Southern African Customs Union (SACU) and the Southern African Development Community (SADC) to which most of Swaziland’s exports are sent and from which most of its imports orginate.

Swaziland, a middle or more accurately low-middle income country like Egypt, is a member of COMESA. Its development strategy concentrates on an investment strategy developed to focus on export driven investments influencing the national export strategy, which seeks to increase the country's exports, the analysis of trade data, and country advantage. The investment is mainly in the industrial sector and the sugar industry is the lifeblood of the economy as one of the largest employers and export earners. Quality standards replaced non-tariff barriers to trade which were eliminated according to WTO provisions. Swaziland is not overprotective. Its trade biases in favour of SADC which about 74% exports to Swaziland are zero. Under SACU, Swaziland negotiated a free trade agreement with the U.S. and EU as well. There are many arrangements to support imports and exports and many facilitates for trade at the regional and international levels. Regarding export arrangement, we can say that, currently, Swaziland imposes duties or taxes on goods sold for the export market.

Regarding import arrangements, Swaziland imposes import permit restrictions on imported goods covered by import control order No.12/1976 for the protection of local motor or inductries in respect of imported second hand motor vehicles. Imports are duty-free, whether the goods are available or not from local industries. Also, this applies to raw materials and component parts which benefit local textile and motor inductries. To facilitate trade at both the regional and international levels, Swaziland's customs are engaged in SACU and SADC arrengements. Under regional levels, the SACU maintains a free interchange of goods among member-states and applies harmonised tariffs and trade regulations on goods imported from non-member countries. On the other hand, under SADC, the goods that are circulated within the SADC region enjoy a lower duty rate in the importing member-countries than similar goods when orginating from non-member countries. At international level (global trade liberalisation), Swaziland has decided to minimise some of its non-tariff barriers by reducing the scope of its import control order, 1976, to cover importation of the goods as listed in the current import control order (Swaziland Ministry of Finance, 2008).

10- Turkey:

Turkey undertook a major liberalisation of trade policies in the 1980s, turning away from its import-substitution trade policies adopted in the 1970s (Harrison et al., 1993). It adopted a strong export promotion strategy. Trade policies are formulated and implemented by means of laws. Turkish trading system is influenced by two main factors; the first is Turkey's current and future trade relations with the European Union (EU) and the second factor is the WTO agreements. Turkey has amended domestic legislation to reflect both its EU and WTO commitments to guarantee improved and more secure conditions to its trading partners. Foreign trade regulations law no.2976 of 1984, the main legislation relating to international trade, develops and regulates foreign trade including export promotion, as well as the imposition or removal of additional financial obligation on transactions of foreign trade.

Turkey adopted a long-term strategy for the period 2001-2023 to support export-oriented activities, especially of small and medium size enterprises by providing credit, guarantee and insurance mechanisms through the Turk Eximbank. Regarding trade agreements, Turkey participates in several regional trade arrangements; customs union with the EU is its top of priority. It has a free trade agreement with the European Free

Trade Association (EFTA) and it is part of the Euro-Meditrranean partnership which aims at establishing a free trade area in the region by 2010. Also, Turkey participates in the Economic Cooperation Organisation and the Black Sea Economic Cooperation. Its acceeded to membership of the WTO in March 1995. It is worth noting that these agreements may affect negatively on the Turkish trade regime, making it be very complex and difficult to be managed. It is worth, as well, mentioning that Turkey's agricultural trade position is shifting from being a net exporter of agricultural products to a net importer.

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