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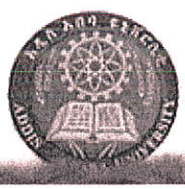

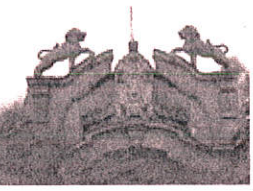

ADDID ABABA UNIVERSITY

SCHOOL OF GRADUTE STUDIES

TRADE LIBERALIZATION AND INDUSTRIAL GROWTH IN ETHIOPIA: A COINTEGRATION ANALYSIS

BY

DEREJE WORKU

A PROJECT SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN APPLIED TRADE POLICY ANALYSIS

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ADDIS ABABA UNIVERSITY

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Trade Liberalization and Industrial Growth in Ethiopia: A Cointegration Analysis

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Abstract

This paper studies the relation between trade policies and economic growth in Ethiopia. The 'human capital model of endogenous growth' developed by Lucas (1988) which takes labor, capital, and education as secondary school enrollment. The Human capital model is augmented with trade liberalization variables of export/GDP and import duty. In the empirical investigation of the aggregate growth function of industrial value added in Ethiopia, cointegration and error correction modeling approaches have been applied to measure the long run and short run determinants of industrial value added.

The data of Ethiopia which covers a period of 1971 to 2005 suggest that there is a long run relationship between the industrial value added and its determinant capital, labor, high school enrollment ratio of ratio of real export to GDP, and import duty collection. The short-term dynamics is also estimated using an error correction model (ECM). The estimate shows that all variables including real capital formation, the labor force, human capital, industrial import tariff and ratio of real exports to GDP have emerged as insignificant determinants of industrial value added function in Ethiopia. The policy implication is government should promote trade liberalization policy.

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CHAPTER ONE

INTRODUCTION

1.1. Back Ground

The Ethiopian economy is one of the poor performing economies in Africa. This is reflected by not only it is highly dependent on the agricultural sector but also the low level of contribution of the industrial and manufacturing sector to the overall level of output, employment, and growth of the country. Recent report of the Ethiopian Economic association (2005) indicate that the agricultural sector employ around 85 % of the population and covers 48% of output, while the industrial sector contribute only 12.7 % of the output of the country.

The Ethiopian Economic Association using the World Bank indicator, 2003 come to the conclusion that the contribution of the industry and particularly that of the manufacturing sector to the national economy is one of the lowest by the Sub-Saharan standard. The Sub-Saharan performance indicate that in the year 2001 the contribution of industry and agriculture to the overall economy was 28% & 16 respectively, while the performance of the industry & agriculture to the Ethiopian national income was 11 & 52% which shows that contribution of industry is not only less than half of the Sub-Saharan countries but also five times less than the contribution of agriculture to the national income.

The average share of agriculture, industry and service in the last years (1999/2000-2004/5) were 48.9, 38.4 and 12.7% respectively. The share of the manufacturing sector, which comprises large and medium scale industries and small-scale industries during similar period, was 5.4, 3.6 & 1.8 percent of the national income. EEA (2004/5:46). This evidence also indicates that the share of the manufacturing industry was also slightly declining from 5.6% in 2002/03 to 5.1% in 2004/2005.

With a change in policy regime, specifically the move to a market based economic management and the reintroduction of the private actors as well as the inclination to privatize some of the earlier nationalized state economies, no significant change in the share of state and private enterprise has been observed. Share of public and private manufacturing firms had been 63.7 & 36.3 percent in 2000/01 now changed only to 58.4 & 41.6% respectively.

In real terms, the average wage per worker in the large and medium scale industry was about of Birr 848 in 2005/6. From 1999/00 to 2004/05 the average rate of productivity per worker declined at a rate of 1.9%. Compared with many developing countries the workers wage is very small which gives competitive advantage to the sector. However during the same period wage per worker grow at a rate of 2.7%. Despite this, productivity per wage bill declined at a rate of 3.1%. This shows that productivity of the sector depends not only on wage but also on other factors.

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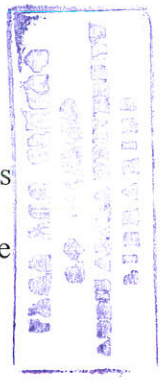
According to the EEA, (2005/06) manufacturing wage per worker in China is about three times greater than its Ethiopian counterpart, while Chinese labor productivity is five times higher than its Ethiopian counterparts.

The total export earning from the manufacturing goods in 2004/05 was about $118 million which is a maximum recorded to date. This is the result of better agricultural performance in the last few years, as well as policy drive which accords high points for export growth. Despite this, export is only a small proportion of the total value of production of the manufacturing sector on average 7.2 percent for the six years period (1999/00-2004/05)

From the above statements it is possible to conclude that the industrial sector contributes insignificant amount to the overall economy and employs only small section of the workers.



1.2. Statements of the problem

Ethiopian economy is predominantly agrarian. It employees the largest amount of workforce and contribute to the highest share of national GDP. The industrial sector and specially manufacturing sector is still in an early stage in Ethiopia. Its share in GDP is less than 7 Percent. Nor is it a significant employer. Yet, manufacturing offers future opportunities to the country to achieve a number of development goals. Efficient manufacturing sector growth raises incomes and creates demand for agricultural products and provides growing employment opportunities. It is also at the heart of modernization of the economy. Trade and Transformation (2004)

Chauvin and Gaulier (2002) also summarized the structural adjustment program taken place after the change in government in 1992 and the impact of trade liberalization polices in the working of the economy as follows. Ethiopia has taken different policy and institutional reforms. These measures include the devaluation of domestic currency, liberalizations of different sector of the economy. The process of trade liberalization requires a careful sequencing of reforms and complementary policies implying that countries involve in gradual reduction of tariff and non-tariff barriers to trade. Though it is believed that trade liberalization improves the allocation efficiency of resources, it will affect previously protected infant industries if their capacity is not improved to compete with imported products resulting in contraction of previously import- substituting industries.

Belay (2007) also argued that in Ethiopia, trade liberalization policy aims at stimulating economic growth by developing the private sector and reinforcing competitiveness among private investors, implementing trade rules compatible with those of WTO, and supporting process of regional integration. It also creates opportunities for expanding markets and creates economies of scale.

The growth and productivity of the industrial sector though basically depends on the amount and quality of labor, the level of investment and the quality of output it produce to the local and international market, it also depends on the degree of liberalization which determine the level of movement of input and output of the sector in the international market. Thus it is important to clearly identify the extent and level of impact of

liberalization policy taken successively by the policy makers on the growth of the industrial sector so far.

1.3. Objective of the study.

Industrial sector is the third most important sector next to the agricultural and service sector. This sector like any other sector is not only affected by the quantity and quality of labor employed, the amount of capital invested and the level of competition in the world market but also is influenced by different integration process which forces countries to open their market to the rest of the world by liberalizing their economy. This study attempts to analyze the performance of the industrial sector and determines factors that affect the growth of the sectors most.

The particular objectives of the study are to assess:

1. The impact of trade liberalization on the growth of industrial sector
2. The impact of human capital on the growth of the industrial sector.

1.4. Hypothesis

It is argued by the classical economists that trade liberalization would lead to economic growth through specialization, scale of economies, and etc. The study tries to examine using the Lucas 'human capital model of endogenous growth' the impact of trade liberalization on growth of the industry. In this study Lucas Human Capital Model

augmented with trade policy variables will be taken into consideration. The model attempts to measure the magnitude of determinants of industrial growth such as capital, labor, export, import duty and education on the value added of the industry.

It is expected that capital, labor, export and education would have positive relationship with industrial growth while import duty would have negative impact on the industrial value added. This study tries to confirm that trade liberalization and other growth variables have the correct relation and determine the magnitude of the relationship.

1.5. Significance of the study

The performance of any economy can be measured by how much the industrial sector contributes to the level of output and employment, share to GDP. Determining factors and the magnitude of the variables that affect the rate and level of growth of the economy not only helps both policy makers and stakeholders to make correct decision but also helps to take efficient and effective strategic policy measures.

Among the factors which affect the growth of the industrial sector are the degree of liberalization or protection, which is determined by the amount of tax, magnitude of subsidy and other related measures, which affect the export and import of the sector. The study tries to analyze the impact of trade liberalization by analyzing export and import variables and establish relationship b/n export, import duty and growth of the industry. This study to my knowledge would be the first of its kind to see the relationship of industrial value added and trade policy variables in Ethiopia.

1.6. Organization of the study

The first section covered the introduction. The next sections are organized as follows. Section two discusses the historical background and profile of the sector. Chapter three discusses the review of similar studies and literature from foreign and Ethiopian context. Chapter four attempts to conduct econometric analysis of the data, Chapter five examines the empirical findings from the data followed by chapter six which offers summery, conclusion and recommendations based on the findings from the previous section.

1.7. Limitation of the Study

The study is not with out limitation. The data of industrial value added real capital labor real export, import duty and education are taken at aggregate level. Hence better result would have been found if the study would have been conducted at disaggregated level.

CHAPTER TWO

INDUSTRIAL POLICY AND PROFILE OF INDUSTRIAL SECTOR

2.1. Industrialization & Industry policy in Ethiopian

The Ethiopian Economic association in its research report of industrialization and industrial policy in Ethiopia compiled in 2005 exhaustively analyzed and summarized the trade policy and their impact in the last three regimes. Based on the report some of the major economic policy and accomplishment are presented below.

Between 1957 and 1974, a series of 'Five-Year Development plans' (FYDP) were drawn, primarily identifying priority areas of investment. Agriculture, natural resource-based agro-industries and human resource development were given priority for resource allocation in the First FYDP. The second FYDP (1963/4 - 1967/8) aimed at promoting agro-industrial activities, introducing new production methods, diversifying production and increasing the productive capacity of the economy. The plan stressed the need for expanding processing industries to assist the development of agriculture by increasing the demand for agricultural raw materials on the one hand, and by supplying agriculture with improved tools and implements on the other. As such, investment in manufacturing was directed towards creating high input-output linkages with agriculture. The Third FYDP, (1968 - 1974) envisaged the public sector to concentrate on the development of infrastructure such as health, education, and transport, while the private sector would invest in productive activities.

To make up for the shortage of capital and lack of entrepreneurial skill, a package of incentives was designed to promote private domestic and foreign investment. The incentives include a five-year profit tax holiday, exemption from import duty on machinery and equipment and building materials, income tax exemption, remittance of profit in the form of dividends and interest payment and gradually taking out the full amount of capital investment upon a specified period of time. A drawback system to encourage exports was also made operational. Foreign exchange was also allowed for repayment of foreign private credits and foreign purchases. Foreign investors were further permitted to have access to domestic loans to buy real estate for establishing industries. Similarly, foreign workers were permitted to remit their savings in foreign exchange. EEA (2005)

Similarly this publication state that under the socialization program of the Duerg, which was the social and economic corner stone of the regime, land (both urban and rural), private medium and large scale manufacturing enterprises and rented buildings and houses were nationalized. Moreover, a limit on the capital ceiling of private investment relegated the private sector to petty or small-scale activities. It is precisely this institutional setting - state ownership of land and other assets and the marginalization of the private sector, among others, which are the underlying factors of today's unprecedented poverty and industrial stagnation in the country.

As the result, the manufacturing sector (and in general the industrial sector) remained stifled and inefficient. Moreover, the nationalization scheme while ending the role of private investment in medium and large scale manufacturing, simultaneously closed the

door for the possible import of new technologies and along with it the learning process and advancement of technological capability. EEA (2005)

Under the socialist industrialization strategy, where the private sector, the key agent for industrial development, had been marginalized, not much progress can be expected. Even within the highly state-centric economic structure of the modern sector of the economy, industry was not given any importance. The military government, nevertheless haphazardly and with support from the socialist block, established a few state owned large firms, such as a cement industry, a tractor assembly plant, large-scale engineering firms, etc. However, their overall contribution to the growth of the manufacturing sector was insignificant, and hence failed to induce further industrialization and transformation of the economy in general. By the time the military government runs over its course, the economic situation of the country in general was much worse than it had been a decade and a half before. The manufacturing sector was in a state of decline while entrepreneurial skill and motivation was forced to decay.

The overarching development strategy of the regime currently in power is Agricultural Development Led industrialization (ADLI). Similar to the socialist strategy of the Duerg, development starts with agriculture and expands to other sectors, particularly to manufacturing. Also, previously nationalized land and urban housing are still state owned. In addition the government controls some strategic industries, such as large-scale engineering, metallurgy, communications, power and pharmaceuticals. Given this, growth in agricultural productivity, through increased application of technical inputs on small plots is expected to improve agricultural income, which in turn increases the demand for

manufactured goods. The latter then motivates higher production capacity utilization and investment in manufacturing. The only difference this time is that unlike the socialist scenario, ADLI operates in the context of a free market economy environment. As market forces create efficient resource allocation, the role of the state will be limited largely to creating conducive policy environment and providing infrastructure. What this implies is that industrialization is inherent in market arbitrated resource allocation, and hence industrial policy is not required.

Accordingly, a number of measures have been taken to create a free market environment and reinstate the private sector's role in the economy. This was effected through the IMF led Structural Adjustment program, based on the motto of stabilization, liberalization and privatization. Inline with this, first generation reforms such as decontrolling prices, deregulating markets, setting minimum deposit rates and devaluing the domestic currency substantially were undertaken. Tariff rates were also substantially reduced and the financial sector partially liberalized. An outward looking strategy to promote export and attract FDI is the central focus of the strategy. A number of state owned medium size manufacturing and service enterprises were also privatized and investment capital ceiling lifted. EEA (2005)

It is noted in the publication that liberalization - specifically, sharply reducing tariff rates - led to the closing down of a number of firms and underutilization of capacity in many others. The manufacturing sector is on average operating at less than half of its full capacity. However, this is taken as an inevitable impact of competitive market operation. As such, no measure has been taken on the part of the government.

The agricultural development led strategy (i.e., indirectly inducing industrialization through income effects of agricultural growth) failed to materialize in practice. So as it stands now there is literally no viable policy for industrial development. There is no program or plan that could lead socio-economic activities on the ground in a coordinated and complementary manner as markets are primarily expected to facilitate this. However, as noted above, markets are largely disintegrated, fragmented and, in some cases, missing, and hence incapable of facilitating socio-economic activities. What is required, therefore, is an industrial policy capable of transforming the economy as a whole. Industrial policy necessitates placing the manufacturing sector at the center of the program.

Clearly, the need for industrialization has generated some kind of a re-thinking about future directions as the recent high-level discussion on industrialization indicates. Though the government has its intention to provide due focus on industrialization, the strategy drafted does not suggest the sort of industrial policy implemented in earlier and newly industrialized countries of the world.

2.2. Profile of the manufacturing industrial sector

According to the Central Statistical Agency operation of the manufacturing industry is classified into nine major classifications. These are food products and beverage, manufacture of tobacco products, textile products and wearing apparel, leather and footwear, wood products except furniture, paper, paper products and printing , chemicals and chemical products, rubber and plastic products, non-metallic mineral products, metal

and electrical and manufacture of furniture. The profile of the sector for the year 2006 is summarized as follows in the following sections.

2.2.1. Number of Establishments and number of employees by ownership

Based on the 2005/2006 report, there are 1244 establishments of which 154 are publicly owned while 1090 are owned privately. The manufacture of food products and beverage contains the highest share by covering 373 establishments which is 30 % of the establishments. The manufacturing sector employees 118,409 workers of which 47 % are employed by the private sector, while the rest 53 % are employed by public sector. The number of establishments and number of employees in the year 2003/04, 2004/05, 2005/06 was 1074, 1207, 1244 and 1053814, 109150,118,409 respectively. The data indicate that the sector is registering successive growth in both parameters in the stated years.

2.2.2. Gross value of production

The manufacturing sector in the year 2005/06 produced 15.6 billion worth of production of which 8.8 billion (57%) are produced by the private sector while 6.8 billion (43%) are produced by the private sector. The highest gross value of production is contributed by the food products and beverage industry (34.6%), while the lowest was contributed by the wood products (less than 1%). The data shows that most of industries are engaged in agro based activity than the production of intermediate and capital output. In addition the data shows that the share of the public share is decreasing form year to year.

Table 2.1 Gross value of production from the year 2002/03-2005/06(in 000)

Year	*Public*	*Private*	*Total*	*% of Public to Total Gross Value of Production*
2002/03	*5554455*	*3740654*	*9295109*	*59*
2003/04	*6203420*	*4668336*	*10871756*	*57*
2004/05	*6317257*	*5999159*	*12316416*	*51*
2005/06	*6796965*	*8823640*	*15620605*	*43*

Source: Author's Computation based on the data of the Ethiopian Central Statistics Agency

2.2.3. Wages and salaries paid to the manufacturing industries

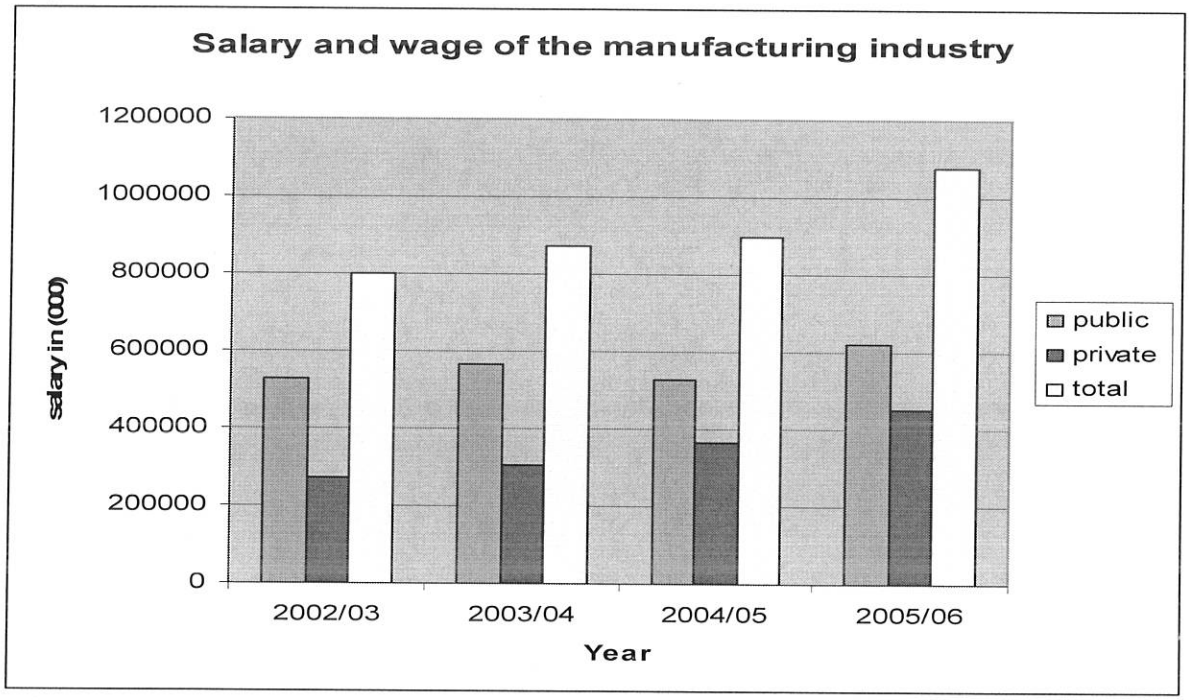
This sector has paid a salary and wages of 1.7billion for its employees. The government sector contributes 57% of the salary and wages while the private sector contributes 43% of the salary and wages to the employees. As usual the highest salary is paid to workers engaged in the food products and beverage industry. Wood product except furniture contributes less than 1% of the wage and salary payment in the industry. The salary paid in the manufacturing sector was 800 million in 2002/03, 871 million in 2003/04, 896 million in 2004/05 and 1.07 billion in 2005/06. The figure shows that there is tremendous growth of wages and salary during the period mentioned in the statistics. Wages and salaries paid to employees are summarized in the following table.

Table 2.2 Wages and salaries paid to the manufacturing industries 2002/03-2005/06(in 000)

Year	*Public*	*Private*	*Total*	*% of Public Salary to Total Salary*
2002/03	*527463*	*273269*	*800732*	*65*
2003/04	*565048*	*306336*	*871384*	*64*
2004/05	*528124*	*368031*	*896155*	*59*
2005/06	*621945*	*449626*	*1076320*	*58*

Source: Author's Computation based on the data of the Ethiopian Central Statistics Agency

Graph 1



2.2.4. Fixed capital asset and investment in fixed asset

The manufacturing sector operates using its fixed capital asset and current assets. The amount of fixed capital asset employed by the sector is 6.6 billion in the year 2005/2006. The public sector employees 2.6 billion (43) worth of fixed asset capital, while the private sector employees 3.9 billion (57) worth of fixed asset capital. The amount of fixed capital utilized by these industries was 6.50, 6.51, 6.40, 6.66 billions of birr in 2002/03, 2003/04, 2004/05, 2005/06 respectively.

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The amount of investment in this sector in 2005 was 925 million of which 604 million (65%) was private while 321 million (35%) was public investment. The total private and public sector industrial fixed asset capital and Investment amounts are summarized and presented in table 2.3.

Table 2.3 Fixed capital asset and investment in fixed asset in (000)

year	Public		Private		Total		% of public to total amount	
	Fixed asset capital	investment in fixed asset	fixed asset capital	investment in fixed asset	fixed asset capital	investment in fixed asset	fixed asset capital	investment in fixed asset
2002/03	2770750	482473	3738706	411762	6509456	894235	43	54
2003/04	2561643	431548	3949846	567516	6511489	999064	39	43
2004/05	2658027	267478	3746718	249533	6404745	517011	42	52
2005/06	2653545	321325	3966792	604189	6620337	925514	40	35

Source: Author's Computation based on the data of the Ethiopian Central

As table 2.3 shows though the share of the public fixed asset capital and investment in fixed asset fluctuate in the mentioned period, it is decreasing from year to year. This may be attributed partly to the relative increase of private investment and the privatization process of government owned enterprise.

In general all parameters, including the number of establishments and number of employees by ownership, gross value of production, wages and salaries paid to the manufacturing industries, fixed capital asset and investment in fixed asset indicate that the share of the public sector is decreasing during the period under consideration.

LITRATURE REVIEW

3.1. Theoretical literature review

3.1.1. Theories of trade liberalization

Overview of trade liberalizations

Bienen (1990), defined trade liberalization, as the relaxation or elimination of tariffs and removal of duties and/or quotas on exports; alteration in non-tariff barriers such as import quotas and quantitative restrictions; changes in licensing and direct allocation of foreign exchange and in specific regulations for products; and removal or relaxation of export subsidies Cited in Newman (2002)

Deb (2002) also examined that, in general, trade liberalization has been equated with becoming more "outward oriented". Pritchet (1996) argues that this term tends to be interpreted in three broad ways. Countries may be if their trade reforms imply a move towards neutrality, liberality and openness. A move towards neutrality involves equalizing incentives, on an average, between the exporting and import competing sector. A more liberal regime is one where the level of intervention has been reduced.

On the other hand Robert (1999), argue that to understand trade liberalization, an understanding of the characteristics and institutional context of trade is required. The most

visible trade barrier is the tariff, but trade liberalization is much more than negotiations on tariff rates. But other measures aside from tariffs, such as subsidies and government procurement practices, also affect trade. These have long been recognized as often having trade-distorting effects and requiring multilateral discipline.

Trade liberalization implies that short-term structural adjustment is necessary for longer-term prosperity. This creates challenges for other policy areas, and raises the question of how governments can most effectively intervene to facilitate adjustment by firms and individuals to new conditions caused by change, including trade. It also raises the question of whether those experiencing pressure to adjust from foreign sources should be treated any differently from those facing pressure from domestic sources Adjustment in this case involves shifting employment and other factors of production within a firm to new production lines, or shifts within an industry Robert (1999).

It is possible to generalize from the above discussion that trade liberalization is not only the relaxation of tariff, quota, and other protective mechanism it is rather a move towards neutrality liberality and openness. Regional and multilateral integration also facilitate trade liberalization.

Gains from trade liberalization

It should be noted that the logic for international trade and for domestic trade are the same (i.e. division of labor and specialization). This logic may also be applied to individuals and

trade among individuals. Without trade, each individual would have to be self-sufficient, and consequently would have an extremely low living standard and short life span. Robert (1999)

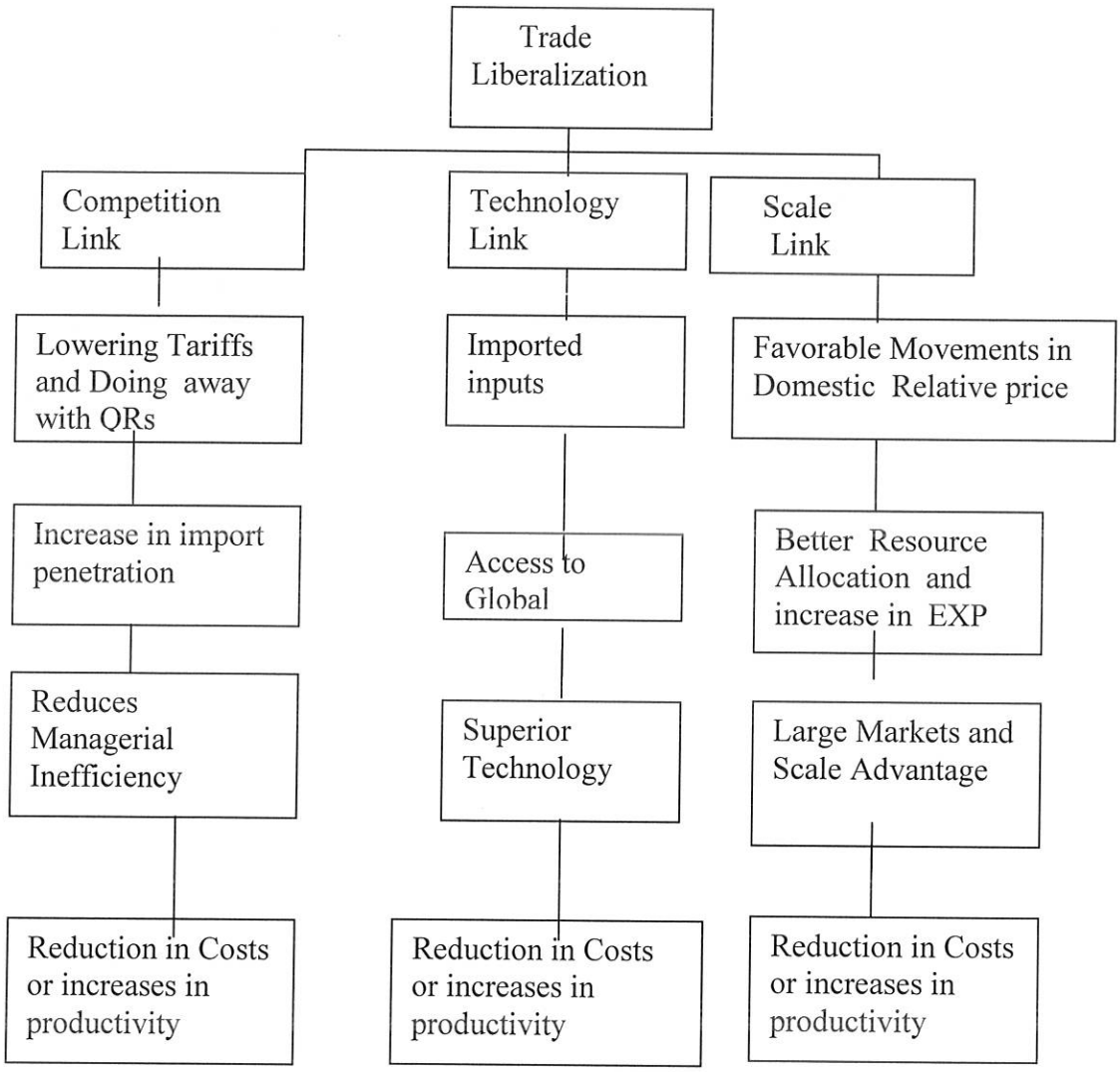
Dournbush (2004) examined the channels through which trade liberalization could benefit the economy in the following ways these are: improved resource allocation in line with social marginal costs and

benefits; access to better technologies, imputes and intermediate goods; an economy better able to take advantage of economies of scale and scope; greater domestic competition; availability of favorable growth externalities, like the transfer of know-how; and a shakeup of industry that may create a Schumpeterian environment specially conducive to growth

Deb (2002) elaborated that there are many arguments explaining why more open trade regimes lead to productivity improvements in the industrial sector. Perhaps the most basic is that returns to entrepreneurial effort increase as exposure to foreign competition rises [Corden (1974), Martin and Page (1983) and Tybout (1992)]. A second argument is that increasing returns to scale imply lower costs per unit as output increases [Pack (1988) and Tybout (1992)]. Finally, greater openness may accelerate adoption of technological innovations originating in industrial countries leading to more investment in product development. There has however been no clear confirmation of the hypothesis that countries with an outward orientation benefit from greater growth in productivity in the component sectors of manufacturing. When combined with the small static costs of

protection, this finding leaves those with a predilection towards a neutral trade regime in a quandary. Further, a conducive macroeconomic environment is also a necessary ingredient to establish the linkage between openness and productivity growth. The theoretical links between trade liberalization and productivity growth is presented in chart 3.1

Chart 1
Trade Liberalization and productivity Growth Theoretical Links



Reasons for trade liberalizations of the developing countries

After 1980s and 1990s many developing countries in Africa and Latin America has shifted from sever and destructive protective trade to free trade favor. Dornbush (2004) the case of trade liberalization in developing countries) has summarized the four overlapping sources of freer trade.

1. Anti statism. The world has seen a broad intellectual swing away from emphasizing the beneficial role of the state in the 1990s, and protection is seen as one of the overly intrusive state.

2. Poor economic performance. Many developing countries suffered dismal economic performance and declining productivity potential. Mach of the reason can be traced to macro economic policies that engendered debt crises and hyper inflation. But since the days of plentiful external credit are gone, attention must shift to productivity gains as source of growth. Trade may offer part of solution.

3. Information. Citizens world wide are exposed to more information about the opportunities available in other countries. It is no longer possible to conceal that goods in a country cost three or four times the world price or that they are not available. It is no longer possible to assert that liberal policy immeserize a country. On the contrary, many economic actors now see access to imports as a way of stretching their buying power.

4. World Bank pressure and evidence of success. Major research projects under the auspices of the NBER of the World Bank have documented the problems of inward-looking trade strategies and discerned the lessons from successful trade strategies (Balassa 1989;Bhagwati,1978; Bruton,1989; Krueger,1978,1990; Pack 1988; Michael et al.1991; Thomas and Nash, 1991a, b). The research helped to diffuse the black-and-white debate-free trade versus protection- to reach a more differentiated judgment involving the importance of neutral trade regimes as opposed to regimes that are biased against exports. The favorable performance of countries which adopted outward- oriented policies served to make trade liberalizations, broadly understood, a central condition for World Bank lending.

3.1.2. Theories of Economic growth

There are different economic growth models that explain the degree and extent of growth. These theories have identified various factors that cause economic growth. With the advancement of theories of growth different factors that have been the source of growth have been identified and tools for analysis of this variable have been developed. The theories have also passed through different stages of development so far and continued to evolve solving the riddle that causes economic growth. This development have been briefly summarized as follows.

Neo Classical growth Model

Panagiotis and George (2006) explained that the starting point of conventional economic growth theorisation is the neoclassical model of Solow (1956). The basic assumptions of the model are: constant returns to scale, diminishing marginal productivity of capital, exogenously determined technical progress and substitutability between capital and labor. As a result the model highlights the savings or investment ratio as important determinant of short-run economic growth.

Technological progress is another important determinant in the long run, although it is regarded as exogenous to the economic system in question. Turning to the issue of convergence/divergence, the model predicts convergence in growth rates on the basis that poor economies will grow faster compared to rich ones. Convergence would be absolute (or unconditional), moving towards a common steady-state, when economies are homogeneous (identical technology, savings rate, population growth rate and depreciation rate), or conditional, moving toward different steady-state positions, in the case of heterogeneous economies.

Endogenous growth model and the role of ideas

Although the neoclassical growth model places emphasis on labor and capital as key determinants of economic growth, other important elements remain unexplored and

particularly the technological progress which is regarded as exogenous to the economic system in question. This shortcoming, coupled with contradictory empirical evidence, has turned researcher's attention to alternatives explanations. For instance, the role of technological progress as a key driver of long–run economic growth has been put in scrutiny from more recent studies that accept constant and increasing returns to capital.

These theories, known as endogenous growth theories, propose that the introduction of new accumulation factors, such as knowledge, innovation, etc., will induce self maintained economic growth. The seminal studies in this area are Romer (1986) and Lucas (1988). Romer presents a formal model that yields positive, long run growth rates on the basis of technological progress driven by the role of externalities, arising from learning by doing and knowledge spillover. Lucas introduces a model in which human capital plays a fundamental role in perpetuating economic growth and preventing diminishing returns to physical capital accumulation.

Romer's and Lucas's work triggered research on the way technological progress affects economic growth. Three significant sources of growth are identified: new knowledge (Romer,1990, Grossman and Helpman, 1991), innovation (Aghion and Howitt, 1992) and public infrastructure (Barro, 1990). As a result, and in contrast to the neoclassic counterpart, policies are deemed to play a substantial role in advancing growth on a long run basis. Panagiotis and George (2006)

Evolutionary Models of Economic growth

The evolutionary approach to growth draws attention to three aspects that are neglected in both Neoclassical and endogenous growth model. First technological advancement ought to be conceptualized as disequilibrium process involving high ex-ante uncertainty, path dependency and long-lasting adjustment processes. Secondly, growth theory should be based on a more realistic theory of the firm that stress (strategic) firm capabilities in a broad sense, rather than just investment in human capital and R&D. Third it must take into account the institutional framework that presumably contributes strangely to an explanation of cross- country difference in economic growth (Nelson 1998) (Cited in Economic competitiveness report 2001)

In our case the endogenous growth model is taken into consideration since it is difficult to incorporate firm capabilities and institutional framework in our work hence more emphasis is given to show the impact of human capital and trade liberalization variables on the growth of industry.

3.1.3. Measurement of trade liberalization and openness

Deb (2002) in his assessment of the impact of trade policy reforms on economic performance requires the understanding of the notion of trade liberalization. The literature on trade policy reform includes several distinct concepts of trade "liberalization" It encompasses both openness and changes in trade orientation. Openness is an economic

wide measure while trade-orientation is an industry specific measure. The lack of an agreed upon definition of definition of trade liberalization makes it difficult to provide the "right" measure of openness or trade orientation, yet the question of how should be measured has received little attention in the past. The evidence on trade and growth includes both cross-country comparisons of trade policies and GDP growth as well as inter industry analysis of the impact of trade liberalization on productivity growth.

Deb (2002) The simplest measures of trade orientation are based on actual trade flows, such as imports /GDP, exports/GDP and exports and imports as share of GDP [Balassa(1985), Quah and Rauch(1990), Helliwal and Chung (1991), Edwards (1992), Milner and Upadhyay (2000) and Jin (2000)]. Most of these measures show a positive association with GDP growth. These measures are however an imperfect proxy for trade policy. Barro (1991) and Bhalla and Lau (1992) on the other hand use price-based measures of trade policy.

Some authors have also attempted to utilize information on policy to classify countries according to the degree to which trade is distorted. In particular, Sachs and Warner (1995), World Development Report Index (1987), Trade Liberalization Index [Thomas et al (1991)], Heritage Foundation Index (1996) undertake a subjective assessment of trade policy stance. Some analysts have tried to use the observed values of the variables associated with trade restrictions- tariff averages, QR averages, collected tariff ratios [Whalee (1993), Edwards (1998)]. In addition, some studies have argued that the black market premium for foreign exchange is a good proxy for the overall degree of external sector distortions [Whalee (1993) and Edwards (1998)]. One can determine the seriousness

of policy interventions by measuring the degree to which trade patterns are distorted from those occurring in the absence of policy interventions. Edwards (1992, 1998) uses the Leamer's openness index as one of the several trade policy indicators. Such a measure has the advantage of determining the effects of intervention, thus avoiding many of the problems with the administrative measures. The principal merit of Dollar's (1992) contribution lies in the construction of two indices- "index of real exchange rate distortion" and an "Index of real exchange rate variability". Dollar's study demonstrates that each of these indices is negatively correlated with economic growth over the 1976-85 period in a sample of 95 developing countries.

The review of the wide range of openness measures shows that given the complex nature of trade policy, and given that trade is being affected by tariffs, quotas, licenses, and exchange controls, it is very difficult to construct a single, satisfactory indicator of trade liberalization. Further, the fact that the various trade policy indicators are weakly correlated with each other suggests that different dimensions of trade policy may have different effects on growth Deb (2002)

From the above discussion it is possible to conclude that despite all the problems and weakness and the inability of different models and trade policy indicator to correctly indicate the impact of trade policy on growth we need to use tools which closely helps for policy measures.

Similarly Deb (2002) clearly summarized the link between trade liberalization and productivity growth in the following ways. The debate on the relationship between trade policy and economic performance attained new heights in the 1980s due to several factors,

such as third world debt crises, reforms in the East European transition economies, the success of East Asian countries. Neoclassical growth models assume that technological change is exogenous, unaffected by a country's trade policy (Solow 1957), among others]. New growth theories assume that technological change is endogenous. Several studies have attempted empirical tests of the effects of openness on economic growth [Dollar (1992), Wha-Lee (1993), Sachs and Warner (1995), Harrison (1996), Jin (2000) and Greenaway *et. al* (2002)]. The impact of openness on productivity growth has been explored in two recent studies [Edwards (1998) and Milner and Upadhyay (2000)]. Despite the voluminous empirical literature, the relationship between openness and economic growth remains highly contentious.

3.2. Empirical Review of Literature

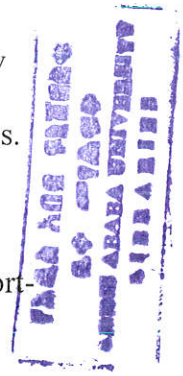
A number of empirical studies have been conducted regarding the impact of trade liberalization on the growth of industrial GDP and its productivity both at country level and cross country level. The review of these literatures is summarized below.

3.2.1. General

Ahmed (2006) empirically analyzed the relationship between trade policy and industrial growth in Pakistan during the period 1973- 1995. They applied the cointigration and error correction model. The empirical results suggest that there is a long run relationship among aggregate growth function of industrial value added and its major determinants of the real capital stock, labor force, real exports, and the import tariff collection rate and the

secondary enrolment ratio. The short term dynamic behavior of Pakistan's growth function of industrial value added has been investigated by estimating error correction model in which the error correction tem has been correctly signed and statically significant.

Omar (2007) evaluated the impact of liberalization on the country's economic growth by analyzing the 1974-2002 data with the help of cointegration and error correction methods. The empirical results suggest that long-run economic growth in Bangladesh is largely explained by physical capital and real interest rate and growth remains unaffected by short-term changes in labor force and secondary enrolment ratio.



Bishwanath and Anita (2002) examined the post reform period from 1981- 98 of India manufacturing. The results of the regression analysis do not indicate any significant adverse effect of import liberalization on productivity growth. Rather there are indications that a lowering of tariff may have contributed positively to productivity growth. Also, it seems that the explanation for lower industrial productivity growth in the 1990s may partly lie in gestation lags in investment projects. The average total productivity growth rate is much lower in the post-reform period (-.29 % per annum compared to the pre reform period 2.02%per annum), but the growth rate of output which is key determinant of productivity growth is about the same in the two periods (around 8.3% per annum in both periods)

Bruce and Perdiks (2000) attempted to quantify the effects of changes in economic policy with regard to the public sector spending and trade liberalization on the growth of the Egyptian Economy in the period of 1955-1996. The result showed that the effects of

government spending, export and investment on output tend to be over in the long run, with little evidence in the short-run relationship.

Satish and Sen (2002) attempted to measure the effect of trade liberalization on the total factor productivity growth in Indian manufacturing using panel data on 30 industries over 1973-88 using a price-wedge as an alternative measure of the extent of protection. . The answer is in the affirmative and is robust to three sensitivity tests.

B. Bhaskara Rao (2004) analyzed the impact of using different growth model on the result of growth. In his analysis he indicated the effects of trade openness on the growth rate of Fiji using time serious data. He showed how the basic Solow growth equation can be extended when the underlying production function is augmented with additional explanatory variables. The empirical results for Fiji showed that the effects of trade openness on growth differ significantly between those based on ad hoc specifications and those properly derived from the underlying neo classical production function and the Solow growth model. Although there were two alternative techniques to estimate the long and short run relationships, both techniques have given close and similar estimates of the parameters.

Musibau (2005) investigated the long run relationship between education and growth in Nigeria through the application of the Johansen Cointegration technique and the vector error correction methodology. The results of the Cointegrating technique suggest that there is long run relationship between enrolments in primary and tertiary level as well the average years of schooling with output per worker. The study was also able to establish long run relations among the other series in the model. Two channels through which human

capital can affect growth were analyzed. Although, it was difficult to separate the two different channels from each other, the result revealed that a well educated labor force possessed a positive and significant impact on economic growth through factor accumulation and on the evolution of total factor productivity. A good performance of an economy in terms of per capita growth may therefore be attributed to a well-developed human capital base.

Antonio and Elias (2006) used data for 37 manufacturing industries in around 40 countries to examine whether higher levels of education and greater improvements in education were associated with faster growth in schooling-intensive industries in the 1980's. They find that output growth in schooling-intensive industries was significantly faster in economies with higher education levels and greater education improvements. These results are robust to controlling for the growth effects of well-functioning financial markets and good property rights protection in external-finance-dependent and intangible asset-intensive industries respectively (Rajan and Zingales, 1998; Claessens and Laeven, 2003).

Barro (2001) measured the determinants of economic growth for around one hundred countries observed from 1960 to 1995. The data reveal a pattern of conditional convergence in the sense that the growth rate of per capita GDP is inversely related to the starting level of per capita GDP. Other variables that influenced economic growth included measures of government policies and institutions, initial stocks of human capital, and the character of the national population. With respect to education, growth is positively related to the starting level of average years of school attainment of adult males at the secondary and higher levels.

3.2.2. Empirical Literature from Ethiopia

To the best of my knowledge not much has been studies have been conducted regarding the impact of trade liberalization on industrial value added. However some studies have been carried out in the related arias. Though it is not exhaustive some of them are reviewed as follows.

Getachew (1997) examined the partial affects of deferent factors determining private investment in Ethiopia. OLS regression for short run model specification is used to estimate for the period 1970/1971-1994/95. The regressive results indicate that while the GDP, credit availability Government Capital expenditure and real interest rate had insignificant contribution , the retained earnings (the industry's cash flow) has a significant role in private manufacturing investment.

Taddese (2000) in his study investigates the production function and determined the, the rate of technological progress of selected industries. on Ethiopian manufacturing industries over the period 1978-1998 using results from the Cobb-Douglas and Constant Elasticity of Substitution. (CES) , production functions and the growth accounting. The empirical results reveal that except on the three industry groups covered in the study labor input contributed more for increase in output. It also shows that while these industry groups exhibited constant returns to scale other industries exhibited constant returns to scale.

Fitsum (2007) examined the possible outcome the foreign trade reform measures of the current Ethiopian government to the country's total productivity level using a time series data which covers a period of 1971-2004. The Cobb-Douglas production function, which explains output as a function of labor, capital & productivity is adapted. Moreover, war & weather are incorporated as dummy variable. Johansson maximum likelihood is used. The result shows that two variables (i.e. student index and exchange rate gap) with the exception of capital stock per labor are found to be statistically significant with a positive sign explaining total factor productivity. Where as capital shows insignificant and negative effect on the dependent variable. The result of the paper support the current trade liberalization measure the government.

CHAPTER FOUR

DATA AND METHDOLOGY

4.1 Source of Data

The study uses different annual data deflated using consumer price index. The study uses data covering from the period o f 1970/71 to 2005/06. The definition of variables and data sources of an aggregate industrial production function for Ethiopia is explained as follows. The choice of this period depends on the availability of the data and the requirement of the model.

The data on the industrial value added (RIND), deflated by unit value index of exports deflated at 2000 base year, are obtained from the National Bank of Ethiopia.

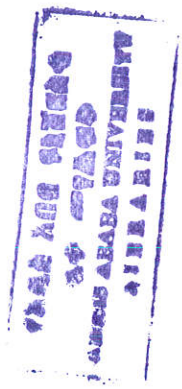
The data on Real export (rexport), nominal exports is expressed in the national currency, and Real GDP is obtained from the National Bank of Ethiopia. Since Export is the function of GDP and there is correlation among the two variables, ratio of Real Export to Real GDP is taken as a good representative of trade liberalization.

RCAPITAL: fixed capital asset is (in thousands of national currency) is collected from different statistical year book abstracts of the Central Statistical Agency. Hence it is converted to constant price by deflating using appropriate deflator of 2000 consumer price index.

The labor force engaged in the industrial sector is collected from the central statistics agency

The amount is of import duty is collected from different statistical abstract documents of the central statistics agency. This amount is deflated by the 2000 consumer price index.

EDU: The number of high school enrollment is obtained from different statistical abstract year book documents of the Central Statistics Agency



4.2 Limitation of data

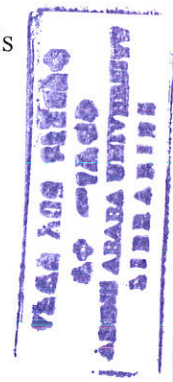
The two main limitations of the data are related to the capital and education variables. The use of fixed asset as proxy for capital is less representative compared to the capital data if it was available. In addition the data on fixed asset had to be calculated based on the average of the beginning and ending balance of fixed asset after adding investment and reducing depreciation. However though there is sufficient data of annual investment which include additions whether new or second hand assets value of at purchase price, lack of annual depreciation data makes it impossible to compute the average annual fixed asset.

The second limitation is on the secondary school enrollment. Data from 1971 to 2001 are consistent since there was no major education policy that brought fundamental change in the school curriculum. However after the year 2000 there is a shift in education policy and courses that were offered even at the university level were begun to be offered at the preparatory level which are included in 10+1 , 10+2, and 10+3. Despite this the preparatory

level and 10+1 , 10+2, and 10+3 are included as high school enrollment for this study. This may create data inconsistency.

4.3 Methodology

The basis of measuring the industrial growth in the study is the 'human capital model of endogenous growth' developed by Lucas (1988). The model considered by Lucas is analyzed in three ways.



1. Model emphasizing physical capital and accumulation of capital.
2. Model emphasizing human capital accumulation through schooling.
3. Model emphasizing specialized human capital accumulation through learning by doing.

The second model is given due attention and taken as a means to measure the impact of the human capital on economic growth. Dilip and Nasuridin (2006) also defined Lucas second model as follows.

Let L_i be the number of workers q_t be a measure of average quality of workers and u be the fraction of working hours workers spend on production of goods, such that uq_tL_t is the *total effective workforce* used to produce output, Y_t . In the Lucas model, Y_t , output, depends on the physical stock, K_t, the effective work force, uq_tL_t , and the average skill of human capital (workers), q_a:

$$Yt = A_t k^b_t (uq_tL_t)^{1-b} q^y_a$$

Where the term q^{y}_{a} represents externalities from the average human capital (AHC), and A_t stands for the technology level which is assumed to be constant

At equilibrium, all workers are assumed to have same skill level ($q_t = q_a$). So the Lucas model becomes

$$Yt = A_t k^{b}_{t} (uL_t)^{1-b} q_t^{1+y-b}$$

From the above function we get the returns to scale

$$(2+y+b) > (2-b) > 1$$

The Lucas Model (1988), the increasing returns to scale due to externalities from average human capital are the deriving force for an economies sustained growth rate. The sustained economic growth depends on the value of y.

Modeling an aggregate production function for Ethiopia.

Similarly following the work of Dilip and Nasuridin ***(2006)*** trade liberalization and the growth rate of industrial production is presented as follows:

$$Y = f(K, L, H, TL) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where Y is the industrial value added; K, L, H, and TL represent respectively, capital, labor inputs, human capital, and an index of trade liberalization.

Thus in Equation 1 the Lucas model is augmented by the TL variable. Trade liberalization is represented by ratio of real export GDP (REXP/GDP), and real import duty collection

(RDUTY), effective workforce of Lucas is proxy by EDU which measures high school enrollment is taken to measure human capital.

Thus the aggregate industrial production function becomes:

RINDU= f(RCAP ,LAB, EXP/GDP, RDUTY, EDU).....2

Specifying the production function in logliniear form (with an error term, U_t),

$LOG(IND)=\alpha_0 + \alpha_1 RCAPt + \alpha_2 LABt + \alpha_3 EXP/GDPt, + \alpha_4 RDUTYt + \alpha_5 EDU + Ut$.....3

Where the elasticties (α_1 , α_2 , α_3 , α_5) >0 and $\alpha_4<0$ i.e. RCAP, LAB, EXP/GDP, EDU are expected to have positive relationship while RDUTY is expected to have inverse relationship with in industrial value added since an increase in import duty reduce import of input which affect industrial growth.

Using the general Error Correction Model, the industrial production function is put in the following form:

$\Delta LOG(IND)t=\beta_0 + \sum\beta_{1i}\Delta LINDt\text{-}i + \beta_2\sum\Delta RCAPt\text{-}i + \beta_3\sum\Delta LABt\text{-}i + \sum \beta_4 \Delta EXP/GDPt\text{-}i, + \sum \beta_5\Delta RDUTYt\text{-}i + \beta_6 EDUt\text{-}1 + \beta_7 ECt\text{-}1 + Et$.....4

Where EC_{t-1} = Error correction term lagged one period

4.4 Testing Mechanisms

Cointegration

Woldredge (2000) explained that cointegration between dependent(y_t) and independent (x_t) variables implies that error correction terms may appear in a model relating Δy_t to Δx_t ; the error correction terms are lags in to y - Bx_t where B is the cointegrating parameter. A simple two-step estimation procedure is available for estimating error correction models. First, B is estimated using a static regression (or the leads and lags regression). Then, OLS is used to estimate a simple dynamic model in first differences which includes the error correction terms.

Unit Root Tests as a Test for Stationarity

(Woldredge 2000, Verbic 2002) explained that the standard statistical properties of least squares hold only when the time series variables involved are stationary. A stochastic process is said to be stationary if its properties are an affected by a change in time origin, or if its mean, variance, and auto-covariances are independent of time. This means that the errors are identically and independently distributed with a mean of zero and a constant variance

Non stationarity can be caused by different sources but an important one is the presence of unit Root. The AR (1) process is stationary if and only if the polynomial is invertible, that

is the root of the characteristics equation is larger than unity. A series which becomes stationary after first differencing is said to be integrated of order one. First differencing often can transform a non stationary series into stationary one. In some cases taking first a difference is insufficient to obtain stationarity and another differencing process is required.

Stationarity can be checked using difference stationary process (DSP), where non stationary series can be made stationary by differencing, i.e. non stationary process can be made stationary by regressing the dependent variable upon a constant

Dickey Fuller Test.

To test for the presence of Unit root, formulation of the null hypothesis is relatively straightforward. This null implies that there is a unit root present in the data. If a two-tailed test is allowed (i.e.,: 0) which allowed either > 0 or < 0, we might encounter some problems. In particular, if H a > 0 this implies > 1. If this is the case the process generating y t is explosive. For this reason, the alternative is expressed only in terms of < 0 (or < 1). This implies that any departures from the null are in the direction of a stationary (or I(0)) process, which is a reasonably plausible assumption. Thus, the alternative is always expressed as :H a < 0. This implies that the test is a one-sided (or left-sided) test and that the relevant critical values are all negative. A value for the sample test-statistic less negative than the critical value leads to the non-rejection of the null hypothesis. In other words the null of a unit root being present in the series cannot be rejected. A positive value for the sample test statistic would also imply a decisive rejection of the null and may be indicating a deviation from the null in the opposite direction to that of a stationary process.

The augmented Dickey-Fuller (ADF) test is a modification of the DF test and involves augmenting the Dickey-Fuller equation by lagged values of the dependent variable. This is done to ensure that the error process in the estimating equation is residually uncorrelated but also captures the possibility that dependent variable is characterized by a higher order autoregressive process. A failure to introduce variables designed to capture omitted dynamics leads to a biased standard errors, hence it is very importance to introduce the lagged terms

4.5 Forecasting Trends

Woldredge (2000) elaborated that Forecasting trending and I(1) series requires special care. Processes with deterministic trends can be forecasted by including time trends in regression models, possibly with lags of variables. A potential drawback is that deterministic trends can provide poor forecasts for long-horizon forecasts: once it is estimated, a linear trend continues to increase or decrease. The typical approach to forecasting an I(1) process is to forecast the difference in the process and to add the level of the variable to that forecasted difference. Alternatively, vector autoregressive models can be used in the levels of the series. If the series are cointegrated, error correction models can be used instead.

CHAPTER FIVE

EMPERICAL RESULTS AND DISCUSSION

5.1 Summery Statistics

To conduct for statinarity the variables must have unique mean variance standard deviation. The result of mean variance and covariance is presented in table 5.1.

Table 5.1 Summery Statistics

	IND	RCAP	REXP	LAB	RDUTY	EDU
Mean	5065.671	2812593	36.14005	84210.56	832.3435	365084.1
Median	4282.235	2116810	22.65494	88122.5	661.605	355987
Std. Dev.	2433.476	1712602	25.61188	15704.8	515.7205	242048.4

Source: Author's computation

4.1. Unit Root Tests

So based on the above definitions and testing procedures using the data which cover the period of 1971 to 2005 unit root test for stationary have been conducted using the DF and PP unit root test for all variable. The test results of DF and ADF at level , first and second difference as well with trend and without trend is summarized in the following table. The corresponding critical values at 95 % for DF and ADF with Trend and Without Trend is also summarized and presented in the next table

Table 5.2 DF-ADF Unit Root Tests for Stationarity

Variable		DF		ADF (1)		conclusion
	Level or first diff	**With out trend**	**With trend**	**With out trend**	**With trend**	
LOG(IND)	levels	-2.14	-3.52	-0.86	-2.33	I(1) under DF and ADF test
	1st diff	-10.34	-10.36	-4.36	-4.41	I(0) under DF and ADF test
LOG(RCAP)	levels	0.01	-1.59	-0.4	-2.21	I(1) under DF and ADF test
	1st diff	-4.6	-5.19	-2.81	-3.5	I(0) under DF test
	2nd diff	-9.79	-9.62	-7.99	-7.9	I(0) under DF test I(1) under and ADF test
LOG(LAB)	levels	-1.45	-1.9	-1.5	-1.9	I(1)
	1st diff	-5.46	-5.42	-3.42	-3.38	I(0) under DF
	2ND diff	-9.67	-9.51	-6.41	-6.33	and ADF test
LOG(EXP)	levels	-1.08	-2.13	-0.72	-1.92	I(1)
	1st diff	-6.17	-6.11	-3.69	-3.69	I(0) under DF and ADF test
	2nd diff					
LOG(RDUTY)	levels	-0.03	-1.16	0.33	-0.9	I(1)
	1st diff	-6.44	-6.9	-4.66	-5.62	I(0) under DF and ADF test
LOG(EDU)	levels	-1.12	-2	-0.94	-2.01	I(0)
	1st diff	-5.35	-5.28	-4.83	-4.79	I(0) under DF and ADF test

Source: Author's computation
Note Unit root tests are conducted using Eview 3.1

Table 5.3 Critical values at 95 % for DF and ADF with Trend and Without Trend

Levels , 1st Difference	DF , ADF	With/ With out trend	Critical values at 95 %
levels	DF	Without trend	-2.9499
	DF	Without trend	-2.9527
	ADF	With trend	-3.5468
	ADF	With trend	-3.5514
1st Difference	DF	Without trend	-2.9527
	DF	Without trend	-2.9558
	ADF	With trend	-3.5514
	ADF	With trend	-3.5562

Source: Author's computation

The table indicate that all variables LOG(IND), LOG(RCAP), LOG(LAB), LOG(EXP/GDP), LOG(DUTY) have unit root and therefore are non stationary under the level test. Therefore it is important to conduct the first difference test. It is found that LOG(IND), LOG(EXP/GDP), LOG(RDUTY) , LOG(EDU) are stationary the first difference while LOG(CAP) and LOG(LAB) are stationary at the second difference

Similar tests have also been conducted using the Phillips (PP) unit root test. The result also confirms that all variables has unit root under level. However they were stationary at the first difference.

Table 5.4 Phillips- Parron (pp) for Unit Root test for Stationarity

Variable	Level, First Difference	Constant no Trend	Constant, Trend	Conclusion
LOG (IND)	level	-1.97	-3.47	I(1)
	1st diff	-10.60	-10.99	I(0)
LOG(RCAP)	level	-0.43	-1.64	I(1)
	1st diff	-4.76	-5.24	I(0)
LOG (LAB)	level	-1.45	-1.98	I(1)
	1st diff	-5.48	-5.44	I(0)
LOG(REXP/GDP)	level	-1.05	-2.25	I(1)
	1st diff	-6.18	-6.12	I(0)
LOG (RDUTY)	level	0.24	-0.90	I(1)
	1st diff	-6.45	-7.25	I(0)
LOG (EDU)	level	-1.35	-2.03	I(1)
	1st diff	-5.34	-5.26	I(0)

Source: Author's computation
Note Unit root tests are conducted using Eview 3.1

Table 5.5 Critical values at 95 % for PP with Trend and Without Trend

For constant and no trend	-2.9499	Levels
For constant and trend	-3.5468	
For constant and no trend	-2.9527	1st Difference
For constant and trend	-3.5514	

Source: Author's computation

Hence we can conclude that all variables; LOG(RIND), LOG(RCAP), LOG(LAB), LOG(EXP/GDP), LOG(RDUTY), are integrated of order one. The next step is to test for

the existence of cointegration among variables of interest. To do this I have identified vector regressive model of lag 1. Autovector regressive model of one is selected since the sample size is relatively small. Johansson -Juselius Maximum Likelihood Cointegration test which takes Eigen value test is conducted.

5.3 Cointegration Test

Table 5.6 Johnson- Juselius Maximum Liklihood Cointegration Tests
(Maximal Eigen Value Test)

Null	Alternative	Statistic	95% Critical Value
r=0	r =1	155.7459	94.15
r≤1	r =2	76.24961	68.52
r≤2	r =3	42.54245	47.21
r≤3	r =4	20.98016	29.68
r≤4	r =5	6.865074	15.41
			3.76

Source: Author's computation
Note: values are computed using Eview 3.1

The Eigen Value suggests that the variable is cointegrated of at most two. Having this into consideration the data of Ethiopia which covers a period of 1971 to 2005 suggest that there is a long run relationship between the industrial value added and its determinant capital, labor, high school enrollment ratio of real export to GDP, and real import duty.

Table 5.7 Estimates of Long-Run Cointegrating Vectors (Linearised)

LOG(RIND)	LOG(RCAP)	LOG(LAB)	LOG(EXP/GDP)	LOG(RDUTY)	LOG(EDU)
1.00	1.20	-7.20	2.36	-3.21	1.30
	(0.45)	(4.33)	(1.15)	(1.76)	(0.85)

Source: Author's computation
Note: values are computed using Eview 3.1
Figure in parenthesis are standard error

LOG (IND) = 1.20LOG (RCAP) -7.20LOG (LAB) +2.36LOG (EXP/GDP) -3.2LOG (RDUTY) + 1.30LOG (EDU)

As it is presented in Table 5.7, the long run Cointegrating vector indicates that LOG (RCAP), and LOG (EDU) has the expected sign. ie a 1% change in RCAP,EXP/GDP, RDUTY, AND EDU will result in 1.2%, 2.36%, -3.21%, and 1.3% increase in the industrial value added.

While LOG (LAB) shows the opposite sign, this may be explained by the existence of hidden unemployment in the sector. Hence additional labor may reduce the industrial value added. In the long run determinants of value added are found insignificant in all. The estimate of the parameters clearly indicate that government should embark the libralization process which is started few years back.

5.4 Estimation of Error Correction Model

Table 5.8 Estimation of Error Correction Model

Dependent Variable = ΔLOG(IND)			
Regressor	*Parameter Estimated*	*standard error*	*T ratio*
Intercept	*-94.81032*	*(32.5189)*	*(-2.91554)*
Δ^2LOG(RCAP)(-1)	*0.192059*	*(0.43803)*	*(0.43846)*
Δ^2LOG(LAB)(-1)	*0.537739*	*(0.88162)*	*(0.60994)*
ΔLOG(EXP/GDP)	*0.021435*	*(0.18673)*	*(0.11479)*
ΔLOG(RDUTY)	*0.460056*	*(0.27310)*	*(0.27310)*
LOG(EDU)(-1)	*0.160380*	*(0.42229)*	*(0.37978)*
EC(-1)	*-1.161543*	*(0.39835)*	*(-2.91585)*
R^2 =0.594659 59 % *F statistics. = 4.034419* *Serial correlation= .259186 (3.84).* *Reset = 2.021487(4.22)*			

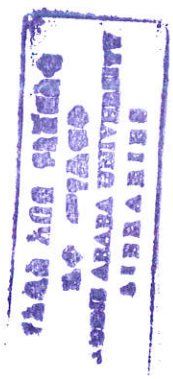
Source: Author's computation

.

In the model, growth rates of labor force lagged one year, real exports lagged one year and real fixed capital formation have emerged insignificant determinants of the growth rate of industrial value added in Ethiopia. The error correction coefficient estimate is -1.16 is

statistically significant at the 1 per cent level, has the correct sign. It implies that there is high speed of convergence to equilibrium.

R^2 is 59% which indicate that the fitted value explain the model well. The F test which shows the joint statistics indicate that the variables are jointly significant at 5 per cent level of significance. Tests that shows serial correlation indicate that the critical value 3.84 exceeds the calculated value .259 we can accept the null hypothesis of 95 % of confidence level that there is no serial correlation in the model. The critical value 4.22 exceeds the calculated value 2.02 which implies that we fail to reject the null hypothesis of linear specification. In general the results of the above diagnostic test statistics show no evidence of misspecification, no serial correlation.



CHAPTER SIX

SUMMERY AND CONCLUSION

This paper studies the relation between trade policies and economic growth in Ethiopia. The 'human capital model of endogenous growth' developed by Lucas (1988) which takes labor, capital and human capital is taken as the theoretical framework for undertaking empirical work on the relation between human capital, trade liberalization, and industrial growth in Ethiopia. The Human capital model augmented with trade liberalization variables of ratio of real export to GDP and import duty collection.

In the empirical investigation of the aggregate growth function of industrial value added in Ethiopia, cointegration and error correction modeling approaches have been applied. Before looking at the cointegration and Error correction results, test for statianarity using Dickey Fuller Test (DF) and Augmented Dickey Fuller Test (ADF) test for all variables have been conducted. In addition PP test is carried out for all dependent and independent variable. The results of the test indicate that all variables are integration of one, which creates suitable ground to undertake the next steps.

As the cointegration test using the Eigen Value suggests that the variable is cointegrated of at most two. Having this into consideration the data of Ethiopia which covers a period of 1971 to 2005 suggest that there is a long run relationship between the industrial value added and its determinant capital, labor, high school enrollment ratio of ratio of real export to GDP, and import duty.

In order to determine the short-term dynamics around the equilibrium relationship, I estimated an error correction model (ECM). The study shows that all variable including real capital formation, the labor force, human capital, industrial import tariff and ratio of real exports to GDP have emerged as insignificant determinants of industrial value added function in Ethiopia. However all variables have the expected sign which is similar to the hypothesis. What is interesting is there is high speed of convergence since the error correction term has correct sign and relatively high value.

The results of the study suggest the importance as well as the imperative for Ethiopia to continue the liberalization process which is started few years back. The findings indicate that the country should conduct comprehensive trade liberalization policies in order to accelerate and sustain economic growth.

However, one of the major limitations of the study is the aggregate nature of the model and proponents of Evolutionary model of growth says, first technological advancement ought to be conceptualized as disequilibrium process involving high ex-ante uncertainty, path dependency and long-lasting adjustment processes. Secondly, growth theory should be based on a more realistic theory of the firm that stresses (strategic) firm capabilities in a broad sense, rather than just investment in human capital and R&D.

So, for effective policy analysis, further studies may be undertaken using data at a disaggregate level. Another limitation is with the variable EDU, which is clearly imperfect: the variable does not include the input of teachers, and it completely ignores primary and higher education. So a better measure of human capital accumulation may be used in the future.

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Appendix I Vector Autoregressive Regression Result

Date: 06/09/08 Time: 11:42						
Sample: 1971 2005						
Included observations: 32						
Test assumption: Linear deterministic trend in the data		UNRESTICTED VAR				
Series: LOG(IN) LOG(CA) LOG(LA) LOG(EX) LOG(TA) LOG(ED)						
Lags interval: 1 to 1						
	Likelihood	5 Percent	1 Percent	Hypothesized		
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)		
0.706747	106.1402	94.15	103.18	None **		
0.567992	66.88522	68.52	76.07	At most 1		
0.415076	40.02724	47.21	54.46	At most 2		
0.303004	22.86648	29.68	35.65	At most 3		
0.202327	11.31527	15.41	20.04	At most 4		
0.119747	4.081484	3.76	6.65	At most 5 *		
*(**) denotes rejection of the hypothesis at 5%(1%) significance level						
L.R. test indicates 1 cointegrating equation(s) at 5% significance level						
Unnormalized Cointegrating Coefficients:						
LOG(IN)	LOG(CA)	LOG(LA)	LOG(EX)	LOG(TA)	LOG(ED)	
-0.314890	0.378555	-2.268112	0.742539	-1.009929	0.410201	
-1.054810	0.177799	2.155960	0.118139	0.683284	-0.584309	
-0.547208	0.248533	-1.978381	-0.223833	0.137056	0.637717	
-0.189989	0.543715	1.617865	-0.057280	0.085587	-0.601284	
0.151022	-0.383072	-2.857470	0.291365	0.121031	0.590438	
0.447088	-0.354501	-1.259486	0.149334	-0.322574	0.022186	
Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)						
LOG(IN)	LOG(CA)	LOG(LA)	LOG(EX)	LOG(TA)	LOG(ED)	C
1.000000	-1.202184	7.202881	-2.358093	3.207249	-1.302681	-69.06171
	(0.44727)	(4.33253)	(1.14522)	(1.76475)	(0.85166)	
Log likelihood	126.0715					
Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)						
LOG(IN)	LOG(CA)	LOG(LA)	LOG(EX)	LOG(TA)	LOG(ED)	C
1.000000	0.000000	-3.551872	0.254286	-1.276444	0.856720	28.55444
		(1.58637)	(0.34306)	(0.44186)	(0.35237)	
0.000000	1.000000	-8.946015	2.173028	-3.729624	1.796232	81.19903
		(3.32693)	(0.71948)	(0.92668)	(0.73899)	

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Log likelihood	139.5005					
Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)						
LOG(IN)	LOG(CA)	LOG(LA)	LOG(EX)	LOG(TA)	LOG(ED)	C
1.000000	0.000000	0.000000	1.560675	-2.040741	-0.523572	6.312556
			(2.35880)	(2.01856)	(0.76063)	
0.000000	1.000000	0.000000	5.463399	-5.654641	-1.680276	25.17894
			(6.39762)	(5.47481)	(2.06301)	
0.000000	0.000000	1.000000	0.367803	-0.215181	-0.388610	-6.262016
			(0.65711)	(0.56232)	(0.21189)	
Log likelihood	148.0809					
Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)						
LOG(IN)	LOG(CA)	LOG(LA)	LOG(EX)	LOG(TA)	LOG(ED)	C
1.000000	0.000000	0.000000	0.000000	-0.576643	-0.128729	-3.009781
				(0.13179)	(0.09168)	
0.000000	1.000000	0.000000	0.000000	-0.529325	-0.298062	-7.455428
				(0.29756)	(0.20700)	
0.000000	0.000000	1.000000	0.000000	0.129861	-0.295557	-8.459004
				(0.03684)	(0.02563)	
0.000000	0.000000	0.000000	1.000000	-0.938119	-0.252995	5.973272
				(0.16901)	(0.11757)	
Log likelihood	153.8565					
Normalized Cointegrating Coefficients: 5 Cointegrating Equation(s)						
LOG(IN)	LOG(CA)	LOG(LA)	LOG(EX)	LOG(TA)	LOG(ED)	C
1.000000	0.000000	0.000000	0.000000	0.000000	-0.372902	-3.715728
					(0.16906)	
0.000000	1.000000	0.000000	0.000000	0.000000	-0.522199	-8.103447
					(0.24266)	
0.000000	0.000000	1.000000	0.000000	0.000000	-0.240569	-8.300023
					(0.02872)	
0.000000	0.000000	0.000000	1.000000	0.000000	-0.650232	4.824794
					(0.21683)	
0.000000	0.000000	0.000000	0.000000	1.000000	-0.423439	-1.224236
					(0.22856)	
Log likelihood	157.4734					

Appendix II .Error Correction Regression Result

Date: 06/09/08 Time: 11:45						
Sample(adjusted): 1974 2004						
Included observations: 31 after adjusting endpoints						
Standard errors & t-statistics in parentheses						
Cointegrating Eq:	CointEq1					
LOG(IN(-1))	1.000000					
DLOG(CA(-1))	-2.075302					
	(0.38288)					
	(-5.42021)					
DLOG(LA(-1))	-1.997646					
	(1.09276)					
	(-1.82807)					
LOG(EX(-1))	0.735632					
	(0.17325)					
	(4.24605)					
LOG(TA(-1))	-1.131766					
	(0.13775)					
	(-8.21630)					
LOG(ED(-1))	-0.316852					
	(0.07011)					
	(-4.51941)					
C	0.622786					
Error Correction:	D(LOG(IN))	D(DLOG(CA))	D(DLOG(LA))	D(LOG(EX))	D(LOG(TA))	D(LOG(ED))
CointEq1	0.305705	0.131800	0.015418	-0.781792	0.286761	0.172488
	(0.22108)	(0.13684)	(0.04391)	(0.20794)	(0.19639)	(0.11512)
	(1.38275)	(0.96313)	(0.35116)	(-3.75969)	(1.46019)	(1.49839)
D(LOG(IN(-1)))	-0.170600	-0.226952	-0.043427	0.564262	0.028982	0.125707
	(0.24069)	(0.14898)	(0.04780)	(0.22638)	(0.21380)	(0.12532)
	(-0.70879)	(-1.52337)	(-0.90853)	(2.49253)	(0.13555)	(1.00305)
D(DLOG(CA(-1)))	0.192059	-0.087474	0.098438	-1.294626	0.147422	-0.041409
	(0.43803)	(0.27113)	(0.08699)	(0.41199)	(0.38910)	(0.22808)
	(0.43846)	(-0.32263)	(1.13161)	(-3.14238)	(0.37888)	(-0.18156)
D(DLOG(LA(-1)))	0.537739	-0.015080	-0.628409	-2.465606	-0.147102	0.294525
	(0.88162)	(0.54570)	(0.17508)	(0.82921)	(0.78313)	(0.45905)
	(0.60994)	(-0.02763)	(-3.58923)	(-2.97346)	(-0.18784)	(0.64160)
D(LOG(EX(-1)))	0.021435	0.027065	-0.044905	-0.018117	-0.066996	-0.073185
	(0.18673)	(0.11558)	(0.03708)	(0.17563)	(0.16587)	(0.09723)
	(0.11479)	(0.23417)	(-1.21095)	(-0.10316)	(-0.40391)	(-0.75272)
D(LOG(TA(-1)))	0.460056	-0.042913	0.116304	-0.215126	0.061753	0.066327
	(0.27310)	(0.16904)	(0.05423)	(0.25686)	(0.24259)	(0.14220)
	(0.27310)	(-0.25386)	(2.14445)	(-0.83752)	(0.25456)	(0.46644)
D(LOG(ED(-1)))	0.160380	-0.061092	0.014050	0.390616	-0.049858	0.092174
	(0.42229)	(0.26139)	(0.08386)	(0.39719)	(0.37511)	(0.21988)
	(0.37978)	(-0.23372)	(0.16753)	(0.98346)	(-0.13292)	(0.41920)

C	-94.81032	-8.446086	-10.05458	5.034131	-21.05065	-21.59107
	(32.5189)	(20.1282)	(6.45795)	(30.5855)	(28.8859)	(16.9322)
	(-2.91554)	(-0.41962)	(-1.55693)	(0.16459)	(-0.72875)	(-1.27515)
ECT(-1)	-1.161543	-0.103545	-0.123197	0.061493	-0.258447	-0.265412
	(0.39835)	(0.24657)	(0.07911)	(0.37467)	(0.35385)	(0.20742)
	(-2.91585)	(-0.41994)	(-1.55729)	(0.16412)	(-0.73038)	(-1.27960)
R-squared	0.594659	0.437946	0.566061	0.489937	0.136563	0.180550
Adj. R-squared	0.447263	0.233563	0.408265	0.304460	-0.177415	-0.117432
Sum sq. resids	1.722171	0.659802	0.067919	1.523479	1.358869	0.466908
S.E. equation	0.279787	0.173179	0.055563	0.263152	0.248529	0.145681
F-statistic	4.034419	2.142769	3.587294	2.641495	0.434944	0.605910
Log likelihood	0.814128	15.68485	50.92591	2.714264	4.486588	21.04488
Akaike AIC	0.528121	-0.431281	-2.704897	0.405531	0.291188	-0.777089
Schwarz SC	0.944440	-0.014962	-2.288579	0.821850	0.707507	-0.360770
Mean dependent	0.024259	-0.004790	0.002603	0.056057	0.038249	0.081324
S.D. dependent	0.376329	0.197814	0.072231	0.315534	0.229041	0.137814
Determinant Residual Covariance		1.22E-11				
Log Likelihood		125.6079				
Akaike Information Criteria		-4.232766				
Schwarz Criteria		-1.457306				

DECLARATION

I, the undersigned, declare that this Project is my own original work and it has not been presented for a degree in any other University and that all sources of materials for this project have been duly acknowledged.

Declared by: -

Name: - Dereje Worku

Signature _____

Place: Addis Ababa University

Date of Submission: - June 2008

Confirmed by: -

Molla Mengistu (Phd)

(Advisor)

Signature _____