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IMPACT OF EXPORT EARNING INSTABILITY ON ECONOMIC GROWTH

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ABSTRACT

This study tries to investigate the impact of export earning instability on economic growth based on log linear econometric model which derived from cob-douglas production function by including export variable. To do this time series data is taken. The empirical result of the long run model explains that export earning instability affect economic growth negatively, but the short run model prevails negative sign however its impact is statistically insignificant. Diversification of export items and improving quality of our export products should be taken as remedial measure in order to achieve progress in the sector.

KEYWORDS
export earning, economic growth.

1. INTRODUCTION

Foreign trade is assumed one of the crucial factors to determine growth in economy of a country. In the year 2000, in sum trade (both exports and imports) are a significant of the GDP of African countries even if the share of Africa's trade in the world is extremely low, being about 2 percent of the world trade. And that little amount constitutes, a significant proportion, about 60 percent of its GDP (Vylder, 2006). If we take particularly Ethiopia, in 2006 the share of Ethiopia's export in the world was very low and it is around 0.01 percent and it constitutes 15.8 percent of its GDP (WTO, 2007; WB, 2007).

Todaro and Smith (2009) suggest these countries' economies highly rely on agriculture and other primary products for most of their export earnings. Africa's poor export performance and its failure to integrate in world trade are associated with poor export performance and lagging development. Their export commodities are concentrated on few agricultural commodities which vulnerable to shocks (Alemayehu, 2006; Bacchatta, 2007; Biggs, 2007; UNTCAD, 2008).

Abay and Zewdu (1999) stated that there is a considerable discussion on the problem of export earning fluctuation and its impact on different primary commodity producing countries. Developing countries, which are heavily dependent on earnings from the sale of primary commodities and concentrating on small range of commodities and market outlays to finance much needed capital good imports, have shown substantial concern with the instability of their export proceedings. In the large part this concern emanates from the fact that commodity prices and consequently foreign exchange earnings have exhibited a tendency towards secular instability. It is often argued that these fluctuations constitute a series of different economic growth.

Ethiopia heavily depends on the exports of few primary commodities whose international price tend to be unstable (Abay and Zewdu,1999) and (Alemayehu,1999). And lastly, the country's imports almost all of its intermediate inputs, fuel and capital goods, which are deemed to be so critical for the country's growth process (Amin, 2001)

If export earnings derived from mainly agricultural products are relatively subjected to large fluctuations, then examining the impact of instability on economic growth is relatively critical for Ethiopia.

2. THEORETICAL ISSUES AND EMPIRICAL EVIDENCE

2.1 LINK BETWEEN EXPORT EARNING INSTABILITY AND ECONOMIC GROWTH

There are different views regarding the link between export earning instability and economic growth. Ozler and Harrigan (1998), stated that there are two views about the impact of export earning instability on economic growth. The first view is the negative impact of export earning instability on growth. The most likely explanation of the negative correlation between export volatility and growth relies on the lack of perfect insurance markets, especially in the absence of ability to smooth out fluctuations of export recites. Developing economies would face occasional difficulties in importing intermediate and capital goods that are highly needed for production. In such economies risk-averse private investors are likely to produce their investment or the ex-post efficiency of the existing investment is likely to be reduced. The second view is that export instability may encourage growth with risk averse individuals in uncertainty about the future income will have a positive impact on saving by increasing precautionary demand for saving. This in turn will ultimately lead to high investment and growth (Ozler and Harrigan, 1998).

According to Brempong (1991) it is not possible to make any prediction about the nature of relationship between export instability and growth rate of output. On the other hand it is possible that incomes in least developed countries are already so low that any reduction in export earning leads to reduction in saving in order to maintain subsistence living standards in these countries. Under such circumstances export instability leads to reduction in investment and hence reduction in growth rates of output. Also the relationship between export instability and economic growth rates will depend on producers' aversion to risk. A risk-averse nation or producer invests resources to insure itself against fluctuations in export, building foreign exchange reverse and so on. While a risk loving or risk neutral nation or producer will not devote its resources to and insurance scheme. The sign of instability variable can therefore only be determined empirically *ibid*.

Brempong, (1991) argue that Instability in export revenues implies instability in government revenue, hence adversely affecting the implementation of development plans and completion of development projects. Moreover, he stated also a large share of government revenues to finance development is derived from export taxes in African countries. An alternative reliance on unstable export revenues to finance development projects in these countries is deficit financing, given the lack of any organized capital market, which means borrowing from the central bank and monetizing the deficit. This leads to inflation, distortion of relative prices and slow economic growth (Brempong, 1991)

Since developing countries' export mainly primary products which vulnerable to shocks and their economic growth suffers from deleterious effects of export instability they experience the detrimental effect of export instability have been attributed to either the price instability of primary products or the resulting fluctuations of export proceeds (Galazcos,1984;ci, Mulugeta,2007).

2.2 EMPIRICAL EVIDENCES

In this section, we review different studies made previously on the relationship between export instability and economic growth. There are studies that are conducted by different authors related with export earning instability and economic growth which shows different results and no consensus has been reached. Some are highlighted as follows. To begin with Knudsen and Parnes (1975), using a transitory index to measure instability, find that marginal propensity to consume out of permanent income is much related to export instability. By taking average data that are collected from 28 developing countries for the period 1958-68, they obtained that there is positive relationship between the two variables. Authors who found positive relation between the two variables, like Knudsen and Parnes and MacBean, opine that if we assume risk averse behavior, uncertainty about export earnings can lead to a reduction in consumption and in turn, and increase in saving and investment and thus economic growth.

The conventional measure of export instability, on the other hand, leads to opposite conclusion that export instability has a negative impact on economic growth. Studies such as Ozler and Harrigan (1988) conducted a research by regressing GDP growth rates on export instability index using cross-section data and they found negative correlation between export instability and economic growth.

Brempong (1991) used average data from 1960-84 for 34 sub Saharan African countries and by tacking cross-section data and applying the production function frame work and three different measures of export instability has reached a result that no matter export instability is measured; it has a negative effect on economic growth.

Sinha also attempted study on the effects of export instability on economic growth using recent time series econometrics techniques for nine Asian countries namely, India, Japan, Malaysia, Myanmar, Pakistan, Philippines, South Korea, Sri Lanka and Thailand. Among these eight are developing and one developed country, Japan. For comparison purpose he sued time series data to study the relationship between export instability and economic growth and variety of results were found i.e. for India mixed, for Japan, Malaysia, Philippines and Sri Lanka evidences suggest negative relationship, and for Korea, Myanmar, Pakistan and Thailand positive relationship obtained between export instability and economic growth. He concluded that results show that cross-section studies which lump together may lead to misleading conclusion because results differ among countries.

The other study is the work of Mulugeta (2007) on the effect of export earnings fluctuation on economic growth in Ethiopia. The study is based on the general production function in which exports are taken as one of the inputs in the production process. "Does export earning fluctuation adversely affect economic growth in Ethiopia?" is his research question. In response to this question he took forty years data and employs logarithmic time-series econometric equation as total output is a function of rate of labor force, change of investment per output, export growth rate, export tax rate and export instability index. The instability index which is calculated using a five-year based moving average. His model is splitted in to two to see the effect of export instability on the general economic growth and its effect on non-export sector. Finally he concluded that the instability of export earnings is found to have a negative effect on economic growth, while the stable component has a positive effect (relation) with economic growth. He added that exports also indirectly affected by enhancing productivity of other inputs in the non-export sector.

Abay and Zewdu (1999) have conducted a research on export earnings instability and export structure in Ethiopia. They investigated export earning instability by taking time-series data from 1962-1995 and employing econometric techniques. Moreover both demand and supply side factors are incorporated as explanatory variables. They specified export instability has a function of the instability index for exports, commodity concentration index at time t, geographic concentration index at time t, the country's share in the world market at time t, the proportion of the value of food items exports to total proceeds at time t, export value index at time t, nominal exchange rate at time t, log value index (1975=100) and dummy variable for policy issues. They insert dummy variable to see the effect of policy measure in different regimes (Derg and EPRDF) and the results suggest that the policy measures taken during the Derg regime had an adverse effect on export instability in Ethiopia. The coefficient of export concentration and geographic concentration are positive but the coefficient of export concentration is significantly while geographic concentration is insignificant. The coefficient of the country's share of the world market and proportion of food export are negative and statistically significant. The negative sign of the coefficient of country's share of the world market in the goods it exports. The negative and significant coefficient of the proportion of the value of food items exports to the total export proceeds variable in the study also suggests that high concentration of exports on food items is inversely related with export instability. The coefficient of exchange rate has very little impact on instability of exports and the variation in export prices was not a significant factor for export instability in the country during the period under investigation.

3. ESTIMATION AND EMPIRICAL RESULTS

3.1 DATA AND METHOD

The data used are secondary and a time-series annual data which covers 34 years from 1974/75-2007/08. The main sources of the data for the variables in the model are National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED) and Central Statistical Authority (CSA).

The method which is going to be followed in this paper is based on Cobb-Douglas production function on which exports enter as an input in the production process. According to Ram (1987) the inclusion of exports is meant to capture international factors not explained by labor and capital. Following the works of Brempong (1991), Sinha (1999) and Mulugeta (2007), the model to be used in the analysis can be derived from the general production function in which exports are used as one of the input in the following form.

$$Y = Y(L, K, X) \quad \text{.. (1)}$$

Where - Y is real aggregate output

-L and K are the conventional labor and capital input

-X is real exports

After taking the total differentiation the model to be estimated takes the form in equation (2) below.

$$dY = \frac{\partial y}{\partial L}\, dL + \frac{\partial y}{\partial k}\, dK \quad \frac{\partial y}{\partial x}\, dX \quad \text{...(2)}$$

Again equation (2) can be written in the form of growth rates as:

$$\frac{dY}{Y} = \frac{\partial Y / Y}{\partial L / L}\, \frac{dL}{L} + \frac{\partial Y / Y}{\partial K / K}\, \frac{dK}{K} + \frac{\partial Y / Y}{\partial X / X}\, \frac{dX}{X} \quad \text{...(3)}$$

Where $\beta_1 = \dfrac{\partial Y / Y}{\partial L / L}$, $\beta_2 = \dfrac{\partial Y / Y}{\partial K / K}$ and $\beta_3 = \dfrac{\partial Y / Y}{\partial X / X}$, thus

Equation (3) can be written in the following form

$$Y = \beta_1 \acute{L} + \beta_2 K + \beta_3 X \quad \text{..…… (4)}$$

Where the dots over the symbols imply the growth rate of the variables L, K, X and β_1, β_2 and β_3 are the elasticities of output with respect to L, K, and X.

Thus adding constant term (β_0) and a stochastic Gaussian disturbance term (U_t) we get the following equation

$$lnY = \beta_0 + \beta_1 lnL + \beta_2 lnK + \beta_3 lnx + U_t \text{.. (5)}$$

In equation (5), lnY is the natural logarithm of GDP percapita, lnk is the natural logarithm of the stock of capital, lnL is the natural logarithm of labor force which is proxied by the population aged 15-64 of the country and lnx is the natural logarithm of total export proceeds of the country.

According to Glezakos cited in Mulugeta (2007) since LDCs have higher rates of population growth, the use of the growth rates of GNP or GDP rather than respective per-capita growth rates introduces an upward bias in to the rates of economic growth of LDCs. Thus in the model we shall use the growth of per-capita GDP instead of the growth of GDP.

The model that will be estimated in this paper is obtained by introducing an instability index component in to the equation. To do that, we split the export component in to stable and unstable. The stable export value refers to the trend export which is calculated by using five years moving average where as the unstable one is the deviation of the actual export earnings from the trend value. Finally the equation to be estimated will thus be:

$$lnY = \beta_0 + \beta_1 ln\, L + \beta_2 lnK + \beta_3\, lnTX + \beta_4 ln\, I_x + U_t \text{.................................(6)}$$

3.2. THE INSTABILITY INDEX

Export instability refers to short-term fluctuation of exports from their trend expected value. The most commonly used instability indices includes normalizing standard error (NSE) index, semi-log standard error (SSE) index, modified log variance (MLV) index, the united nation index, the international monitory fund index and deviation from n years moving average index. From the stated indices almost all share one common limitation; they do not reflect what is known as inherent variability of time series. All the stated indices have been used by different researchers but there is no general consensus on the measurement of export instability.

The absence of generally accepted instability index has forced some researchers to use more than one instability index and though their results were the same from using different indices, the differences lie in the magnitude and significance of the parameters of the instability the explanatory power of the index.

Moving average is one of the most widely used methods in the literature. It is preferred for its flexibility, ease of computation, ability to accommodate different trends and ability to distinguish between rise and fall. It is given as the absolute value of exports from the trend value. In this paper the five year moving average method is used to measure export instability which is given as follows;

$I_t = |X_t - X_{5j}|$

$$\sum_{j=t-4}^{t} xj$$

Where $X_{5j} = 1/5$, It is the export earning instability in year t and X_{5j} is the five year based moving average.

3.3 Diagnostic tests and the result

Before any time series econometric model is estimated, appropriate diagnostics tests of the variables must take place to observe their time series properties.

In the classical regression technique of ordinary least square (OLS), the variables are assumed to be non stationary. But such non stationary variables give spurious or nonsense regression (Alemayehu *et.al*. 2000). Thus the variables must be stationary before applying any estimation technique.

According to Gujirati (2004), unit root test is the recently developed and widely used of stationarity. The Dickey-Fuller (DF) and Augmented Dicky-Fuller (ADF) test are the two methods, among others, that are used for test for the existence of unit roots. In this study the variables of the model are tested for unit roots using ADF test which augments DF test by lags of independent variable. According to the test result, as can be seen from the table 3.1, all variables are found to be non-stationary. Therefore, the variables are tested having differenced them once. And the table indicates all variables are stationary at first difference.

TABLE 3.1: THE ADF TEST STATISTIC FOR UNIT ROOTS FOR THE VARIABLES

| Variables | Level | | First difference | |
	ADF	Conclusion	ADF	Conclusion
LRGDP	2.022	NS	-4.661**	S
lnL	0.894	NS	-5.755**	S
lnK	0.864	NS	-6.485**	S
lnTX	-2.744	NS	-3.467*	S
lnI_X	-0.724	NS	-8.425**	S

NOTE: All variables are in logarithmic form   ** denotes stationary at 1% significance level
NS = Non-stationary   critical value at 1% first diff.= - 3.682
S = Stationary   critical value at 5% first diff. = -2.972

Many economic variables happen to have the nature of non-stationarity because economies involve, grow and change overtime in both real and nominal terms as a result economic forecasts are often badly wrong (Hendry and Katrina, 2000). The need for testing co-integration allows us to describe the existence of equilibrium or stationary relationship among two or more time series each of which individually non- stationary. Economically speaking, two variables will be cointegrated if they have a long term, or equilibrium relationship between them (Gujirati, 2004). Alemayehu *et.al*.(2000) noted that the co-integration test shows that even though the variables taken separately are not stationary, i.e are I(1), their linear combination (tacking them together) may be stationary. In such a case the variables are said to be co-integrated. The study has followed Engle-Granger (EG) approach to perform the co-integration test; and it is found that the residual is stationary at 1 percent which is shown in table 3.2. The fact that the residual is stationary implies that the variables are co-integrated of there exists a long run equilibrium relationship among the variables of the model.

According to Gujirati (2004), even if the variables of the model are co-integrated, there may be disequilibrium in the short run. The error correction mechanism (ECM) is important since it conveys information for the speed of the adjustment from short run disturbance to long-run equilibrium.

TABLE 3.2: ADF TEST STATISTIC FOR THE RESIDUALS

Test statistic	1% critical value	5 % critical value	10% critical value
-3.034*	-3.696	-2.978	-2.618

The residual is stationary at 5 % & 10% critical value

4. ESTIMATION RESULT

4.1 ESTIMATION RESULT OF THE LONG RUN MODEL

LRGDP =   9.8757 +   0.5272lnL +   0.1727LnK +   0.0134LTX +   - 0.0156LnIX
t-stat   (9.07)   (6.09)   (4.92)   (0.32)   (1.88)
t-prob   (0.000)   (0.000)   (0.000)   (0.749)   (0.070)
F-stat=273.75
Prob>F=0.0000
R-squared=0.9742
Adj R-squared=0.9742

The result from the above equation shows that the probability of the F-statistics is equal to 0.0000 (prob>F=0.0000) and this implies all the explanatory variables jointly explain the dependent variable at 1% level of significance. The OLS regression results shows that $AdjR^2$=0.9742, the model describes 97% of the long run variation of real GDP is explained by the explanatory variables of the model.

The estimation result of the long run model of the t-statistics in the above equation indicates the instability index (lnIx) is found to have negative sign and statistically significant at 10% level of significance. This shows that export instability affects economic growth negatively. The labor force (lnL) and the stock of

capital (lnK) significantly affect the economic growth of Ethiopia at 1% level of significance and both variables confirmed their expected positive sign. But the result suggests that labor contributes more to the growth of the economy. The other variable, trend export (lnTX), confirm the expected positive sign but in contrary to literature it has insignificant effect on growth rate of GDP.

4.2 ESTIMATION RESULT OF THE SHORT-RUN MODEL IS

$$\Delta LRGDP = 0.0281 + -0.594\Delta LnL + 0.066\Delta LnK + 0.185\Delta\ LnTX - 0.003\Delta Lnlx - 0.5229ECM_{-1}$$

t-stat	(1.20)	(-0.76)	(1.95)	(3.58)	(-0.55)	(-3.53)
t-prob	(0.040)	(0.455)	(0.061)	(0.001)	(0.589)	(0.002)

F-stat=6.83
Prob>F=0.0003
R-squared=0.5585
Adj.R-squared=0.4768

Both the short run and long run model of the study explain the negative sign of export earning instability index, however the short run model prevails statistically insignificant of the impact on real GDP. Unlike the long run interpretation the instability index and the labor force have negative sign and statistically insignificant in the short run. The negative sign of the labor force indicates that there is labor surplus in the country. The results show that the stock of capital has positive and significant relationship with the growth rate of GDP both in the long run and the short run. The result also shows that the trend export is positively related to economic growth at 1% level of significance in the short run.

The empirical result of the short run dynamic model gives R^2 equal to 0.47 showing that 47% of the variation in the growth rate of GDP is explained by the model in the short run. The F-test result indicates that the joint effects of all the variables are statistically significant at 1% significance level. The coefficient of the error correction term has the expected negative sign with magnitude of 0.5224 which implies almost 52% of the discrepancy between the actual and the long run equilibrium value is corrected each year.

The other growth explaining variables included in the model are proved to have explained the variation in the growth of the economy and have the expected sign of the parameters. When it comes to the long run, capital is the only variable that explained the variation in the growth of the economy.

5. CONCLUSION

The study aimed at the impact of export earning instability on economic growth and the results in section three shows that export earning instability indicates a negative sign both in the long run and in the short run. However, the significance of the coefficients is different i.e. the short run coefficient is insignificant while the long run coefficient is significant. The long run result is similar to findings of other researchers like Amin (2001) and Mulugeta (2007) who studied the Ethiopian case and Brempong (1991) who studied the case on 34 Sub-Saharan African countries and found negative and significant relationship between export earning instability and economic growth. But other researchers like Sinha found positive relationship between the two variables on three developing countries, Myanmar, Pakistan, and Thailand; from nine countries he studied the case.

The negative and significant effects of export earning instability in the long run deteriorate economic growth unless something has to do. Diversification both vertically and horizontally from traditional agricultural exports in to those where demand is growing should be encouraged. Engaging in the introduction of new commodities which is higher valued products is important rather than simply the expansion of old ones which are vulnerable to shocks. Quality improvements of traditional products also should be maintained to reduce export earning instability and enhance growth of export.

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