The Balance of Payment-Constrained Economic Growth in Ethiopia

Naod Mekonnen Anega[1]

Abstract

The objective of this paper is to empirically test the validity of the simplified version of the balance of payment-constrained economic growth model for Ethiopia during the period 1971-2008[2]. According to the model, economies only grow at a pace allowed by the constraints imposed by the requirement of balance of payment. Import demand function is estimated for the same period in order to estimate income elasticity; co-integration test between GDP and export is conducted using the Engel Granger two step technique[3] and the effect of liberalization on import income elasticity is incorporated into the analysis. The finding shows that the average economic growth over the sample period is 2.84 percent, whereas the economic growth as suggested by Thirwall's law is 7.42 percent. These finding show that Ethiopia's economy has been growing at a low rate as compared to the model's predicted growth rate. Achieving persistent and sustainable economic growth depends upon the strategies that relate to institutional and technological progress along with the other significant factors such as sound infrastructure and continuity in policies.

Keywords: Economic growth; Balance of payment-constrained growth; Demand-oriented growth.

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[1] Assistant Researcher, Ethiopian Economics Policy Research Institute (EEA/EEPRI), Addis Ababa.

[2] This period was selected for the availability of data.

[3] The relatively few observations we have do not allow us to apply the Johansen (1988) procedure to test for co-integration.

1. Introduction

In explaining differences in rates of economic growth among countries or regions and factors that constrain a country's economic growth, two viewpoints contest with each other. On the one hand, the conventional view takes a supply-oriented approach in which differences in economic performance among countries or regions are explained exclusively by exogenously determined technological progress and factors of production available in the economies considered. Therefore, economic growth is constrained only by factors that prescribe supply conditions. On the other hand, the demand-oriented approach questions the very presumption of the exogeneity of the factors of production and technical progress. In this viewpoint, the supply of factors of production and technological progress are driven by demand rather than determined outside the economy (Yongbook 2006).

According to a Kaldorian line of argument export demanded from abroad is the ultimate demand determinant of economic growth. Using this argument, Thirlwall (1979) developed a balance of payment-constrained model. This model was developed as a tool to study the constraint imposed by the need to generate foreign exchange and to provide explanation about the balance of payment related demand-side structural parameters that limit growth. According to Thirlwall, for an economic growth to be sustainable in an international context, the growing demand for imports associated with economic growth must be financed by the revenue of foreign exchange from exports. Thus economies only grow at a pace allowed by constraints imposed by the requirement of balance of payment.

Assuming that a country's economic output is influenced by import and export, Thirlwall (1979) developed a seminal hypothesis assessing that a country's economic growth rate can be approximated by the inverse of import income elasticity multiplied by the rate of growth of exports. Moreover, Thirlwall showed that neither trade nor

financial liberalization and export promotion strategy necessarily lead to better growth performance. Rather, one should consider not only exports of goods and services, but also the income elasticity of imports. The balance of payments-constrained growth model postulates that the rate of growth in any country is constrained by its balance of payment as the economic growth cannot be higher than the consistent level of the balance of payment equilibrium, or, at least consistent with a sustainable deficit in the balance of payments.

In its simplest version, the model is based on the assumption that a current deficit cannot be financed indefinitely and, hence in the long run the balance of payment equilibrium has to prevail. Revenue of foreign exchange from exports of goods and services enable an economy to finance the increased import spending that is demanded by the expansion of domestic activities. Thus, in this model it is assumed that trade balance is in equilibrium and that imports are related to domestic income only.

When we look at the structure of Ethiopia's external sector, because of the need to import large quantities of food and the lack of high-value exports such as minerals or petroleum, annual deficits in the merchandise trade account have exceeded US$1 billion since the late 1990s.The calculation using national bank report in annex 8 shows that trade balance has never been positive in Ethiopia since the last Imperial regime.

Ethiopia has experienced large deficits in its current account since at least the late 1990s. The services sector has shown consistent surpluses, reflecting revenues from Ethiopian Air Lines and to a lesser extent from tourism and shipping services, having risen from US$114 million in 1998–99 to an estimated US$159 million in 2002–03. Similarly, transfers of funds from official donors and remittances from nationals living abroad have been strong, amounting to US$502 million in 1998–99 and more than US$1 billion in 2003–04. These surpluses, however, have not been enough to offset large shortfalls in

merchandise trade and debt-service payments. In 1998–99, the current account deficit was US$510 million. It fell to US$262 million in 2000–2001 before rising to an estimated US$397 million in 2002–03. These deficits have been covered by credits and loans from international lending institutions and by debt forgiveness. Moreover, the overall balance of payment deteriorated from a surplus of birr 480 million (0.5% of GDP) during 2005/06 fiscal year to a deficit of birr -2.7 billion (-1.1% of GDP) in the year 2007/2008.

2. Empirical Literature

Houthakker and Magee (1969) have provided a basis for numerous comparisons of trade equations across countries. Thirlwall (1979) used their finding of large inter-country variation in income elasticities to explain long-run growth rate differences between countries. In an open economy, the dominant constraint on demand, according to Thirlwall, is the external constraint. If a developing country runs into balance of payments problems before it reaches its short-run capacity, then demand must be curtailed. Thus resources are underutilized. Technological progress is curtailed and the country's competitiveness suffers, worsening the balance of payments position. If, on the other hand, a country is able to expand demand up to the level of full utilization of resources without running into balance of payments problems, the pressure emanating from demand may raise the capacity growth rate through investment, technological progress, and increased factor supply. Thus, while a country cannot grow faster than its balance of payments equilibrium growth rate for very long, unless it can finance an ever-growing deficit, there is little stopping a country from growing slower and accumulating large surpluses (Thirlwall 1979, 49).

Using trade functions of the Cobb-Douglas form, Thirlwall derived the Balance of Payment Constrained Economic Growth (BPCG) rate, which he relates to the dynamic version of the Harrod trade multiplier. Thirlwall and Hussain (1982) extended the model to analyze the experience of developing countries that run current

account deficits for prolonged periods. The evolution of capital flows, therefore, appears as an additional constraint on long-term growth in their model.

Lopez and Cruz (1986) applied the balance of payment constrained model to four Latin American countries, namely, Argentina, Brazil, Colombia, and Mexico. They estimate the model using co-integration analysis and a Vector Auto Regression (VAR) specification. In addition, they showed a co-integration between export and GDP, and they tested a Granger causality model. They came to the conclusion that balance of payments growth model is an appropriate tool to analyze countries log-run growth.

Atesoglu (1997) and Hieke (1997) tested the balance of payment constrained growth model using Johansen procedure for USA. They both have found the same result. However Hieke (1999) tested the law using Augmented Dickey Fuller (ADF) test. With his analysis Hieke found that the income elasticity of demand for imports has not been stable throughout post-World War II. Thus, he demonstrated that for some periods after World War II, the model is not valid for the US economy. This is the only case where the model failed to estimate.

On the other hand, Yongbook (2006) empirically tested the validity of balance of payment constrained growth model for China during the reform period of 1979-2002. The income elasticity of import demand, an aggregate import demand function for the Chinese economy is estimated using Unrestricted Error Correction Mode (UECM) model and the bounds text. The results are: (1) for 1979-2002, the Chinese economy has grown on average as fast as Thirlwall's law predicts; the average actual growth rate and predicted growth rate were, respectively, 9.25 and 8.55 which are statistically identical; (2) the growth of GDP and of exports are co- integrated. Both (1) and (2) provide a strong support for Thirlwall's law in China.

Jorgen and Virmantas (2004) examined the balance of payments constrained growth model in three Baltic countries, namely, Estonia, Latvia and Lithuania. The study found that based on the estimation of income elasticities of imports and assumptions about export growth, GDP growth rates were consistent with the balance of payment equilibrium.

Bashir and Sharib (2007) tested the balance of payment constraint model for Pakistan for the period 1950- 2007. To examine whether the co-integration relationship exists among the relevant variables or not, they employed Johansen's (1988) co-integration and a Vector Error Correction (VEC) framework. The study found that co-integration relationship holds between exports growth and economic growth in Pakistan. These results are robust in various econometric techniques implying the application of Thirlwall's law in Pakistan.

More recently, Guadalupe and David (2008) tested the balance of payment constrained growth model for Cuba. The study employed co-integration technique and the result shows that economic growth, exports of goods and services, and terms of trade are driven by a common stochastic trend. The study concludes that economic growth is constrained by the country's own external demand position.
Generally, this balance of payment-constrained growth model has been applied to developed countries and developing countries, showing that the actual growth rates are very close to the predicted ones and, therefore, that the economic growth is influenced by balance of payments (McCombie and Thirwall 1994; Atesoglu 1995; Moreno-Brid and Perez 1999; Tuner 1999; Perraton 2003; Pacheco-Lopez and Thirwall 2006; and Fumaroles and Matesanz 2008).

3. Specification of the Model

According to the balance of payment constrained growth model, countries' long-run economic growth is constrained by the need to finance their import. Thus, formulation of the simple balance of payments constrained model makes use of the following equation.

Given the balance of payments in initial current account disequilibrium, this may be expressed as:

$$P_{dt}\mathrm{X}_t + C_t = Pf_t M_t E_t, \ldots\ldots\ldots(1.1)$$

Where X_t is the volume of export; P_{dt} is the domestic price of exports; M_t is the volume of imports; Pf_t is the foreign price of imports; E_t is the exchange rate (measured as the domestic price of foreign currency), and E_t is the value of capital flows measured in domestic currency. $C_t>0$ measures capital inflows, and $C_t<0$ measures capital outflows. Taking rates of change of the variables in equation (1.1) gives:

$$\left(\frac{E}{K}\right)\left(P_{dt} + \mathrm{X}_t\right) + \left(\frac{C}{K}\right)\left(C_t\right) = Pf_t + M_t + e_t \ldots\ldots\ldots\ldots\ldots\ldots(1.2)$$

where the lower case letters represent rates of growth of the variables, and $\left(\frac{E}{K}\right)$ and $\left(\frac{C}{K}\right)$ represent the share of exports and capital flows as a proportion of total receipts (or the proportion the import 'bill financed' by export earnings and capital flow in the case of developing countries.

Now assume that the normal multiplicative import and export demand functions with constant elasticity:

$$M_t\left(\frac{Pf_t E_t}{P_{dt}}\right)^{\Psi} Y_t^{\Pi} \ldots\ldots\ldots\ldots\ldots\ldots(1.3)$$

And $X_t\left(\frac{P_{dt}}{Pf_t E_t}\right)^{\eta} Z_t^{\Sigma} \ldots\ldots\ldots\ldots\ldots(1.4)$

Where Ψ is the price elasticity of demand for imports $(\Psi < 0)$; η is the price elasticity of demand for exports $(\eta < 0)$; Y is domestic income; Z_t is the level of world income; Π is the income elasticity of demand for exports. From equation (1.3) and (1.4) taking rates of change of the variables, we have;

$$M_t = \Psi(Pf_t + e_t - Pdt) + \Pi(Y_t) \quad \text{.....(1.5)}$$

$$X_t = \eta(P_{dt} - e_t - Of_t) + \Sigma(Z_t) \quad \text{.....(1.6)}$$

Substituting equation (1.5) and (1.6) by equation (1.2) gives the balance of payments constrained growth rate starting from initial disequilibrium of:

$$Y_{Bt} = \frac{\left(\frac{E}{R}\eta + \Psi\right)(P_{dt} - e_t - Pf_t) + (P_{dt} - Pf_t - e_t) + \frac{E}{R}(Z(Z_t) + \left(\frac{C}{R}\right)(C_t - P_{dt})}{\Pi} \quad \text{.....(1.7)}$$

The first term on the left-hand side gives the volume effect of relative price changes on balance of payments constrained real income growth; the second term gives the terms of trade effect; the third term the effect of exogenous changes in income growth aboard; and the last term gives the effect of the rate of growth of capital flows. If P_{dt}-e_t+Pf_t, i.e., if relative prices measured in a common currency were to remain unchanged over the long-run, equation (1.7) would be reduced to:

$$Y^*_{Bt} = \frac{\frac{E}{R}(\varepsilon(Z_t)) + \frac{C}{R}(C_t - P_{dt})}{\Pi} \quad \text{..... ....(1.8)}$$

Since we do not have information on $\varepsilon(Z_t)$ for all countries we shall assume that $\varepsilon(Z_t) = X_t$, thereby incorporating into the analysis from the start any volume changes in exports from relative price movements. The equation we focus on is thus:

$$Y_{Bt}^* = \frac{\frac{E}{R}(X_t) + \frac{C}{R}(C_t - P_{dt})}{\Pi} \quad \text{.....(1.9)}$$

The above model is known as the balance of payments constrained growth model with the incorporation of capital flow. But this study

will not incorporate capital in-flow, and hence, shows no initial disequilibrium and no capital flows, $\frac{E}{R} = 1 \; and \; \frac{C}{R} = 0$.

Therefore, the model will have the following form;

$$Y_{Bt} = \frac{X_t}{\Pi} \text{..... ....} (2)$$

Where y_{Bt}; predicted long-run growth X_t; Growth of export Π; Income elasticity demand for imports.

According to Thirlwall (1979), before the model is directly tested, one has to check for co-integration between GDP(y) and export (X). If co-integration exists, it will be appropriate to use the balance of payment constrained model to explain long-run economic growth. Accordingly, the estimated model for testing the co-integration between GDP(y) and export (X) has the following form;

$$LRY_t = \alpha_1 + \alpha_2 LRX_t + \varepsilon i \text{.....} (2.1)$$

Where, RY= Real GDP, RX =Real export

εi; Error term; t = time. The expected sign is $\alpha_2 \geq 0$

Apart from testing co-integration between GDP(y) and exports(X), one very important issue in verifying the validity of the balance of payments constrained model is the direction of causation between exports and GDP. The procedure applied in testing the causality of these two variables is based on the pair-wise Granger causality test.

According to the test result provided in Annex 2, the null hypothesis Exports does not Granger cause GDP is rejected. Hence, the direction of causality from export to GDP confirms the validity of the balance of payment constrained growth model.

3.1 Co-integration test between GDP and Export

Using equation (2.1), the existence of co=integration between GDP and exports was tested using Engle-Granger two step procedure; first the long-run model was estimated using Ordinary Least Square (OLS). Then the residual series of the model is stored. The second step was to test for the stationarity of the residual obtained from the long-run GDP function using ADF. The results are reported in Table 1.

Table1. Stationarity test for the error term

Variables	ADF without constant and trend
Residual from the long-run GDP function	-2.18*
Critical values	5% ; -1.953
	1%; -2.645

From Table 1, the stationarity of error terms at 5% level of significance indicates the existence of co-integration between GDP and export. Thus there exists long-run relationship between the estimated variables (See Annex 1 for the long-run and the short-run equations with their results). The existence of co-integration between GDP and export indicates that the balance of payment constrained growth model can be used to explain the long-run economic growth in light of the demand side.

3.2 Model Specification and Estimation Import Demand Function

In order to estimate import income elasticity in the model, an import demand function of the following form was tested:

$$LM_{Agg} = \alpha_1 + \alpha_2 LGDP_t + \alpha_3 LREER_t + \alpha_4 LODA_t + \alpha_5 LIB + \varepsilon i$$

…… (2.2)

Where, M_{Agg} is real aggregate import, GDP is Real GDP, $REER$ is Real exchange rate used as a proxy for relative prices, ODA is

Overall development assistance and LIB is a shift dummy variable which takes a value of one for the year of liberalization and zero otherwise, t is time L is log value, εi is the error term, and the expected signs of the coefficients are $\alpha_2 \geq 0 \alpha_4 \geq 0 \alpha_5 \geq 0 \text{ and } \alpha_3 \leq 0$.

Given this, import demand model, estimation of import income elasticity was conducted. This will help us to estimate the balance of payment constrained growth model which is given by the formula $Y_b = \frac{X}{\Pi}$ where X stands for the Growth of export and $\prod$ stands for the import income elasticity of the import demand function.

A. Stationarity Test for Import Demand Equation

As a preliminary step to study the existence of one or more co-integration relationships, it is necessary to analyze the integration order of the variables to include in the model. That is why it is important to know if the variables are stationary or not, and if not then what order of integration they have. Therefore, the Augmented Dickey-Fuller (ADF) tests are applied. Using this test, the results in (See Annex 6) show that all the variables are stationary at their first difference: I.e. I (1).

Short-run and long-run analysis of a model always depends on the residual value of the model that must be stationary. Here, in our import demand model, the residual was found to be stationary at 1% level of significance; as a result, we can say there exists a long-run relation between the short-run model and the long-run model of the estimated import demand function. Thus, the long-run estimated import demand function has the following form.

$$LM_{Agg_t} = -9.4 + 1.82LGDP_t - 0.5LREER_t + 0.14LODA_t - 0.32LIB \quad \ldots\ldots(2.3)$$
$$S.E \quad \ldots\ldots(0.3) \quad \ldots\ldots(0.19) \quad \ldots\ldots(0.05) \quad \ldots\ldots(0.11)$$

Where RSS is 0.7; R^2 is 0.94; DWis 1.824; Number of observation is 30; and Number of parameters is 5.

After the long run equation of the model is tested, the residual from the long-run equation is stored for testing long-run adjustment of the equation and for estimating the short-run dynamics. But here we are only concerned with the import income elasticity which is the coefficient of GDP in the long-run equation. Thus, we run the short-run dynamics equation only for computational purposes.

Table 2. Stationarity test for the Error Term

Variables	ADF with out constant and trend
Residual from the long-run import demand function	-2.92**
Critical values 5% ; -1.953 1%; -2.645	

From Table 2, the error term is stationary at 1% level of significance. And the level of significance indicates the existence of co-integration among the variables in the import demand function. In other words, there exists a long-run relationship between import and the other explanatory variables.

B. Short-Run Estimation of the Import Demand Function

The short-run estimation of the import demand function shows that GDP, REER and ODA are significant with positive coefficients.

$$DLM_{Agg_t} = -0.075 + 1.645DLGDP_t - 0.49DLREER_t - 0.14DLODA_t - 0.57ECM_{t-1} \quad \ldots\ldots(2.4)$$
$$[S.E \quad \ldots\ldots(0.5) \quad \ldots\ldots(0.22) \quad \ldots\ldots(0.075) \quad \ldots\ldots(0.12)]$$

Where, R^2 is 0.614; DW is 1.94; Number of observations is 30; and Number of parameters is 5.
The Error Correction Model (ECM) in the above short-run dynamic model indicates that the model will adjust to its long-run equilibrium. Therefore, the interpretation is, the model will adjust to its long-run equilibrium by 57% each year. The $R^{2,}$ on the other hand, indicates that 61% of the variations in the dependent demand function is explained by the independent variable.

Hence, according to the long-run import demand equation the income elasticity demand for imports was found to be 1.82. This is the coefficient of GDP; the interpretation is that, a 1% increase in real GDP will give rise to an increase in import by 1.82. Moreover, this value [the import elasticity] will be used in the balance of payment constrained model which is going to be discussed in the next section.

3.3 The Effect of Liberalization on the Import Income Elasticity

In order to understand the effect of liberalization on the import income elasticity, we need to estimate another import demand function of the following form:

$$LM_{Agg_t} = \alpha_1 + \alpha_2 LGDP_t + \alpha_3 LREER_t + \alpha_4 LODA_t + \alpha_5 LIB_t + \alpha_6 LGDP_t^* DLIB_t + \varepsilon_i \quad \ldots(2.5)$$

Where: M_{Agg} is real aggregate import, GDP Real GDP, $REER$ is real effective exchange as a proxy for relative prices, ODA is overall development assistance, LIB is a shift dummy variable which takes a value of one for year of liberalization and zero, otherwise t, is time, L

is long value, εi is the error term, $LGDP * DLIB_t$ is Parameter to measure post-liberalization effect on import income elasticity

According to Gujrati (1995), the introduction of the dummy variables in the multiplicative form enables us to differentiate between slopes coefficients of the two periods, just as the introduction of the dummy variable in the additive form enables us to distinguish between the intercepts of the two periods. Thus, before liberalization, import elasticity will be α_2 and after liberalization import elasticity will be $(\alpha_1 + \alpha_6)$. For now, let us examine the results of the estimated model that has incorporated the effect of liberalization.

$$LM_{Aggt} = 2.41 + 1.26GDP_t - 0.28REER_t + 0.2LODA_t - 0.27LIB + 2.55LGFDP_t * DLIB_t \quad \ldots (2.6)$$

$$S.E \quad \ldots\ldots\ldots\ldots (0.21) \quad \ldots\ldots\ldots (0.12) \quad \ldots\ldots\ldots (0.24) \quad \ldots\ldots (0.32) \quad \ldots\ldots (0.06) \quad \ldots (0.05)$$

Where R^2 = 0.96, DW= 1.73, Number of observation = 30, Number of parameter= 6.

According to the new estimated import demand model, the import income elasticity has increased after the post-reform period. That is, liberalization has increased import income elasticity from 1.26 to 3.2 $(\alpha_1 + \alpha_6)$. The direct interpretation is that liberalization has increased the import income elasticity. The indirect interpretation is that after liberalization, as GDP increases by 1% the imports increase by 3.2% (see Table 3).

Table 3. Income elasticity for import demand equation

Period	Import income elasticity
Before liberalization (1974-1991)	1.26
After liberalization (1991-2008)	3.2
For all period (1971-2008)	1.84

4. Findings and Discussion

According Thrilwall (1979), there are two cases in which an economic growth is constrained by the balance of payment. The first case is when the predicted growth (Y_b) is greater than the actual growth. The second case is when both the predicted growth (Y_b) and the actual growth are statistically identical.

Thus, our result shows that the predicted growth Y_b is greater than the actual growth Y_A (See Annex4). The direct interpretation of the above result is that the country's economic growth is constrained by the balance of payment. Therefore, the country's economic growth cannot pass the constraint imposed by requirements of balance of payment (See Annex 5).

During the period 1992-2003,1993-2004 ,1994-2005 (See Annex 5), the mean decennial growth rates for predicted growth has declined seriously but was still greater than the actual growth. This is because the country was in conflict with Eritrea. As a result, the country's export declined at a high rate. And since our formula for predicted growth is export growth over import income elasticity, the effect can be easily recognized.

The import income elasticity, which was 1.26 before liberalization, has increased to 3.2 after the country underwent the reform, i.e., liberalization. The increase in imports income elasticity has made imports to be more elastic. When we look at the impact of liberalization on the model, the actual growth and the predicted growth were 3.2 and 1.9, respectively (See annex 4), before liberalization. On the other hand, after liberalization, the actual and the predicted growth were found to be 6.7 and 3.5 (See annex 4).

Using the above results, we can assess whether or not trade liberalization contributes to the poor performance of the country's balance of payments and hence to economic growth. In other words, we can capture the impact of trade liberalization through its effect on import.

The empirical finding in Annex 4 shows that trade liberalization increased the income elasticity of imports demand from 1.26 to 3.2 in 1974-1991 and 1992-2005, respectively. Therefore, trade liberalization reinforced the balance of payments constraints on the country's economic growth. Therefore, liberalization has worsened the country's balance of payment position.

Looking again at the actual growth rate in the economy in Annex 5, it appears as if the post-1991 liberalization might have slightly slowed the economic growth. But there was in fact no dramatic change; nor the increased growth promised by supporters of liberalization. The empirical results in this section indicate the importance of one constraint, namely, the balance of payments constraint, as a contributor to the failed promises of increased growth.[4] The export-led growth strategy of the 1990s reflected itself as a trade deficit in which imports exceeded exports. There is no doubt that in itself, export growth functions as an engine of overall economic growth through expanding the national income level. However, the constraint occurs at the point when high income elasticities of demand for imports then transform this into a persistent foreign trade deficit. The post-1991 liberalization programs led to such a problem.

5. Conclusion

In this article, we empirically analyzed the simplified version of the balance of payment-constrained economic growth model for

[4] This study doesn't claim that other constraints might not also be important, nor does it attempt to measure the relative importance of other constraints. The article focuses on only one constraint, i.e., balance of payment constraint.

Ethiopia. Empirical results reveal long-run relationship between GDP and export. The finding presents a reasonable explanation of variations in the long-run economic growth of Ethiopia. Overall, these results are supportive of Thirlwall's law in Ethiopia and suggest that development process can be stimulated through employing Keynesian approach. The model proposes that economic growth phenomenon could be explained well by demand-oriented approach as compared to supply-oriented approach. As it can be seen from Annex 3, the study not only analyzed the actual growth rate but also the suggested growth rate of the economy by estimating the implicit elasticity of imports in Ethiopia.

The average economic growth over the sample period is 2.84 percent, whereas the economic growth as suggested by Thirwall's law is 7.42 percent. These findings show that Ethiopia's economy has been growing at a low rate as compared to the model's predicted growth rate (See Annex5). Achieving persistent and sustainable economic growth depends upon the strategies that relate to institutional and technological progress along with the other significant factors such as sound infrastructure, continuity in policies, etc.

From the literature, we note that developing countries are producing and supplying few agricultural commodities for world market that have low price and income inelastic demand while they import manufactured goods that have high price and income elasticity of demand. Therefore, the poor nations have been experiencing deteriorating terms of trade and declining economic growth.

Ethiopia is one of the developing countries sharing the above problems. While the country's export earning is low and fluctuating, the import of high priced goods is increasing over time. These unproportional growth rates of export and import value contributed to the deteriorating balance of payment of the country and thus to the country's slow economic growth (See Annex 7 and Annex 8).

Thirlwall's law is a demand-oriented approach which considers export demand from abroad and income elasticity of import for foreign goods as the determinants of economic growth. Ethiopia's long-run rate of actual economic growth was less than the balance of payments-constrained growth rates. This result conforms to Thirlwall's proposition that says 'no country can grow faster than that rate consistent with the balance of payments equilibrium on current account unless it can finance ever growing deficits which in general it cannot' (Santos-Paulino and Thirlwall 2004, 41)

Policy Related Issues

According to the balance of payment-constrained growth model, the constraint is imposed because the country's growing import could not be financed by the export earnings. In other words, the model provides a parsimonious (if partial) explanation of the balance of payments-related demand-side structural parameters that limit growth.

The policy implication of the model is that an economic policy that reduces income elasticity of demand for imports would relax the balance of payment-constrained growth constraint on growth, thus allowing Ethiopia to achieve more rapid growth. One approach to implement this in Ethiopia would be to encourage the consumption of more locally produced goods in response to increased income. Coupled with continued export promotion, this would relax the balance of payment-constrained growth constraint and increase economic growth. This type of export-based growth can only be done with the help of economic planning. Moreover, import controls can be imposed on unproductive goods so as to reduce income elasticity of demand for imports. In line with this, implementation of the policies which aim at diversification of export products should be undertaken seriously. Overall, the empirical findings supportive of Thirlwall's law in Ethiopia suggest further the relevance of demand-oriented approach to economic growth in Ethiopia. But it is also important to know that the supply side approach should also be properly addressed so that we one could attain optimal policy mix.

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Annex 1: Result and estimated equations for Co-integration test between GDP and export Stationarity test

Variables at level	ADF with constant and trend at level	Variables at 1st difference	ADF with constant and trend at difference
$LGDP_t$ LX	*2.134* *4.16*	*DLGDP* *DLX*	*-2.56*** *-3.251**
Critical values 5%; -3.557 1%; -4.308			

The long-run equation of GDP and export functions:

$$\underset{SE}{LGDP} = \underset{0.136}{8.498} + \underset{0.186}{0.3122}\, LX$$

The short-run equation with the Error Correction Model (ECM):

$$\underset{SE}{DLGDP} = \underset{0.0924}{0.029} + \underset{0.0329}{0.070} DLX - \underset{0.0788}{0.892} ECM$$

Annex2: E Views Test Result of Causality

Null hypothesis	Direction of causality	Number of lags	F Value	Decision
GDP does not granger cause Exports	*GXE*	2	5	*Reject*
Export dose not granger cause GDP	*EXG*	2	0.0029	*Do not Reject*
GDP does not granger cause Exports	*GXE*	3	3.47	*Reject*
Export dose not granger cause GDP	*EXG*	3	0.73	*Do not Reject*
GDP does not granger cause Exports	*GXE*	4	2.3	*Reject*
Export dose not granger cause GDP	*EXG*	4	0.8	*Do not Reject*
GDP does not granger cause Exports	*GXE*	5	2.06	*Reject*
Export dose not granger cause GDP	*EXG*	5	2.12	*Reject*
GDP does not granger cause Exports	*GXE*	6	1.86	*Do not Reject*
Export dose not granger cause GDP	*EXG*	6	6.7	*Reject*
GDP does not granger cause Exports	*GXE*	7	1.18	*Do not Reject*
Export dose not granger cause GDP	*EXG*	7	6.5	*Reject*

Annex 3: Decennial Growth Rate in Ethiopia[5]

Year	GDP	Yb
1971-1980	1.8150873	7.438666
1972-1981	2.0093805	6.595321
1973-1982	1.6140367	3.983444
1974-1983	2.3051063	2.405684
1975-1984	1.6088338	4.501949
1976-1985	0.4025653	2.521651
1977-1986	1.1873641	2.69042
1978-1987	2.2689826	1.890954
1979-1988	2.6419356	1.243182
1980-1989	2.8968894	0.306288
1981-1990	2.1928412	-0.02771
1982-1991	2.3524736	-1.06956
1983-1992	1.4682915	-3.61537
1984-1993	0.531644	6.457529
1985-1994	1.6738158	10.27604
1986-1995	3.1739598	14.42529
1987-1996	3.3967007	14.66208
1988-1997	2.7846841	17.51621

[5] GDP is for actual growth (Y_A) and it is calculated using normal growth rate concept. And Y_b is for predicted growth which is calculated using $y_b = \frac{\overline{X}}{\Pi}$

1989-1998	2.6392535	16.96227
1991-2002	3.5895601	19.08413

Annex 3: *Cont'd.*

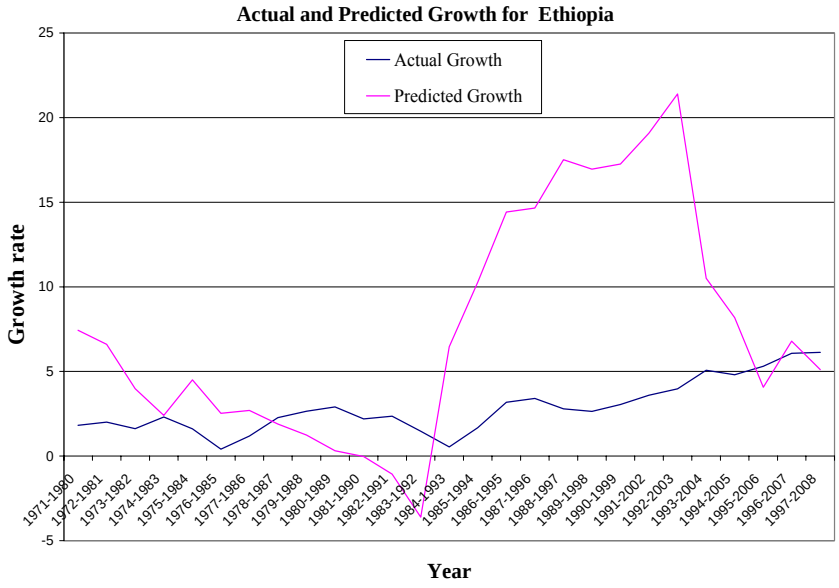
Year	GDP	Yb
1990-1999	3.0413749	17.25847
1992-2003	3.9774334	21.3942
1993-2004	5.0653046	10.50544

1994-2005	4.8015292	8.179832
1995-2006	5.3095404	4.071165
1996-2007	6.0681778	6.797872
1997-2008	6.1252465	5.105789
All Period	**2.8497042**	**7.465231**

Annex 4: Summary of the balance of payment constrained growth model

Periods	$\overline{X}$	Π	y_b = (predicted growth) $y_b = \frac{\overline{X}}{\Pi}$	Actual growth (Y_A)
For all period	13.53	1.56	7.45	2.849
For 1974-1991(Before liberalization)	4.044	1.26	3.2	1.904
For 1992-2008 (after liberalization)	21.73	3.2	6.78	3.57

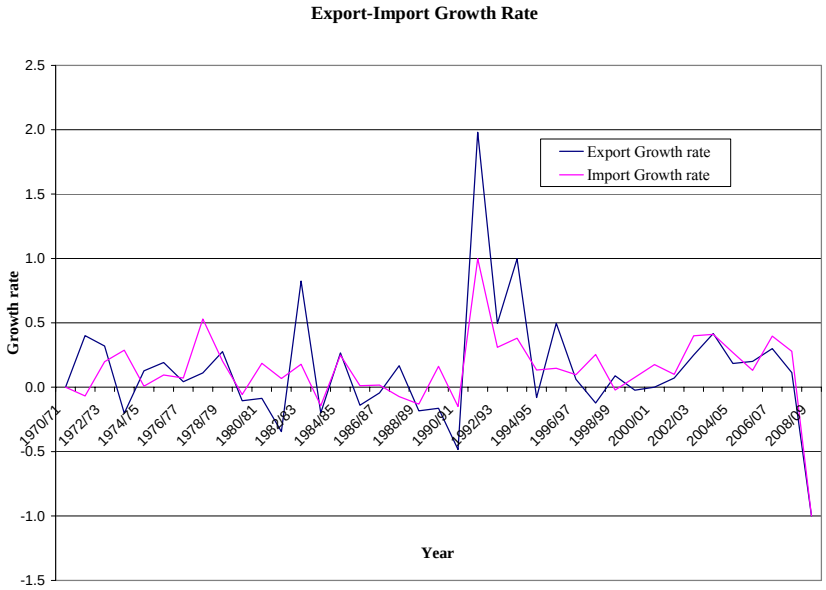
Annex 5: Actual Growth and Predicted Growth Rate Trends for Ethiopia



Annex 6: Import demand function stationarity test

Variables at level	ADF with constant and trend at level	Variables at 1st difference	ADF with constant and trend at difference
$Limport_t$	*-1.26*	$DLimport_t$	*3.788***
$LREER_t$	*-2.73*	$DLREER_t$	*-4.299***
$LODA_t$	*-2.41*	$DLODA_t$	*-3.942**
$LGDP_t$	*-2.23*	$DLGDP_t$	*-5.88.2***
Critical values 5%; -3.557 1%; -4.308			

Annex 7: Import and Export growth Rates



Annex 8: Trade balance for Ethiopia