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Estimating the Demand for Import Under Foreign Exchange Constraint in Ethiopia

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ABSTRACT: *This study estimates the demand for import under foreign exchange constraint for Ethiopia using a time series data for the period 1991/92-2019/20. Both the simple descriptive analysis and the Johansen's co-integration approach are employed to see the impact of foreign exchange constraint on the import demand of the nation. The quantitative results from co-integration and error correction specifications show that imports of the country are sensitive to changes in foreign exchange reserves both in the long run and in the short run. The result of the study also indicates the existence of an underlying long-run stationary steady state relationship between import demand and relative import price index, real income and policy dummy in Ethiopia. Moreover, all the explanatory variables of interest i.e. foreign exchange constraints, relative import price index and real income, do significantly cause import demand in the short run. Lastly, the estimated Vector Error Correction Model of import is stable over the sample period that it can be used for a policy purpose. The lower short run income elasticity of import shows the room available for import substitution industrialization strategy in Ethiopia and the higher long run income elasticity provides an evidence in favor of product diversification.*

KEYWORDS: Co-integration, Imports, foreign exchange reserve and Trade liberalization

INTRODUCTION

In a global network no country is self-sufficient. There is mutual interdependence among countries. The less developed countries particularly depend on the developed countries for finance, technology, and even technical work force while the advanced countries depend on the less developed countries especially for their raw materials (see Lardy, 2003). Hence; economic literatures have identified illustrious channels through which international trade can have an effect on economic growth of participating nations. Naturally, the process of economic growth sets in the motion of a growing demand for capital and consumer goods as well as raw materials to sustain the expansion. Clearly, sustainable development particularly economic growth necessitates the provision of additional resources as it occurs (see K. Wing, 2014). However; the stipulation of these extra resources cannot be sustained out of domestic supplied resources alone; rather we have to imports of foreign resources to necessary fill the gap between a growing aggregate domestic demand and a limited supply of economic resources.

However; the determination of the import behavior of a given country's required to taking into account the availability of foreign exchange reserves in central bank pocket (See Bastourre e t al, 2009). Accordingly, the linkage between the availability of foreign exchange reserve and the pattern of import is intuitively palpable, in such way that countries which have limited access to foreign borrowing ought to take into account the estimated time path of their future export earning in deciding about how much import today. Otherwise they will expose themselves to the threats of fluctuation in export earning in turns the need to crucial imported items (See K. Reed, 2015).

Consequently; in the historical skeleton till now there is a growing cogitation on the issue: do developing countries need to accumulate much reserve? This question divided economists in to two streams. Let me sketch the arguments what each blocks pointed out in every time horizon. First, pessimists in their thought pointed out that the accumulation of more reserves is costly, for instance; the reserves held in the pocket of central bank will earn a modest return which far below countries' own cost of borrowing from domestic and foreign sources either in local currency or in dollars. So, why those countries hold more cash in the bank and pay high interest on outstanding liabilities? On the opposite side, the optimistic of holding more foreign reserve remind that the cost of holding more reserve is undersized when we compared to the vast economic consequences of having depreciation in the value of the domestic currency which upshot by financial crises in developing economies. And also, the advocates narrated that accumulation of more foreign reserves is a psychic policy which have a paramount importance for those when defending the value of the currency makes sense.

Like other developing countries, the explicit bottleneck that we have observed in Ethiopian economy currently is that the shortage of foreign exchange reserve to financing needed imports for development and its various ambitious program which it undertake. This activities requires heavy imports of capital goods, essential raw materials and in some cases, even food grains have been imported. Besides, imports of oil on a large scale are being made. On account of all these imports, import expenditure of the country has been rapidly increasing. Not for blessing, due to the relative low competitiveness of export items and imposed restrictions, the growth of exports in the economy has been sluggish. As a result of these sluggish exports and mounting imports, the economy has been facing balance of payment difficulties and shortage of foreign exchange which at times has assumed crisis proportions.

The problem of import under foreign exchange constraint has been investigated in various economic literatures by different authors using different models. Generally, we can scrutinize those empirical literatures in two rivulets.

In one side, economists employed traditional import model by incorporating relative income and price to determine the import demand behavior for instance, Khan and Ross (1977) and Thursby (1984) have been examined the income and price effect of import demand by applying the traditional import model. But this model becomes questioned to explain the sag of import in developing countries with shortage of foreign exchange reserves.

On the other pillar, Hemphill (1974) have been applied extended model for import which slot in foreign exchange receipts and international reserves in to the traditional import model.

Moran (1989) have been employed the general import model to analysis the demand for import under foreign exchange constraint, in such way that import will best explains with a foreign exchange constraint by incorporating the ideas of Hemphill model and the traditional one.

In this study, in turn, the researcher attempt to contribute to the existing body of literature via considering: first, the reserve tranche position in international monetary fund and special drawing right as a part of foreign exchange receipts in to the current import decision. Second since the specification issues in the import demand model is prone to bias and errors if structural shifts are not considered, the effect of import liberalization has capture by including dummy variable which was not included in the investigation of the above articles and Finally the researcher tries to update the work by Moran (1989) with inclusion of latest data on the variables under consideration. This, as such, a unique contribution on the study which uses representative agent model at the national level with a binding foreign exchange constraint assumption that represents the volume of import in a given economy.

In a nutshell, having the importance of foreign exchange reserve to import in one hand and the above knowledge gap which wraps the area of interest under consideration in other round, the researchers will eager to answer the following questions in line with the general intent:

What are the significant factors that affect the behavior of import demand in Ethiopia?

What will be the price and income elasticity of import demand in Ethiopia in the period under consideration?

What will be the effect of foreign exchange reserves on the import demand?

LITERATURE REVIEW

The economic literatures on the effect of foreign exchange availability on macroeconomic performances specifically the demand import and its policy implications in Sub-Saharan Africa are very scant, especially in Ethiopia. However, there are a few studies that look at the issues of import demand and foreign exchange reserves in developing countries using various methods with different foci (for example, Moran 1988; Faini, et al., 1988; Lopez and Thomas 1990; Lensink (1995), Egwaikhide 1999; Ooskooee (2005);Stiglitz et al. (2006),Wodon and Zaman 2008; Bayo and Bernard 2012; Huppe, et al., 2013; Sissay, 2011 and Manitra, et al., 2011). To detain the state of the existing literature on demand for import and the availability of foreign exchange reserves especially in Sub-Saharan Africa, it needs a closer scrutinizing on these literatures. Commonly in the reviewed literatures, one can observe that those earlier studies which investigate the demand for imports, lays its foundations in the traditional models of import developed by Hemphill (1974). Afterward Moran (1988) has revised the Hemphill (1974) and sets the newly extended model, which was later empirically investigated by Sun-Dararajan (1986), and Faini, et al (1988). Following these authors, almost all of the empirical investigations laid on demand for import modeling in developing countries espoused and prolonged the traditional demand import models of Hemphill (1974).

When we looked at the intention behind Hemphill (1974), he alleges that the demand for import is chiefly determined by foreign exchange availability, and the liaisons of short-term reaction

to disequilibrium are based on the specification of the import-exchange rate equation. Moreover, he argues that most "the theoretical and empirical investigations on the demand of import shows that the pour of imports to be gritty largely by aggregate economic activity and prices of imported items relative to prices of locally produced items" (see p. 637). However, Hemphill signifies for developing countries, this liaison is indecisive and it leaves a lot of critiques due to the costs of international trade and exchange barriers. But one can understood from this is that, these anomalies and critiques stressed on the import functions are barely valid for developed economies where the structures of import is highly characterized by importing of semi-final goods, producer goods and capital kits which is hardly to substitutes on domestic competing resources whatsoever.

Another ground-breaking study was conducted by Moran shows that "The traditional demand for import model which merely looks GDP and real import prices as explanatory variables, have failed to foresee and elucidate the demand for import in developing countries' in the early 1980s" (see Moran, 1998, p. 2). His result shows that the importing behaviors of most developing countries were pessimistically affected by the fall in the inflows of foreign exchange reserves and have experienced significant drop in imports which, in turn, led to a wear and tear of investment and a drop or stagnant per capita output growth. Similarly, an investigation conducted by Dash (2005) on the aggregate import demand function for India by using yearly time series data and by applied the Johansen Juselius multivariate co-integration technique from the period 1975 to 2003. To integrate the dynamics of the short run (changes) with long run (levels) adjustment process this study used co-integration and error correction model (ECM). The variables used were gross domestic product, unit value of import prices, prices of domestically produced goods and foreign exchange reserves. Their study suggested that import demand in India is largely explained by price of domestically produced goods, GDP, lag of import and foreign exchange reserves.

On the analogous issue but with a macroeconomic framework Lensink (1995) investigated the effect of exchange rate reserve on overall macroeconomic performance with an emphasis on economic progress. Under in his simulation analysis one can observe that SSA countries are highly hat by the global financial crisis. According to him, ceteris paribus, the progress of the economy in low-income countries heavily depends on foreign exchange reserves to import those capital and intermediate inputs. In the same fashion, a recent study by Sissay (2011) also examining the same concerns but with a standard small open economy New Keynesian DSGE model by introducing foreign exchange availability as an additional constraint faced by firms, suggests that low income countries were heavily rely on imported capital and intermediate inputs. These imported items, in turn, chiefly depend on the stock of foreign exchange on the disposal of the economy. Hence, the feat of the external sector in generating foreign exchange is decisive to boost the piece of the rest macro-economy of home countries. As a result, in the event of a global financial crisis, these countries are expected to be hard-hit (see P. 34).

Having the above point in mind, the issue of foreign exchange reserves of a given country can have a significant effect on the adjustment of noteworthy macroeconomic variables and therefore a broader policies and empirical investigations have to make closer watch on the import structures of developing economies and it importance can be rationalized within

different economic scenarios. Let's triangulate those implications in three peculiar reasoning's. On production side, in most economic activities foreign exchange constraint is considered as factors of production to the economy, in the case that productions of goods and services heavily depend on imported inputs such as fuels, chemicals, raw materials, intermediate inputs, and capital. But the availability of those inputs in turns depends on the amount of reserves that monetary authority holds. Hence, the stock of foreign exchange in the pocket of central bank to import these inputs influences the level of production. For example, the recent global financial crisis that entailed a fall in inflows of foreign exchange into low-income countries from export revenues, remittances and other sources, led to foreign exchange rationing. This, in turn, resulted into significantly reduced production or complete suspension of production by imported-input intensive firms in some countries.

As a signaling indicator, analyzing the importance of the availability of foreign exchange can serve as a proxy to capture the vulnerability ratio of domestic economy through external financing such as aid, loan, and remittance , indicators of ability to repay foreign debt and for currency defense which used to determine credit ratings of nations, and as an insurance against financial shocks which has momentous implications on macro- economic recital of a given country since it creates confidence. Thus, most empirical evidences use total external debt as a percent of gross international reserves, as percent of broad money, as percent of short-term external debt and as percent of short-term external debt on residual maturity basis plus current account deficit. Therefore, countries with similar characteristics would accumulate reserves to avoid negative assessment by the financial market and to filling the national resource gap; which plays a role that cannot be substituted by domestic savings (see McKinnon (1964) and works cited there).

Finally, some countries see accumulation of foreign exchange reserves as exchange rate policy. The argument is that since reserves are the most vital component in the monetary base (high power money), central banks can boost the value of their domestic currencies by selling reserves. For instance, when central bank selloff its reserves in exchange for its domestic currency it decreases the prices of whatever selling and shrinks the money supply by taking the proceeds from the sale out of circulation. Implying that, if central bank sells gold it reduces the price of gold by increasing the supply in the market and the values of dollars it receives in exchange for the gold are removed from the money supply. Theoretically, anything that the central bank can sell in exchange for its currency can be considered a foreign exchange reserve. Thus, central banks around the world sell off their reserves which are mostly dollars, to boost their currencies and slow their domestic food inflation. As a result, most often the monetary authority uses foreign reserve accumulations as a policy instrument to manipulate the strength of domestic currency. In some cases, this could improve welfare, since the lowering of inflation and boosting of currencies would compensate the costs for accretion of more foreign currencies.

Succinctly, though price and income effects are extremely important to analyze the behavior of import in developing countries the import models which take in to account foreign exchange constraint in the macro dynamics of low- income countries become a trendy way to investigate

how the demand for import responds to global financial shocks explicitly for the availability of foreign exchange reserves.

METHODOLOGY

Type and Source of data

The study depends mainly on secondary data and the sources are annual reports of National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED), African Development Bank (ADB), Ethiopian Economics Association (EEA), International Monetary Fund (IMF) and Central Statistical Authority (CSA). The time series data of selected macroeconomic variables between 1992 and 2019 were collected from their respective sources, so as to make the study fruitful in achieving its proposed objectives.

Model specification

The foremost intention of this theoretical model is to investigate impacts of accumulated foreign exchange reserves on import behavior in Ethiopia. Following of the analysis employed by Ceglowski (1991), Clarida (1994) and Emran (2008) incorporate the idea of a rational expectation in permanent income model of a representative agent to derive the import demand function. For this sake, representative agents assumed to maximize their satisfaction by consuming two composite goods (domestically produced (Dt) and imported items (It)). This optimization problem has constrained with its dynamic budget which reflects the accumulation of asset, and with foreign exchange reserve constraint. Now, let's denote Pt as the relative price of imports at prevailed exchange rate, Atas assets, Ŷt as labor incomeFt as the amount of foreign exchange reserve and r as the constant real interest rate. The researcher also has assumed that representative agents discount the future with subjective rate of time preference δ.

Accordingly, the optimization problem of the representative agent is:

$$Max(Dt,It,At)V=E\int_{(t=0)}^{\infty} [\![e^{(-\delta t)} U(Dt,It)dt]\!]$$

Subject to

$$dAt/dt=rAt+\hat{Y}t-Dt-PtIt \ldots\ldots (1) \qquad And \qquad PtIt\leq Ft \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

In line with this, the current value Hamiltonian of the above optimization problem can be written as:

$$H=U(Dt,It)+\lambda t(rAt+\hat{Y}t-Dt-PtIt)+\mu t(Ft-PtIt)$$

Where ¸ λt is the co-state variable, interpreted as the marginal utility of money and μtis the Lagrange multiplier associated with the foreign exchange constraint. Thus, for the above optimization problem we can derive the following the first order conditions:

$$dH/dDt=\lambda t \ldots\ldots\ldots\ldots\ldots (3)$$

$$dH/dIt=Pt(\lambda t+\mu \ldots. (4)$$

$$d\lambda t/dt=(\delta-r)\lambda t \ldots\ldots (5)$$

$$(Ft-PtIt)\geq 0 \text{ and} \mu t^*(Ft-PtIt)=0 \ldots (6)$$

Tag on the empirical frameworks of Emran (2008); we have assumed that (3) and (4) is an additive log utility function then:

$$U(Dt,It)=Ct\ 〖Dt〗^{(1-a)/(1-a)}+Bt\ 〖It〗^{(1-\gamma)/(1-\gamma)}$$

Where Ct and Bt are random and strictly stationary shocks to preference. From the above utility function, we can derive the following first order conditions:

$$〖dU/dDt=CtDt〗^{(-a)}=\lambda t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

$$dU/dIt=〖BtIt〗^{(-\gamma)}=Pt\lambda t(1+\mu\_t^{*})=\lambda\_t\ P\_t^{*} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Where $\mu\_t^*=\mu t/\lambda t$ is the scarcity premia, and $P_t^*$is the scarcity price at which transactions occur at the shop floor in the secondary market. Now let's eliminate $\lambda_t$fromequation (8) by substituting its figure in equation (7) and if we take logarithm of the end result we have obtain the following mathematical structure:

$$\ln Bt-\gamma \ln It=\ln Ct+\ln Pt-a\ln Dt+\ln(1+\mu\_t^{*}) \ldots (9)$$

In order to derive the long -run demand for import functions, we have to impose the steady state conditions of variables asdAt/dt=dλt/dt=0and as Pt = 〖P〗_t^*. Hence total household income is, a composite of both labor and asset income which evaluated at the equilibrium price vector, denoted by 〖Y〗_t^*. As a result, the steady state solution implies that:

$$Y\_t^*=Dt+P\_t^{*}\ It \ldots\ldots\ldots\ldots (10)$$

Using the steady state condition and taking logarithm, we get the following expression for

$$\ln Dt.\ \ln Dt=\ln f_0(Y\_t^*-P\_t^{*}\ It)$$

$$\ln Dt=\ln f_0(Yt-PtIt) \ldots\ldots\ldots (11)$$

Where, $Yt=Y\_t^*-〖\mu\_t^{*}\ P〗\_t^*$ Itis the observed income in the regime where foreign exchange is constrained likewise Pt is the observed price. Now let's use last equation to eliminate lnDtfrom equation (9) and if we solve forlnIt we can obtain the following equation:

$$\ln It=a/\gamma\ \ln f_0(Yt-PtIt)-1/\gamma\ Pt-1/\gamma\ \ln(1+\mu\_t^{*})+\varepsilon\_t \ldots\ldots (12)$$

Where, $\varepsilon\_t=1/\gamma(\ln Bt-\ln Ct)$ is a random and strictly stationary shock of preferences, Y is the total expenditure by domestic consumers on both domestically produced goods and imports and the scale variable $\ln f_0(Yt-PtIt)$in the right hand side of equation defined as GDP minus exports. When the foreign exchange constraint is binding, the Kuhn-Tucker theorem requires that $\mu t>0$, and hence $\mu\_t^*>0$. For most of the developing countries time series data on the scarcity premia on imports, are not available. In order to make the estimating procedure easy,

we need a theoretically consistent parameterization of μ_t^* in terms of the observed variables. Since μ_t^* represents the scarcity premia on foreign exchange, it should be, ceteris paribus, a negative function of the amount of foreign exchange available. So one would tend to think that a good proxy for μ_t^* can be the foreign exchange receipts (Ft), thus providing an ex-post rationalization of the widely used foreign exchange availability approach. To capture the effect of policy changes in external sector dummy variable has to be included in the model.

Taking in to account the above information, we can straightforwardly recapitulate the demand for import function which can be estimated with the data available in Ethiopia as follow:

lnIt=a/γ ln(Yt-PtIt)-1/γ Pt-1/γ lnFt+Dm+ε_t

$$\ln It=\beta 1 \ln(Yt-PtIt)-\beta 2Pt+\beta 3\ln Ft+\beta 4Dm+\varepsilon_t \ldots. (13)$$

Noted that, all variables which are employed in this study with exception of the dummy variable are elucidated in logarithm form and this logarithmic formulation of the variable allows us to make a direct estimation of import elasticity.

DISCUSSION AND ANALYSIS

Unit root test

The co-integration test among the variables that are used in the model requires the existence of a unit root for each variable. The Augmented Dickey- Fuller (ADF) and Phillips Perron (PP) tests were applied to test unit root of the variables. The results of the ADF and PP tests are presented in table 8 in the appendix.

The results reported in the appendix were carried with both intercept and trend. Other deterministic trend assumptions were explored but did not yield better results. Under the assumptions of no intercept and trend in all cases and trend no intercept in some of the cases, the test statistics were insignificant, hence only the ones that produced better results were reported. The unit root tests using intercept and trend suggests that all series are non-stationary in level and becomes stationary after differencing. Thus the variables becomes integrated of order one, I (1).

Co-integration Test

This study employs the Johansen's (Johansen and Juselius 1990) maximum likelihood approach to test for co-integration. The pair- wise correlation matrix is adopted in this study to determine the exact relationship between the five variables used in the study. Results from the pair- wise correlation matrix are presented in Table 1 in the appendix.

From the pair-wise correlation results shown in table 1 in the appendix Yt and Ft are positively correlated with the dependent variable Mt. Yt is highly correlated with Mt than Ft. The positive correlation of both variables is in line with previously stated theoretical underpinnings. Theory suggests that an increase in net income and foreign exchange reserve causes an increase in import bill expenditure. This emanates from increased consumption expenditure, investment,

employment and capital outlay amongst several other positive effects (Caporale and Chui (1999).

Dm and Pm are negatively correlated with Yt. This confirms theoretical suggestions, which propose that the increment in the import price discourages investment. This translates into low levels of demand for import. On the same note, a change in Dm has a negative long run relationship with demand for import. The logic lies for instance, in control of capital, since all payments abroad require permits and all transactions in foreign exchange must be carried out through authorized dealers supervised by the national bank of Ethiopia. The national bank of Ethiopia has delegated most of the foreign exchange transaction functions to the commercial banks but strictly dictates margins. Importers and exporters can obtain import/export permits through the commercial banks. This suppresses the coffers that could have been channeled for further development and leads foreign exchange shortages due to weak export performance and high demand for foreign currency that continue to present significant market challenges (Bertola and Faini (1990).

In using the Johansen test, there is need to determine optimal lag length which eliminates serial -correlation in the residuals as well as determining the deterministic trend assumptions for the VAR model. To select the lag order for the VAR the information criteria approach is applied as a direction in choosing lag order. A maximum of 3 lags is utilized in order to permit adjustment in the model and accomplish well behaved residuals. Table 2 in the appendix confirms the lag lengths selected by different information criteria.

As Table 2 in the appendix shows all the criteria selected 1 lag. Therefore, the information criteria approach produced agreeing results and a decision to adopt 1 lag can be made. Subsequently, the Johansen co-integration test is conducted using 1 lag for the VAR.

Similarly, the Johansen co-integration based on the trace test is shown in table 3 (a) in the appendix. The trace tests the null hypothesis that the number of co-integrating equations is greater than the number of variables involved. The null hypothesis fails to be rejected if the test statistic is smaller than the critical values of the trace tests.

Likewise, table 3(b) in the appendix shows the results of the Johansen co-integration tests based on the maximum Eigen value. The maximum Eigen value test is conducted on the null hypothesis of the number of co-integrating equations (r) against the alternative hypothesis of number of co-integrating equations plus one (r + 1). The null hypothesis cannot be rejected if the test statistic is smaller than the maximum Eigen value test critical value.

The trace test which is much stricter reflected that at least two co-integrating equations exist at 5 percent significance level. The null hypothesis of no co-integrating vectors and at most 1 is rejected since the trace (test) statistic of 84.24 and 48.27 is greater than the 5 percent critical value of approximately 69.82 and 47.86 respectively. Hence the trace statistics specified 2 co-integrating relationship at 5 percent significance level.

The maximum Eigen value test in table 3 (b) in the appendix reveals that at least one co-integrating equation exists at 5 percent significance level. The null hypothesis of no co-integrating vectors is rejected since the Eigen value of 35.97 is greater than the 5 percent critical

value of about 33.88. Using the same analysis, the null hypothesis that there is at most one co-integrating vector cannot be rejected since the test statistic of 21.98 is less than the 5 percent critical value of 27.58. Therefore it can be concluded that there are two significant long run relationships between the variables using the trace test. Since variables can either have short or long run effects, a vector error correction model (VECM) was used to disaggregate these effects.

A summary of results in table 3 (a) in the appendix shows the existence of two co-integrating equations. Trace test and the maximum Eigen value test evidently generate conflicting results. In such a situation Johansen and Juselius (1990) advises the examination of the co-integrating vector and base the decision on the interpretability of the co-integrating relations.

Luintel and Khan (1999:32) reiterated that, it is essential to use results of both tests. In this regard, the choice of the co-integration rank should be guided by prior theoretical information. Batchelor (2000:12) in turn suggests that, in the presence of two co-integrating equations, there is need for normalization of the co-integrating coefficients. The normalization process yields one co-integration equation and one co-integration vector. Bartchelor's approach is adopted in the study.

The co-integration vector represents the deviations of the endogenous variable from its long run equilibrium level. As shown in table 8 in the appendix from 1992 to 2019 the deviations of EPT from equilibrium were stationary. This is critical for its use as an error correction model.

Vector Error Correction Model

The discovery of at least one co-integration equation in the previous section implies that a VECM can be used. This allows us to distinguish between the short and long run effects of variables so as to establish the effect of foreign exchange reserve on import demand. Section 4.3.1 and 4.3.2 presents results of the VECM over the Long run and Short run period.

Long Run Terms

Summary of the long run parameters in the model is reported in Table 4 in the appendix. The long run impact of the explanatory variables on Mt as shown by table 4 in the appendix is illustrated using equation 14:

$$Mt = 4.660 + 1.539Yt + 0.782Ft - 2.799Dm - 0.544Pt \ldots (14)$$

Equation 14 shows that Dm and Pt, has a negative long run relationship with Mt. Yt and Ft has a positive impact on Mt. All the explanatory variables are statistically significant in explaining Mt since they have absolute t-values greater than 2.

A unit increases in Pt causes a decrease in Mt by 54.4 percent. This is portrayed by a t value of -5.96 at 5 percent level of significance. This is compatible with theory. In theoretical suggestions, Pt causes a decrease in import demand schedule. This emanates from the spill-over effects in low demand for capital and technology and a decrease in production. As a result, there is impediment in the flow of imported items.

A unit increase in foreign exchange reserve results in an increase in Mt by 78.2 percent. The relationship is consistent with theory as foreign exchange reserve can be defined as deposits of a foreign currency held by the central bank of a country; it has been curtailed by the ease of currencies availability from the financial sector. This has implications of increased foreign exchange reserve. This is emanates from the fact that the more foreign exchange reserve that the country have the more capacity to import its desired raw materials. Hence a positive relationship with Mt is ensued (Bougrine and Seccareccia, 2004).

Real income has a positive long run relationship with demand for import in the model. The result is plausible since it is compatible to the theoretical suggestion of the marginal propensity to import (MPM) which implies the amount imports increase or decrease with each unit rise or decline in disposable income. The marginal propensity to import is thus the change in imports induced by a change in income. And thus an economy with a positive marginal propensity to consume is likely to have a positive marginal propensity to import. This is because a portion of goods consumed is likely to be imported (Emran and Shilpi, 1996). A unit increase in real income will result in 15.4 percent increase in import demand profiles.

A dummy variable as proxy of policy changes in external sector was found to be significant and negatively related to demand for import. The t-value, -6.60 is significant at 5 percent level. A change in trade policy regime reduces demand for import by 27.9 percent. This is compatible with economic theory. In theoretical suggestions, developing countries have somewhat relied on capital control to adjust economic activities. This has a negative implication on demand for import in the long run as it scarify the interest payment that mount up from foreign and hence it reduce the investment bills.

Speed of Adjustment and Short Run Terms

The speed of adjustment is indicated by the coefficients of the error correction terms. Results from the error correction model are presented in Table 5 in the appendix. Using results from table 5 in the appendix, the coefficient of D (Mt) is reported as -0.285. This shows that the speed of adjustment is approximately 28.5 percent. The implication is that, if there is a deviation from equilibrium, only 28.5 percent is corrected in one year as the variable moves towards restoring equilibrium. Thus, there is no strong pressure on Mt to restore long run equilibrium whenever there is a disturbance. The speed of adjustment is statistically significant with a negative t- value of -1.168. The low speed of adjustment by Mt may reflect the existence of some factors affecting Mt in Ethiopia other thanYt. These factors include level of education connoted as human capital, consumer price index, exports, amongst others.

The lag of LYt is found to have a positive effect on Mt in the short-run. However, the t- value of -1.765 is insignificant. The coefficient shows that current Mt can increase by 86.3 percent if LYt is increased by 1 percent. This shows that the exogenous component of Yt exerts a reliable, positive impact on demand for import. The error term, which has been included to take into account all factors that affects Mt but were not taken into account explicitly, was found to be insignificant.

Despite its insignificance, the usage of the error term made rightful contribution in determination of the co-integrating relationship in the model. Thus, a model with an error term is preferred to a model without an error term.

Diagnostic Tests

The fitness of the model was tested in three main ways. Firstly heteroscedasticity was tested using White's test with no cross terms. This was followed by Jarque-Bera's normality test. Finally serial correlation was tested using the Langrage multiplier (LM) test. The Diagnostic test results are shown in table 6 in the appendix.

Heteroscedasticity

Results from table 6 in the appendix shows that, the test for heteroscedasticity using White test with no cross-terms produced a Ch-sq of 319.086 at a probability of 0.215. The presence of heteroscedasticity means the model has some misspecifications hence conclusive results cannot be derived from such a model. The null hypothesis of no heteroscedasticity or no misspecification will thus not be rejected. This implies that the model has no misspecifications and can be relied on.

Residual Normality Test

Normality tests were carried using the Jarque –Bera (J-B) test. The J-B statistic follows the chi-square distribution with 2d.f. If the computed p value of the J-B is sufficiently low, which will happen if the value of the test statistic is different from 0, one can reject the hypothesis that the residuals are normally distributed. If the p value is high, that is when the value of the test statistic is close to 0; we do not reject the normality assumption (Gujarati, 2004:148).

Based on results from table 6 in the appendix, the Jarque- Bera statistic of 13.779 with a probability of 0.083 indicates that the null hypothesis fail to rejection at 5 percent significance level. This shows that residuals are normally distributed. According to Harris (1995:83), normality in the residuals is specifically looking for skewness and kurtosis that is different from that of the normal (it squares the standardized deviations and sums them) and will tend to be significant when skewness and kurtosis deviating from the values at the normal are present.

Autocorrelation Langrage Multiplier (LM) Test

The problem of serial correlation arises when a variable has relationships with itself in a manner that the value of such a variable in past periods has an effect on its future values (Gujarati, 2004:680).

The results reported in Table 6 in the appendix show the test for serial correlation produced an LM statistic of 30.623 with a probability of 0.702. This suggests that we cannot reject the null hypothesis of no serial correlation due to high probability. The diagnostic checks have all revealed the suitability of the model. Thus, compelling conclusions on the effect of foreign exchange reserve on demand for import can be deduced and applicable policies can be safely formulated.

Variance Decomposition Analysis

Variance decomposition analysis indicates the proportion of the movements in a sequence due to its own shocks versus shocks to other variables. It shows the fraction of the forecast error variance for each variable that is attributable to its innovations and innovations in the other variables in the system. The results of the variance decomposition analysis are presented in table 7 in the appendix and this show the proportion of the forecast error variance in Mt explained by its own innovations and innovations in explanatory variables.

The variance decomposition analysis in table 7 in the appendix covers a period of 10 years in order to ascertain the effects when the variables were allowed to affect Mt for a relatively longer time. In the first year, all of the variance in Mt is explained by its own innovations. For the 5th year a head forecast error variance, Mt explains about 77 percent of its variation. Explanatory variables account for 23 percent of the error variance. Yt , explains 6 percent, Ft about 1 percent, Dm about 8 percent and Pt 8 percent.

After a period of 10 years, Mt explains about 57 percent of its own variation. Explanatory variables explain the remaining 43 percent. The influence of Yt increases substantially to about 14 percent. Ft remains at 1 percent. Dm increases to about 18 percent. This explains the largest component of the 43 percent variation in Mt that is explained by the explanatory variables. Pt increases slightly to 10 percent. The variance decomposition analysis results are compatible with economic theory.

CONCLUSION AND RECOMMENDATION

The co-integration result shows that there is long run equilibrium relationship between real import, real income, relative price of import and the foreign exchange reserves signifying the relevance of including foreign exchange reserves in the model. Analyzing the size of the coefficients, we find that the domestic income turns out to be the most important factor determining the volume of import in the long run as well as in the short run. The empirical estimate shows that long run import is elastic with respect to income and inelastic with respect to relative price of import and foreign exchange reserves. This implies that the import volume would grow at faster rate than the growth in income of the country and would deteriorate the trade balance of the country if the growth in income is not accompanied by growth in exports.

Foreign exchange reserves turns out to be statistically significant factor affecting import demand both in the short run as well as in the long run. However its economic impact is relatively small in particular to the size of estimated income elasticity but close to price elasticity. Nevertheless, it constitutes an important determinant of import, and omitting such an important variable may cause misspecification of the model and may lead to overemphasizing the influence of the variables included in the model.

With respect to price also, Ethiopians' import is found to be significantly related to, both in the long run and in the short run. However, the low coefficient implies that its import is non competitive in nature and import substitution industrialization strategy has not been able to successfully provide the domestic substitutes to these products to compete with these imports. Since the price elasticity is very low even depreciation may not be an effective policy to reduce

the trade deficits. This is also evident from the fact that despite the continuous depreciation of the Birr, the trade deficits continue to rise.

Recognizing the nature of imports, controlling import without providing adequate domestic substitutes may not be desirable as it may have an adverse impact on the growth of economy. Since, the sign of foreign exchange reserve is both expected and its magnitude is high, the estimated result implies that accumulation of foreign currency increases import demand and further deteriorates balance of payment. Therefore, policy makers should care when using it as exchange rate policy for trade balance adjustment purpose.

Thus, the government and other concerned bodies have to take a certain action on several factors that explain how much foreign exchange reserves a country wants to hold. For instance, they must have a close watch on;

Factors related to the volatility of international receipts and payments, since insofar as reserves are intended to help cushion the economy; that is, reserve holdings are likely to increase with more volatility in a country's export receipts.

Factors related with vulnerability to external shocks; since reserve holdings are likely to increase with a country's average propensity to import, which is a measure of the economy's openness and vulnerability to external shocks.

Finally, a country's tolerance for greater exchange rate flexibility should reduce its demand for reserves, because its central bank would not need a large reserve stockpile to manage a fixed exchange rate; therefore, reserve holdings are likely to be lower the more variable the country's exchange rate is.

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