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Determination of Import Demand in Pakistan: The Role of Expenditure Components

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Abstract. *The paper uses imperfect substitution approach to derive the aggregate import demand function on the basis of disaggregated expenditure components. This derived import demand function is then empirically tested for Pakistan by using co-integration and error correction mechanism. The empirical results show that elasticity of import demand with respect to different macro components of final expenditure is different. The import demand in Pakistan is affected positively and significantly by all expenditure components. The relative prices have negative but insignificant relationship with import demand in Pakistan. The findings indicate that use of aggregate expenditure variable in the aggregate import demand function leads to aggregation bias because different macro components of final expenditure have different import contents. The model derived in this study provides in-depth guidelines for macroeconomic policy decisions in order to overcome the problem of persistent trade deficit in the country.*

Keywords: import demand; expenditure components; relative prices; trade deficit.

JEL Codes: F10, F14, F41.
REL Codes: 10D, 10E.

1. Introduction

The role of international trade is very important and crucial in the development of any economy. In this modern era of globalization, trade among nations has become almost unavoidable and inevitable due to its important role in fulfilling the growing needs of the economies across the globe. Traditional trade theories of absolute advantage and comparative advantage consider international trade as beneficial for trade partners due to its economic efficiency and welfare effects. Theoretically trade can minimize income inequalities among and within nations by increasing the incomes of unskilled labour in labour abundant countries. However the empirical evidence shows that distribution of trade gains among different nations is uneven. This has given birth to a sort of controversy among economists regarding the gains of trade.

On the basis of above mentioned controversy, trade economists can be distinguished into two different groups termed as "Trade Pessimists" and "Trade Optimists" (Kavoussi , 1985). "Trade Pessimists" are inward looking and favour import substitution and protection policies whereas "Trade Optimists" advocate for free trade policies. The intellectual roots of Trade Optimists' view can be found in the theory of absolute advantage put forward by Smith (1776) that still resonates today due to its persuasive flair. Expected gains from free trade may include increase in economic efficiency, promotion of competition among firms, acceleration of economic growth, advancement in technology and increase in human welfare through the availability of better quality and wide variety of products at competitive prices (Dollar, Kraay, 2004, Gupta, Choudhry, 1997, World Bank, 2002). The opposing view of Trade Pessimists emphasizes fair trade instead of free trade by arguing that free trade may be less beneficial or harmful for the developing nations and the poor.

Trade optimistic views are dominant in present era of globalization. The issue of free trade has gotten great importance and being debated among intellectuals and in the policy circles of different countries especially after the emergence of World Trade Organization (WTO). This has become a matter of great concern for developing countries like Pakistan which are heavily dependent on the import of diverse capital and consumer goods to fulfill the growing needs of their industries and households. Most of these countries are facing the problem of persistent trade balance which can be eased only by formulating the rational and research based trade policies (Salvatore, 1983). This objective can be met through a careful analysis of trade pattern of these countries.

Apart from studying the causes and effects of trade among nations, estimation of the income and price elasticities of imports and exports are

important because it can be helpful in judging the effect of income and price changes on trade balance (Brester, 1996). Theses elasticities can also be used in explaining the welfare and employment implications of changes in own or partner-countries' trade restrictions and the severity of external balance constraints on domestic policy choices (Goldstein, Khan, 1985). Income elasticities of imports and exports are as important as their price elasticities, especially in a growing economy. In a two country model, if trade is initially balanced, prices are stagnant and income growth is the same in both countries then the trade balance between them can still change over time if their respective income elasticities of demand for imports differ (Johnson, 1958). In such case, even relatively slow domestic income growth may be insufficient to alleviate payments imbalances for the country having relatively unfavorable income elasticities (Houthakker, Magee, 1969). Thus these elasticities seem to have wide macroeconomic policy implications.

Unlike previous studies on Pakistan which have used total expenditures as an explanatory variable in import demand function, the present study uses the disaggregated components of total expenditure (GDP) like consumption expenditure, investment and exports. In fact the use of aggregate expenditure variable in the aggregate import demand function leads to aggregation bias because different macro components of final expenditure have different import contents. This study will provide detailed information for macro-economic policy decisions in Pakistan. This information will be useful for efficient utilization of both expenditure switching and expenditure dampening policies to overcome the problem of persistent trade deficit in the country.

The study comprises of five different sections. Introduction of the study is given in section one. The second section reviews the relevant literature. Theoretical evolution of import demand function and methodological issues have been presented in third section. Fourth section consists of the discussion of empirical results. Concluding remarks and policy suggestions are presented in fifth section.

2. Literature review

Import demand literature can be categorized into three different dimensions(1). First kind of literature considers import demand as a function of aggregate income and prices. The second strand of literature consists of those studies which use the disaggregated imports of different commodity groups as a function of income and relative prices. In the third category of literature aggregate import is treated as a function of disaggregated components of total income or aggregate expenditure. In all these categories, both kinds of studies are included that take price determinant of import demand as relative prices or

take domestic and import prices separately. Harberger (1953), Hinshaw (1945), Liu (1954), Lovasy and Zassenhaus (1953) and Vegh (1941) are among the earlier studies that checked the effect of aggregate national income and relative prices on import demand. In fact, studying income and price elasticities of import demand have been matter of interest for trade economists due to their important implications for trade balance.

The impact of real income and relative prices on import demand for the case of United States has been checked by Adler (1945). By using data for the period 1922 to 1937, the study has found positive and significant effect of national income on import demand while the effect of relative prices was noted to be insignificant; however this effect of relative prices remained significant and negative when duty free imports were used as dependent variable.

By applying Johansen co-integration and the error correction models, Abbott and Seddighi (1996) estimated the import demand function for United Kingdom. Their results reveal that import demand is more sensitive to changes in consumption expenditures as compared to changes in export expenditures and investment expenditures. But for the case of Malaysia investment expenditures were found as having the most explanatory power for import demand behavior. Consumption expenditures and expenditures on exports were proved to be of lesser importance in this regard (Mohammed, Tang, 2000).

Mohammed et al. (2001) has proved the existence of long-run co-integrating relationship between import demand and expenditure components for the case of ASEAN countries. Afzal (2001) has calculated the import demand elasticity with respect to income and relative prices by using log linear form of import demand equation for the case of Pakistan. The results of this study reveal that import demand elasticity with respect to income is positive while it is negative with respect to relative prices. Moreover the coefficient of relative prices remains statistically insignificant in this study.

Min et al. (2002) reveal that import demand in Korea is positively affected by consumption and export expenditures, whereas it is negatively affected by relative prices and investment expenditure. In order to estimate import demand function for China, bounds testing co-integration approach has been used by Tang (2003a). Positive long run effects of export expenditure, consumption expenditure and investment expenditure on import demand of China has been noted by this study. The study revealed negative long run relationship between import demand and relative prices. The coefficient of export expenditure seems to be the largest among all variables used in this study. In Fiji import demand has been found inelastic with respect to total consumption, relative prices, investment expenditure and export expenditure (Narayan, Narayan, 2005).

By applying Johansen co-integration technique and using data for the period of 1975 to 2005, Rehman (2007) confirms the existence of long run relationship among the variables of aggregate import demand, income, import prices and domestic price level for Pakistan. The elasticity of domestic price proves to be insignificant in long run as well as in short run, while income and import price elasticities are found to be significant in long run but insignificant in short run . Hye (2008) also proves the existence of co-integrating relationship among the variables of imports, income and relative prices but does not discuss the significance of long run coefficients of income and relative prices.

A time series analysis of demand function for Cote D'Ivoire has been conducted by Constant and Yue (2010). The study has used data for the period 1970 to 2007 and autoregressive distributed lag model approach to co-integration has been employed to check the long run relationship among import demand, consumption expenditure, investment expenditure, exports and relative prices. The results reveal that in long run, import demand in Cote D'Ivoire is more sensitive to investment and exports expenditure as compared to relative prices while in short run consumption expenditures have been found as major determinant of import demand. The import demand in the country is price inelastic as the variable of relative prices seems to be having insignificant effect on import demand in long run as well as in short run analysis.

3. Theoretical framework

Two general models of trade are widely used in the empirical literature. These models of trade are known as the perfect substitutes model and the imperfect substitutes model (Goldstein, Khan, 1985). The perfect substitutes model is based upon the assumption that traded goods are perfectly substitutes. If this is the case then a country can be either an importer or an exporter but not both of them (Rhomberg, 1973). But in reality, traded goods are not perfect substitutes hence both (imported goods and locally produced goods) coexist in the same market. The increasing trade among the nations and existence of intra-industry trade also put the question mark on the validity of the perfect substitutes hypothesis (Giovannetti, 1989). Thus imperfect substitutes model based upon the assumption of differentiated products seems to be more realistic. Drawing upon this imperfect substitutes framework, the basic import demand model can be given as:

$$M_t = f(X_{1t}, X_{2t}, X_{3t}),\ t = 1,2,3,....,T, \qquad (1)$$

where M_t is the import demand, X_{1t} represents nominal income of the importing country, X_{2t} represents the prices of imports and X_{3t} represents the prices of domestically produced goods and t denotes time period.

According to Goldstein and Khan (1985) import demand function based on the imperfect substitutes model is in accordance with conventional demand theory which follows utility maximization framework. Thus the resulting demand functions for imports represent the quantity demanded as a function of the level of nominal income in the importing country, the imported good's own price, and the price of domestically produced goods. This framework considers the 'absence of money illusion' as the demand function is homogeneous of degree zero (Deaton and Muellbauer, 1980). This implies that dividing the right hand side of the equation (3.1) will give the following result:

$$M_t = f(Y_{1t}, Y_{2t}), t = 1,2,3,....,T, \quad (2)$$

where,

$Y_{1t} = (X_{1t} / X_{3t})$ = real income (final expenditure) of importing country

$Y_{2t} = (X_{2t} / X_{3t})$ = relative prices of imports (relative to domestic prices).

The prices of imports relative to the prices of their domestically produced substitutes (Y_{2t}) are main determinant of the import demand. The relative prices are expected to be inversely related to the demand for imports. The studies which only examine the import demand behaviour normally assume that the supply elasticities are infinite and the domestic prices are assumed to be flexible and would change to eliminate excess demand at home.

The final expenditure (Y_{1t}) is one of the important factors affecting import demand. Different macro-components of final expenditure have different import content. Considering the composition of final expenditure is very important while studying the import demand (Abbott, Seddighi, 1996, Giovannetti, 1989). Giovannetti (1989) has also proved that the use of a single aggregate expenditure variable in the aggregate import demand function results in aggregation bias because different macro components of final expenditure have different import contents. However, following Abbott and Seddighi (1996), Giovannetti (1989), Min et al. (2002) and Narayan and Narayan (2005) income (final expenditure) can be split into three components in import demand function. Xu (2002) and Tang (2003b) propose that time trend should be included in import demand function to represent the role of taste and habits in import demand. Thus our import demand function takes the following form:

$$M_t = f(CG_t, I_t, X_t, RP_t),\ t = 1,2,3,....,T, \quad (3)$$

where M_t is the import demand in time t, CG_t is the sum of household and government consumption expenditure in time t, I_t is the total investment in time t and X_t is expenditure on exports of goods and services in time t and RP_t is the ratio of the import prices to the domestic prices in time t.

The equation (3) can be written in the following form:

$$M_t = \alpha_0 CG_t^{\beta_1} I_t^{\beta_2} X_t^{\beta_3} RP_t^{\beta_4} e^{\beta_5 t} e^{\varepsilon_t},\ t = 1, 2, \ldots, 37, \quad (4)$$

where '*e*' is base of natural logarithm and ε_t is the error term.

Taking natural logarithm of equation (4), we can have the following estimation equation:

$$\ln M_t = \beta_0 + \beta_1 \ln CG_t + \beta_2 \ln I_t + \beta_3 \ln X_t + \beta_4 \ln RP_t + \beta_5 t + \varepsilon_t,\ t = 1,2,3,...,37, \quad (5)$$

where 'ln' represents the natural logarithm and $\beta_0 = \ln \alpha_0$.

A. Data sources

This study uses the variables of consumption expenditure, total investment expenditure, expenditure on total exports of goods and services, imports of goods and services and relative prices of imports in Pakistan for empirical analysis from 1972 to 2008. Data for the variables of consumption expenditure, total investment expenditure, expenditure on total exports of goods and services and imports of goods and service is taken from World Development Indicators (WDI) online database by World Bank (2009). The relative price variable is the ratio of unit value index of imports to the GDP deflator and both variables are taken from International Financial Statistics (IFS) online database by International Monetary Fund (2010).

B. Econometric methodology

Most of the time series and economic data faces the problem of non-stationarity due to the presence of time trend in it. In such situation regression results may be misleading and unauthentic (Granger, Newbold, 1974). According to Phillips (1986), in the absence of co-integrating relationship among the variables, regression results obtained from Ordinary Least Square (OLS) method may be spurious. Thus the regression results obtained through Ordinary Least Square (OLS) method are reliable only if the variables are stationary and co-integrated. Hence verifying stationarity and co-integration is necessary at the first step.

B.1. Augmented Dickey-Fuller test

Augmented Dickey-Fuller test proposed by Dickey and Fuller (1979) and Dickey and Fuller (1981) has been used by this study to check the stationarity of the variables. The following regressions are used for the application of this test.

$$\Delta X_t = \alpha + \delta X_{t-1} + \sum_{j=1}^{q} \gamma_j \Delta X_{t-j} + \in_{1t} \quad (6)$$

$$\Delta X_t = \alpha + \beta t_1 + \delta X_{t-1} + \sum_{j=1}^{q} \gamma_j \Delta X_{t-j} + \in_{1t} \quad (7)$$

$$\Delta\Delta X_t = \alpha + \delta \Delta X_{t-1} + \sum_{j=1}^{q} \gamma_j \Delta\Delta X_{t-j} + \in_{2t} \quad (8)$$

$$\Delta\Delta X_t = \alpha + \beta t_1 + \delta \Delta X_{t-1} + \sum_{j=1}^{q} \gamma_j \Delta\Delta X_{t-j} + \in_{2t} \quad (9)$$

where

$\Delta X_t = X_t - X_{t-1}$

$q =$ number of lags in the dependent variable.

In order to check the stationarity following hypotheses are tested;

$H_0: \delta = 0$ (X_t is non-stationary)

$H_a: \delta < 0$ (X_t is stationary).

B.2. Johansen co-integration test

Johansen co-integration test proposed by Johansen (1988) and Johansen and Juselius (1990) is used to find long run relationship among the variables which are found to be stationary at the same order. Initially, the concept of co-integration was put forward by Engle and Granger (1987). Unlike two steps estimation approach suggested by Engle and Granger (1987) by which only one co-integrating vector can be found, Johansen (1988) and Johansen and Juselius (1990) suggest maximum likelihood testing procedure to find out the number of co-integrating vectors in the Vector Autoregressive (VAR) representation. The general form of VAR is as under:

$$Y_t = \mu + \beta_t Y_{t-1} + \ldots\ldots + \beta_k Y_{t-k} + \varepsilon_t \quad (10)$$

where Y_t is an $(n \times 1)$ vector of variables that are integrated of order 1, α is a $(n \times 1)$ vector of constant terms, $\beta_t \ldots\ldots \beta_{t-k}$ are parameters and ε_t is an independently and identically distributed error term. This VAR can also be written in the following alternative form of Vector Error Correction Model (VECM).

$$\Delta Y_t = \mu + \sum_{i=0}^{\rho-1} \Gamma_i \Delta Y_{t-i} + \Pi Y_{t-1} + \varepsilon_t \quad (11)$$

where Y_t is a $(n\times1)$ column vector of ρ variables, μ is a $(n\times1)$ vector of constant terms, ε_t is $(n\times1)$ vector of usual error term, Δ is difference operator and Γ and Π represent coefficient matrices. The coefficient matrix Π is also termed as impact matrix and it describes about the long run relationship. Two types of likelihood ratio tests termed as trace test statistics and maximum eigenvalue test statistics are used to find the number of co-integrating vectors. The representation of VECM with respect to our variables is as given:

$$\Delta \ln M_t = \alpha_\circ + \sum_{J=0}^{n} \beta_1 \Delta \ln I_t + \sum_{j=0}^{n} \beta_2 \Delta \ln CG_t + \sum_{j=0}^{n} \beta_3 \Delta \ln X_t + \sum_{j=0}^{n} \beta_4 \Delta \ln RP_t + \eta ECT_{t-1} + \varepsilon_t \quad (12)$$

The significance of the coefficient of error correction term ECT_{t-1} describes about the existence of short run relationship. Its value and sign tells about the speed and convergence or divergence to or from the long run equilibrium. Its negative value indicates about the convergence whereas its positive value indicates about the divergence. A significant coefficient of error correction with negative sign is considered as a further proof of the existence of stable long run relationship (Banerjee et al., 1998).

4. Estimation results

We have used ADF unit root test to check the stationarity of time series data in logarithmic form. According to these results variables of import of goods and services, consumption expenditure, total investment expenditure, exports of goods and services and relative prices of imports are not stationary at level. This implies that null hypothesis of unit root at level cannot be rejected for all variables. However all the variables are stationary at first difference. This shows that the null hypothesis of unit root for all variables is rejected when we use the first difference of the variables. Thus the variables have same order of integration. All of them are I(1) (integrated of order one).

Table 1

Augmented Dickey-Fuller (ADF) Unit Root Test Results

Augmented Dickey-Fuller (ADF) Test at Level		
Variables	t –Statistic	p- Value
$\ln M_t$	-0.6881	0.8372
$\ln I_t$	-0.4952	0.8807
$\ln CG_t$	-0.5798	0.8628
$\ln X_t$	-0.5101	0.8777
$\ln RP_t$	-1.9871	0.2909
Augmented Dickey-Fuller (ADF) Test at 1st Difference		
Variables	t –Statistic	p- Value
$\Delta \ln M_t$	-6.1518	0.0000
$\Delta \ln I_t$	-5.6909	0.0000
$\Delta \ln CG_t$	-6.2154	0.0000
$\Delta \ln X_t$	-6.1500	0.0000
$\Delta \ln RP_t$	-4.5961	0.0008

Keeping in view the number of observations, number of variables to be studied and lags requirement of the cointegration test maximum three lags are allowed to select the optimum lag length in Vector Auto-Regressive (VAR) process. Schwarz Information Criterion (SIC) suggests that an optimal lag length of 1. Thus the lag length 1 has been used in our analysis.

Johansen co-integration technique has been applied to check the co-integration among the variables of import demand, consumption expenditure, investment expenditure, export expenditure and relative prices.

The results of Johansen's co-integration test have been reported in Table 2 and Table 3. Trace statistics λ_{trace} and maximum eigen statistics are used to check the number of co-integrating vectors. Both statistics test the null hypothesis of no co-integration against the alternative of co-integration, starting with the null hypothesis of no co-integration ($r \leq 0$) among the variables. The trace-test statistics is 100.2037, which is above the critical value of 84.3782 at 10% significance level. Hence it rejects the null hypothesis $r \leq 0$ in favour of alternative hypothesis $r = 1$. Similarly, the null hypothesis of $r \leq 1$ can also be rejected in favour of alternative hypothesis of $r = 2$. But null hypothesis of $r \leq 2$ can not be rejected in favour of alternative hypothesis of $r = 3$ because trace statistics 31.4703 which is less than the critical value of 39.7553 at 10% significance level. All of this shows the existence of two cointegrating vectors. Same is the case when we use maximum eigen test statistics, which also confirm the existence of two cointegrating vectors.

Thus the analysis of data confirms the presence of long run relationship among import demand, consumption expenditure, total investment expenditure, exports of goods and services and relative prices of imports in Pakistan.

Table 2

Unrestricted Co-integration Rank Test (Trace)

H_0	H_1	Trace Statistic	0.10 Critical Value	Prob.[a]
R = 0*	R ≥ 1	100.2037	84.37817	0.0059
R ≤ 1*	R ≥ 2	63.32148	60.08629	0.0556
R ≤ 2	R ≥ 3	31.47026	39.75526	0.4175
R ≤ 3	R ≥ 4	14.41054	23.34234	0.6236
R ≤ 4	R ≥ 5	3.192006	10.66637	0.8529

a MacKinnon-Haug-Michelis (1999) p-values

* denotes rejection of the hypothesis at the 0.1 level

Table 3

Unrestricted Co-integration Rank Test (Max-Eigen)

H_0	H_1	Max-Eigen Statistic	0.10 Critical Value	Prob.[a]
R = 0*	R ≥ 1	36.88223	35.58124	0.0726
R ≤ 1*	R ≥ 2	31.85122	29.54003	0.0538
R ≤ 2	R ≥ 3	17.05972	23.44089	0.4527
R ≤ 3	R ≥ 4	11.21853	17.23410	0.4911
R ≤ 4	R ≥ 5	3.192006	10.66637	0.8529

[a] MacKinnon-Haug-Michelis (1999) p-values

* denotes rejection of the hypothesis at the 0.1 level

As cointegration exists among the variables used in the study, therefore, the results presented for long run are reliable. These results represent long run elasticities of import demand with respect to expenditure components. The long run results are reported in Table 4.

Table 4

Long Run Relationships

Dependent Variable: $\ln M_t$			
Variable	Coefficient	t-Statistic	p-Value
$\ln I_t$	0.5860	2.4453	0.0208
$\ln CG_t$	2.6734	6.3363	0.0000
$\ln X_t$	0.2685	2.5341	0.0169
$\ln RP_t$	-0.1352	-1.0786	0.2896
Time	-0.1200	-4.9566	0.0000
Constant	-69.7417	-6.0809	0.0000
R^2 = 0.9664 Adj-R^2 = 0.9549 F-Statistic = 139.1804 Prob(F-statistic) = 0.0000 Durbin-Watson = 2.1713			

The results reported in the Table 4 show that all expenditure components (consumption expenditure, total investment expenditure, exports of goods and services) have statistically significant impact on import demand in Pakistan. But the impact of relative prices on import demand is negative and not significant in long run. While studying the import demand behaviour in Pakistan, Afzal (2001) and Rehman (2007) also find the similar result about the effect of relative prices on import demand in Pakistan. The consumption expenditure, total investment expenditure, exports of goods and services have positive impact on import demand. The results show that consumption expenditure has the highest 2.6734 elasticity of import demand and it is followed by investment expenditure 0.5860 and exports of goods and services 0.2685. Relative prices have insignificant, negative and the lowest elasticity -0.1352 of import demand. The positive and significant import demand elasticities with respect to all components of final expenditure indicate that increase in economic growth will lead to higher import demand in Pakistan as indicated by Keynesian absorption theory.

The results show that long run coefficients of independent variables have theoretically correct signs. The difference in magnitude of the effects of different expenditure components on import demand further strengthen the significance of using different components of final expenditure separately in import demand equation. The inelastic and insignificant effect of relative prices on import demand reflects that import substitution policy adopted by government of Pakistan since 1950s has not been successful in achieving the target of producing sufficient import substitutes. The elasticity import demand with respect to relative prices reveals that a large proportion of Pakistan's imports are essential goods which have inelastic demand.

Once cointegration among the variables is proved, we can use VECM to study the short run dynamics. Table 5 shows the short run dynamics of the variables. According to the table, consumption expenditure, total investment expenditure, exports of goods and services have statistically significant effect on import demand in short run while the impact of relative price variable is statistically insignificant in short run.

Table 5

Short Run Dynamics

Dependent Variable = $\Delta \ln M_t$			
Variable	Coefficient	t-Statistic	p-Value
$\Delta \ln I_t$	0.6877	3.6603	0.0010
$\Delta \ln CG_t$	2.6024	7.7284	0.0000
$\Delta \ln X_t$	0.2119	2.0180	0.0529
$\Delta \ln RP_t$	-0.0532	-0.4441	0.6603
ECT_{t-1}	-0.4560	-3.6749	0.0010
Time	0.0008	0.8392	0.4082
Constant	-0.1490	-4.9012	0.0000
$R^2 = 0.7647$ Adj-$R^2 = 0.7160$ F-Statistic = 15.7088 Prob(F-statistic) = 0.0000 Durbin-Watson = 1.9554			

The error correction term is statistically significant and has a negative sign. It is further proof of long run relationship among the variables of our interest. The results, reported in Table 5, show that coefficients of all expenditure components have theoretically expected signs and are statistically significant in short run. The coefficient of relative price variable has theoretically correct sign and is insignificant in short run. The consumption expenditure, total investment expenditure, exports of goods and services have positive impact on import demand in short run as well. The results show that consumption expenditure has the highest 2.6024 elasticity of import demand and it is followed by investment expenditure 0.6877 and exports of goods and services 0.2119. Relative prices have correct negative but insignificant elasticity -0.0532 of import demand.

Diagnostic tests are applied to check the validity of the assumptions of serial correlation, normality; model specification and heteroskedasticity have been conducted. The results of these tests are presented in Table 6.

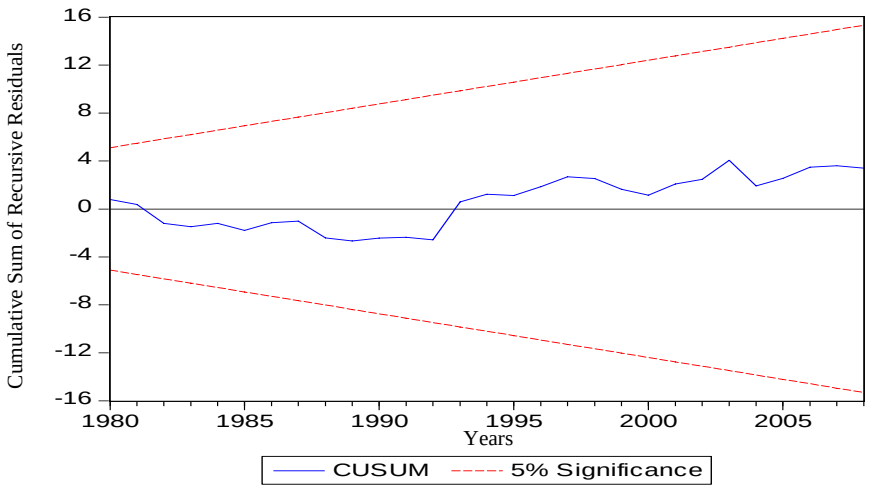
Table 6

Diagnostic Tests

Normality Test (Jarque-Bera Statistics)	Jarque-Bera Statistics = 0.2199	Probability = 0.8959
Serial Correlation (Breush-Godfrey Serial Correlation LM Test)	F-statistics = 0.4377	Probability = 0.5137
ARCH Test (Autoregressive Conditional Heteroskedasticity Test)	F-statistics = 0.4135	Probability = 0.5245
Heteroskedasticity Test (White Heteroskedasticity Test)	F-statistics = 1.1554	Probability = 0.4434

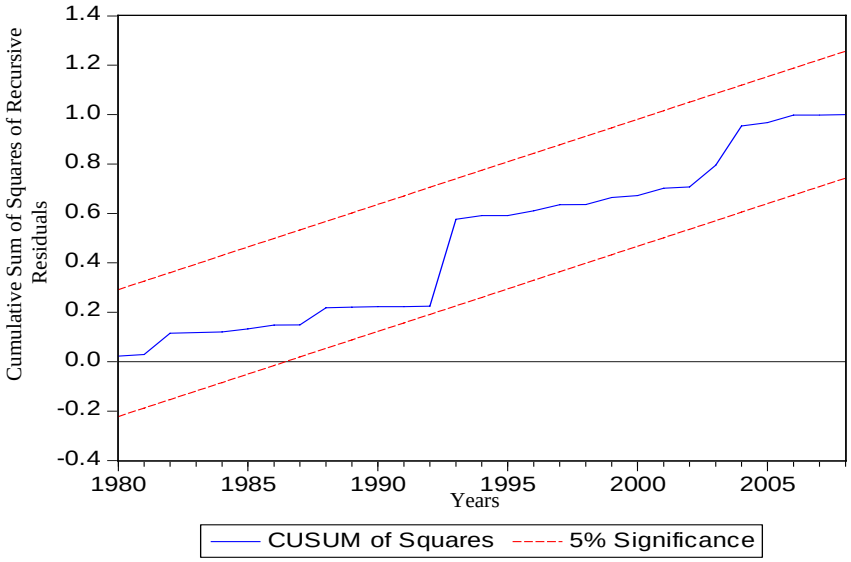
These results indicate that the residuals are normally distributed and there is no presence of heteroskedasticity. There is also no problem of serial correlation and autoregressive conditional heteroskedasticity.

To analyze the stability of the long-run coefficients together with the short run dynamics, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) are applied. A graphical representation of CUSUM and CUSUMsq are shown in figures 1 and 2. The null hypothesis that the regression equation is correctly specified cannot be rejected if the plot of these statistics remains within the critical boundaries of the 5% significance level. Figures 1 and 2 show that the plots of both the CUSUM and the CUSUMsq are within the boundaries and hence these statistics confirm that the model is correctly specified.



**The straight lines represent critical bounds at 5% significance level*

Figure 1. *Plot of cumulative sum of recursive residuals*



The straight lines represent critical bounds at 5% significance level

Figure 2. *Plot of cumulative sum of squares of recursive residuals*

5. Conclusion and policy implications

The results indicate that consumption expenditure is the major determinant of import demand in Pakistan as it has the highest coefficient in our import demand equation. The investment expenditure has the second highest coefficient and is followed by government expenditure and exports. The highest elasticity of import demand with respect to consumption expenditure is due to the reason that final consumer goods and raw materials used as inputs in the production of consumer goods have more than sixty percent share in total imports of Pakistan. Our results also confirm the reality that our imports are more consumption oriented and import growth of Pakistan is more sensitive to change in domestic consumption.

The results of present study have profound policy implications. The empirical findings suggest that exchange rate policies which directly affect the relative prices will have little impact on import demand in Pakistan. Thus devaluation of domestic currency is not a rational and suitable policy to overcome the problem of persistent trade deficit rather this policy can increase the severity of the problem by reducing the competitiveness of our exports. Devaluation of domestic currency may serve to raise the production costs

because very large share of our imports consists of raw material and capital goods. It may also increase the import bill and can lead to balance of payment problems.

Import substitution policy should focus on the establishment of capital goods industries and the industries which can utilize the domestic resources rather than imported raw material.

Industrial policy should be formulated in a way which could increase the export of value added goods instead of exports of raw material or primary goods. For this purpose forward and backward linkages among the industries should be established.

The positive and significant import demand elasticities with respect to all components of final expenditure indicate that increase in economic growth will lead to higher import demand in Pakistan as indicated by Keynesian absorption theory. Thus monetary and fiscal policies should be designed in such a way that may be helpful in altering the existing composition of final expenditure for reducing the trade deficit. This objective can be achieved by increasing the share of those components for which import demand elasticity is low and by reducing the share of those components for which import demand elasticity is high. For instance, monetary policy promoting saving and investment and fiscal policy providing incentives for domestic resource-based and export oriented industries will be useful. Export of finished goods instead of primary or semi-finished commodities should be promoted.

Note

(1) For detailed review of literature and discussion on Pakistan's economy refer Irfan, M. (2010), „The Impact of Expenditure Components on Import Demand in Pakistan: An Empirical Analysis". An unpuplished M. Phil dissertation submitted to National College of Business Administration and Economics, Lahore, Pakistan.

References

Abbott, A.J., Seddighi, H.R., "Aggregate Imports and Expenditure Components in the U.K.: An Empirical Analysis", *Applied Economics*, 28(9), 1996, pp. 1119-1125

Adler, J.H., "United States Import Demand during the Interwar Period", *The American Economic Review*, 35(3), 1945, pp. 418-430

Afzal, M., "Import Function for Pakistan: A Simultaneous Equation Approach", The Lahore *Journal of Economics*, 6(2), 2001, pp. 109-116

Banerjee, A., Dolado, J., Mestre, R., "Error-Correction Mechanism Tests for Cointegration in a Single-Equation Framework", *Journal of Time Series Analysis*, 19(3), 1998, pp. 267-283

Brester, G.W., "Estimation of the US Import Demand Elasticity for Beef: The Importance of Disaggregation", *Review of Agricultural Economics*, 18(1), 1996, pp. 31-42

Constant, N'guessan Bi Zambe Serge, Yue, Y., "An Econometric Estimation of Import Demand Function for Cote D'Ivoire", *International Journal of Business and Management*, 5(2), 2010, pp. 77-84

Deaton, A., Muellbauer, J. (1980). *Economics and Consumer Behaviour*, Cambridge: Cambridge University Press

Dickey, D.A., Fuller, W.A., "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", *Econometrica*, 49(4), 1981, pp. 1057-1072

Dickey, D.A., Fuller, W.A., "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, 74(366), 1979, pp. 427-431

Dollar, D., Kraay, A., "Trade, Growth, and Poverty", *The Economic Journal*, 114(493), 2004, pp. F22-49

Engle, R.F., Granger, C.W.J., "Co-Integration and Error Correction: Representation, Estimation, and Testing", *Econometrica*, 55(2), 1987, pp. 251-276

Giovannetti, G., "Aggregate Imports and Expenditure Components in Italy: An Econometric Analysis", *Applied Economics*, 21(7), 1989, p. 957

Goldstein, M., Khan, M.S., "Income and Price Effects in Foreign Trade", in Jones, R.W. and P.B. Kenen. (Eds.), *Handbook of International Economics II*, New York: *Elsevier Science Publications*, 1985, pp. 1041-1105

Granger, C.W.J., Newbold, P., "Spurious Regressions in Econometrics", *Journal of Econometrics*, 2(2), 1974, pp. 111-120

Gupta, S.D., Choudhry, N.K. (1997). *Globalization, Growth and Sustainability:* An *Introduction*, in S. D. Gupta and N. K. Choudhry. (Eds.), Globalization Growth and Sustainability , Massachusetts, USA: Kluwer Academic Publishers

Harberger, A.C., "A Structural Approach to the Problem of Import Demand", *The American Economic Review*, 43(2, Papers and Proceedings of the Sixty-fifth Annual Meeting of the American Economic Association), 1953, pp. 148-159

Hinshaw, R., "American Prosperity and the British Balance-of-Payments Problem", *The Review of Economics and Statistics*, 27(1), 1945, pp. 1-9

Houthakker, H.S., Magee, S.P., "Income and Price Elasticities in World Trade", *The Review of Economics and Statistics*, 51(2), 1969, pp. 111-125

Hye, Q.M.A., "Aggregate Import Demand Function for Pakistan: Analysis in the Form of Old and Relatively New Cointegration Techniques", *International Journal of Economic Perspectives*, Vol. 2, no. 4, 2008, pp. 236-245

International Monetary Fund (2010), "International Financial Statistics (IFS) Online Database", Washington, D.C., USA: International Monetary Fund

Johansen, S., "Statistical Analysis of Cointegration Vectors", *Journal of Economic Dynamics and Control*, 12(2-3), 1988, pp. 231-254

Johansen, S., Juselius, K., "Maximum Likelihood Estimation and Inference on Cointegration - with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics*, 52(2), 1990, pp. 169-210

Johnson, H.G. (1958). *International Trade and Economic Growth*, Cambridge: Harvard University Press

Kavoussi, R.M., "International Trade and Economic Development: The Recent Experience of Developing Countries", *The Journal of Developing Areas*, 19(3), 1985, pp. 379-392

Liu, T., "The Elasticity of U.S. Import Demand: A Theoretical and Empirical Reappraisal", *Staff Papers - International Monetary Fund*, 3(3), 1954, pp. 416-441

Lovasy, G., Zassenhaus, H.K., "Short-Run Fluctuations in U.S. Imports of Raw Materials, 1928-39 and 1947-52", *Staff Papers - International Monetary Fund*, 3(2), 1953, pp. 270-289

Min, B.S., Mohammed, H.A., Tang, T.C., "An Analysis of South Korea's Import Demand", *Journal of Asia Pacific Affairs*, 4(1), 2002, pp. 1-17

Mohammed, H.A., Tang, T.C., "A ASEAN Economic Bulletin, 17(3), 2000, p. 257

Mohammed, H.A., Tang, T.C., Othman, J., "Aggregate Import Demand and Expenditure Components in Five ASEAN Countries: An Empirical Study", *Journal Ekonomi Malaysia*, 35, 2001, pp. 37-60

Narayan, S., Narayan, P.K., "An Empirical Analysis of Fiji's Import Demand Function", *Journal of Economic Studies*, 32(2), 2005, pp. 158-68

Phillips, P.C.B., "Understanding Spurious Regressions in Econometrics", *Journal of Econometrics*, 33(3), 1986, pp. 311-340

Rehman, H.U., "an Econometric Estimation of Traditional Import Demand Function for Pakistan", *Pakistan Economic and Social Review*, 45(2), 2007, pp. 245-256

Rhomberg, R.R. (1973), "Towards a General Trade Model", in R. J. Ball. (Eds.), *The International Linkage of National Economic Model* , North-Holland: Amsterdam, pp. 9-20

Salvatore, D., "A Simultaneous Equations Model of Trade and Development with Dynamic Policy Simulations", *Kyklos*, 36(1), 1983, p. 66

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*, Chicago, University Of Chicago Press

Tang, T.C., "An Empirical Analysis of China's Aggregate Import Demand Function", *China Economic Review*, 14(2), 2003a, pp. 142-163

Tang, T.C., "Japanese Aggregate Import Demand Function: Reassessment from the 'bounds' Testing Approach", *Japan and the World Economy*, 15(4), 2003b, pp. 419-436

Vegh, I.D., "Imports and Income in the United States and Canada", *The Review of Economics and Statistics*, 23(3), 1941, pp. 130-146

World Bank (2009). *World Development Indicators (WDI) Online Database*, Washington D.C., USA: The World Bank

World Bank (2002). *World Development Report: Building Institutions for Markets, Washington*, D.C., USA: The World Bank

Xu, X., "The Dynamic-Optimizing Approach to Import Demand: A Structural Model", *Economics Letters*, 74(2), 2002, pp. 265-270