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Role of Expenditure Components on Import Demand in Iran

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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 Iran by using co-integration and error correction mechanism. The empirical results show that the elasticity of import demand with respect to different macroeconomic components of final expenditure is different. The household consumption expenditure and export of goods and services have negative, but household consumption expenditure significantly and export of goods and services insignificant relationship with import demand in Iran. The findings indicate that use of aggregate expenditure variable in the aggregate import demand function leads to aggregation bias because different macroeconomic 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, cointegration

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. A 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 labor in labor abundant countries. However the empirical evidence shows that distribution of trade gains among different nations is uneven.

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 and Choudhry, 1997; World Bank, 2002; Ali, 2011; Ali and Naeeem, 2017). 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 the 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. This has become a matter of great concern for developing countries like Iran, which are heavily dependent on the import of diverse capital and consumer goods to fulfill the growing needs of their industries and households (Ali and Chani, 2013; Siddiqi et al., 2015; Ahmad et al., 2022). Most of these countries are facing the problem of persistent trade balance which can be eased only by formulating the rationale and research based trade policies (Salvatore, 1983; Ali, 2015). 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). These 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

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domestic income growth may be insufficient to alleviate payments imbalances for the country having relatively unfavorable income elasticities (Houthakker, Magee, 1969; Elahi et al., 2021). Thus, these elasticities seem to have wider macroeconomic policy implications.

Our single equation model indicate that corn import can be explained by the corn relative prices, per capita national disposable income, corn domestic product, corn domestic consumption, Governmental stock corn in previous year and a dummy variable as corn insurance. Some recent changes in the overall trend of series are evident and well-captured in and reflected on the estimates.

Regarding the governmental stock corn in previous years as a central issue in the public and policy-making debate, it should be mentioned that governmental stock corn is revealed as a significant determinant of import. This observation might suggest that governmental stock corn has negative effect on corn import demand.

In the next section, a brief review of the leading literature as well as of some recent studies is provided. Section 3 provides the single equation estimates of the import flow and Section 4 concludes the study and covers the further research agenda.

2. Literature Review

Import demand literature can be categorized into three different dimensions. The 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 has been a matter of interest for trade economists due to their important implications for the trade balance.

The impact of real income and relative prices on import demand for the case of the United States has been checked by Adler (1945). By using data for the period 1922 to 1937, the study has found a 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 the 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; Asif et al., 2020).

Mohammed et al. (2001) has proved the existence of long-run co-integrating the relationship between import demand and expenditure components in the case of ASEAN countries. Afzal (2001) has calculated the import demand elasticity with respect to income and relative prices by using a log linear form of the 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 in this study. The study revealed a 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; Asif et al., 2020).

By applying Johansen co-integration technique and using data for the period of 1975 to 2005, Rehman (2007) confirms the existence of the 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 the long run as well as in the short run, while income and import price elasticities are found to be significant in the long run but insignificant in the 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 between import demand, consumption expenditure, investment expenditure, exports and relative prices. The results reveal that in the 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 a major determinant of import demand. The import demand in the country is price inelastic as the variable of relative prices seems to be having an insignificant effect on import demand in the long run as well as in the short run analysis.

3. Data Sources

This study uses the variables of household consumption expenditure, government consumption expenditure, total investment expenditure, expenditure on total exports of goods and services, imports of goods and services and official exchange rates in Iran for empirical analysis from 1965 to 2017. Data of all variables is taken from World Development Indicators (WDI) online database by World Bank (2018).

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 the null hypothesis of a 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 a unit root for all variables is rejected when we use the first difference of the variables. Thus the variables have the same order of integration. All of them are I(1) (integrated of order one).

Table 1: Augmented Dickey-Fuller (ADF) Unit Root Test Results at Level

	Intercept			Intercept Time trend		
	D.F test statistic	P-Value	No. of lags	D.F test statistic	P-Value	No. of lags
Mt	-2.428492	0.1405	1	-2.489601	0.3314	1
Xt	-2.085987	0.2511	1	-1.300720	0.8741	0
Hc	1.746044	0.9996	0	0.177806	0.9971	0
Gc	-2.351089	0.1616	1	-2.715184	0.2363	2
It	-1.493405	0.5269	1	-2.820963	0.1984	1
Exr	1.674915	0.9995	0	-0.357460	0.9867	0

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test Results at 1st difference

Variables Name	Intercept			Intercept Time trend		
	D.F test statistic	P-Value	No. of lags	D.F test statistic	P-Value	No. of lags
Mt	-4.763075	0.0004	0	-4.701811	0.0026	0
Xt	-4.058360	0.0029	0	-4.008857	0.0161	0
Hc	-4.561844	0.0007	0	-4.828165	0.0019	0
Gc	-4.291466	0.0015	0	-4.355864	0.0067	0
It	-5.050875	0.0002	1	-5.009364	0.0012	1
Exr	-5.404681	0.0000	0	-5.987735	0.0000	0

Keeping in view the number of observations, number of variables to be studied and lags requirement of the co-integration 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 household consumption expenditure, government consumption expenditure, total investment expenditure, expenditure on total exports of goods and services, imports of goods and services and official exchange rates.

The results of Johansen's co-integration test has been reported in below Tables. 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 111.0410, which is above the critical value of 95.75366 at 5% 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 $r \leq 2$ cannot be rejected in favour of alternative hypothesis of $r = 3$ because trace statistics 40.66779 which is less than the critical value of 47.85613 at 5% significance level. All of this shows the existence of two co-integrating vectors. Same is the case when we use maximum eigen test statistics, which also confirm the existence of two co-integrating vectors. Thus the analysis of data confirms the presence of long run relationship among household consumption expenditure, government consumption expenditure, total investment expenditure, expenditure on total exports of goods and services, imports of goods and services and the official exchange rate in Iran.

Table 2: Johansen co-integrated test, Unrestricted co-integration Rank (Trace)

H_0	H_1	Trace Statistic	0.05 Critical Value	Probability
R = 0*	R ≥ 1*	111.0410	95.75366	0.0029
R ≤ 1*	R ≥ 2	70.20304	69.81889	0.0466
R ≤ 2	R ≥ 3	40.66779	47.85613	0.1995
R ≤ 3	R ≥ 4	18.80524	29.79707	0.5070
R ≤ 4	R ≥ 5	9.855568	15.49471	0.2920
R ≤ 5	R ≥ 6	2.369178	3.841466	0.1238

Trace test indicates 2 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 3: Unrestricted Co-integration Rank Test (Max-Eigen)

H_0	H_1	Max-Eigen Statistic	0.05 Critical Value	Probability
R = 0*		40.83800	40.07757	0.0410
R ≤ 1		29.53525	33.87687	0.1512
R ≤ 2		21.86256	27.58434	0.2275
R ≤ 3		8.949668	21.13162	0.8365
R ≤ 4		7.486390	14.26460	0.4333
R ≤ 5		2.369178	3.841466	0.1238

Max-eigen value test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis(1999)p-values

As co-integration exists among the variables used in the study, therefore, the results presented for the 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 below table.

Table 4: Long Run Relationships

Dependent Variable: M_t			
Variables	Coefficient	t-statistics	p-value
Hc	-0.426427	-4.575257	0.0001
Gc	1.201004	5.096106	0.0000
I_t	0.783099	7.174071	0.0000
X_t	-0.108202	-0.949223	0.3487
Ex_R	1.42E+09	0.997570	0.3250
Constant	2.49E+12	0.310854	0.7577
R^2 = 0.885984, Adj-R^2 = 0.870577, F-statistic = 57.50332, Prob(F-statistic) = 0.0000, Durbin-Watson stat = 0.889745			

The results reported in the above table show that three expenditure components (Household consumption expenditure, total investment expenditure, government consumption expenditure) have a statistically significant impact on import demand in Iran. But the impact of export of goods and services and the official exchange rate on import demand is not significant in the long run. The government consumption expenditure, total investment expenditure, the official exchange rate has a positive impact on import demand, but household consumption expenditure, export of goods and services have a negative impact on import demand. The results show that government consumption expenditure has the highest 1.2010 elasticity of import demand and it is followed by official exchange rate 1.42E+09 and investment expenditure 0.7831. Export of goods and services has insignificant, Household consumption expenditure has

significant; negative and the lowest elasticity 0.1082, 0.4264 of import demand. The positive and significant import demand elasticities with respect to "Gc, I_t, X_t "components indicate that increase in economic growth will lead to higher import demand in Iran as indicated by the Keynesian absorption theory. The elasticity import demand with respect to household consumption expenditure, export of goods and services reveals that a large proportion of Iran's imports are essential goods which have inelastic demand.

Once Co-integration among the variables is proved, we can use VECM to study the short run dynamics. The table shows the short run dynamics of the variables. According to the table, household and government consumption expenditure and total investment expenditure have statistically significant effect on import demand in the short run while the impact of export of good and services and official exchange rate is statistically insignificant in the short run.

Table 5: Short Run Dynamics

Dependent Variable: DMt			
Variable	Coefficient	t-statistic	p-value
DH_c	0.356399	2.631270	0.0127
DG_c	0.710005	2.350649	0.0247
DI_t	0.652165	9.940677	0.0000
DX_t	0.089255	0.697703	0.4901
DEXR	-2.71E+08	-0.209276	0.8355
ECM(-1)	-0.208626	-2.000625	0.0241
C	-3.12E+12	-2.446087	0.0198
R^2 = 0.840989, Adj-R^2 = 0.812929, F-statistic = 29.97033, Prob(F-statistic) = 0.0000, Durbin-Watson stat = 1.904885			

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 the table show that coefficients of all expenditure components, have theoretically expected signs and are statistically significant in the short run.The household and government consumption expenditure, total investment expenditure have a positive impact on import demand in the short run as well. The results show that government consumption expenditure has the highest 0.71005 elasticity of import demand and it is followed by investment expenditure 0.652165, household consumption expenditure 0.356399 and exports of goods and services 0.089255. The Official exchange rate have correct negative, but insignificant elasticity -2.71E+08 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 below table.

Table 6: Diagnostic Tests

Normality Test (Jarque-Bera Statistics)	Jarque-Bera Statistics= 0.43139	Probability = 0.80598
Serial Correlation (Breush-Godfrey LM Test)	F-statistics = 3.112897	Probability =0.0582
ARCH Test	F-statistics = 9.277352	Probability = 0.0042
Heteroskedasticity Test (White Test)	F-statistics = 4.756207	Probability = 0.0025

These results indicate that the residuals are normally distributed and there is a presence of heteroskedasticity. There is problem of serial correlation and autoregressive conditional heteroskedasticity.

5. Conclusion

The results indicate that government consumption expenditure is the major determinant of import demand in Iran as it has the highest coefficient in our import demand equation. The official exchange rate has the second highest coefficient and is followed by investment expenditure. Our results also confirm the reality that our imports are more consumption oriented and import growth of Iran is more sensitive to changes in domestic consumption.

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