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A Critical Appraisal of the Import Demand Literature

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ABSTRACT: Increased Globalization has led to an increase in interdependence among countries at the world level. Substantial reduction in trade restrictions and the implementation of WTO rules contributed to a rise in exports and imports of most developing countries. But the study of imports in comparison to that of exports is considered more important for the fact that the production for exports requires imports in the first place. By explaining and reviewing the methodologies the study aims to identify the research gaps prevalent in the area and provide a direction for future research. It has been found that panel data techniques have not found that place in the literature as the time series techniques have so there is a need for application of the same.

Keywords: Import demand, Marshall Lerner condition, Trade balance, Error correction, Cointegration.

1. INTRODUCTION

Increased globalization has led to increased interdependence among countries at the world level. Each country wants to attain rapid economic development through modernization in the production process and international trade. Also, a substantial reduction in trade restrictions and the implementation of WTO rules contributed to rising exports and imports of most developing countries. But it's more important to study imports than exports due to 3 reasons. First, to export, we need to import (machinery, raw materials and other intermediate goods). Second, imports react more rapidly than exports to changing economic conditions. Third, the quantity of imports is closely related to domestic economic conditions. Basic economic theory assumes several factors like the price of the good, the price of a substitute good/complementary good, price and income elasticity,availability of foreign exchange which impacts the demand for imports though their relative importance may vary from country to country.

A large body of empirical literature on estimating the import demand function has evolved for an outsized range of countries. Not solely has this list of countries studied grown up within the second half decade however additionally three main enhancements have been created to the empirical methodologies. First, advances in cointegration techniques have improved the results. Second, the employment of disaggregated information (by countries and by industry) helped uncover the proof of effects that were obscured by the employment of aggregated information. Third, recognition of further variables like money supply, savings rate, exchange rate, real income as vital determinants of import demand.

This review tries to bring connected empirical literature concerningestimating the import demand function and testing the importance of determinants of import demand function up to date. This paper may be a thought paper and evolved from the discussion regarding the subjectfor countries like Japan, China & Pakistan but not for Republic of India. From these publications, this paper developed to present a basis for the controversy and development round the field by trying to consolidate the current findings, establishattainable gaps and thereby create attainable future directions for development. In this paper, the priority isn't much with advancing the theory per se butproviding a taxonomy with which to gauge and map the available research. Thus, the main objectives of the current study are:

1. To look at some major critics of the import demand literature and present a framework for classification and analysis.

2. To explain and assess the methodologies employed in the import demand literature.

The paper is divided into 4sections. Section 1 presents the objectives and rationale of the study. Section 2 involves the review of literature related to the first step of the estimation process of the import demand function i.e., the selection of the appropriate functional form, aggregated and disaggregated studies where the disaggregation may be with respect to variables like real national income disaggregated into expenditure components or product wise disaggregation may be done. It also describes the literature that is evolving in recent times by using techniques based on panel data &gravity modelling rather than the time series data as has conventionally been used in the literature till now. Section 3considers the literature associated with testing the stability of import demand function. Section4 presents some conclusions that can be drawn and the research gaps that have been identified to provide direction for future research.

1. Selection of appropriate functional form

Khwaja Sarmad (1988) remarked selectingthe functional form on the grounds of convenience or by reference to standard goodness of fit criteria involved arbitrariness which had economic and statistical implications. Thus, the selection of the appropriate functional form was an important methodological problem. A general power function of aggregate import demand was presented for Peru, Venezuela, Morocco, Kenya Greece and Portugal using annual data for 1960 to 1981. A modified version of demand function for importsrelating the amount of imports to domestic income level, foreign exchange availability and relative prices adjusted for tariff was used.Functional form tests were conducted using the maximum likelihood method for dynamic import demand function. Results showed that log-linear specification is superior to the linear formulation.

2. Aggregated & Disaggregated Import demand function

Aggregated Import demand function

Dipendra Sinha (1997) estimated the aggregate import demand function for Thailand using the cointegration methodology to study the behaviour of imports using annual data for the period 1953-1990. Box cox test functional form indicated the superiority of log-linear specification as the appropriate functional form. ADF, KPSS, PP tests revealed non-stationarity of the variables under study (Imports, domestic prices, import prices, Real GDP). Johansen Juselius test for cointegration indicated the presence of long-run relationship among the variables after which elasticities were estimated using the OLS method. Aggregate import demand of Thailand was found to be price inelastic, cross-price inelastic in both the short and the long run but it was highly income elastic in the long run.Tambi Emmanuel (1998), tested for the hypothesis that a rise in relative price elasticities isn't related to accrued import substitution and a rise in financial gain and forex elasticities isn'trelated to a greater degree ofopenness of the Cameroon economy. Import demand function was estimated using real GNP, price index and effective real foreign exchange rate (US$/ Francs) for the period 1970-94. Given that the variables were cointegrated the import demand function was estimated using the error correction modelling technique (ECM) so

that short-run and long-run elasticities of import demand could be estimated for all categories of imports. However, the results suggested high price elasticities for merchandise and raw materials andlow-price elasticities of capital and intermediate goods in the long run overall suggesting that the Cameroon economy can be more liberal.Tuck Cheong Tang & Mahendhiran Nair (2002) presented an empirical analysis of aggregated import demand behaviour for Malaysia involving a small sample of annual data from 1970-98. To estimate the long-term relationships between import demand and its determinants namely income & relative prices arobust bounds testing approach was used and henceforth the import demand function was estimated using the UECM approach. Long run elasticity with respect to income and relative prices indicated 1. Satisfaction of the Marshall Lerner condition 2. The sensitivity of imports to increases in domestic price levels 3. Income elastic import demand.Dilip Dutta and Nasiruddin Ahmed(2004) examined the effect of import liberalization on India's Import demand from 1971-95 at aggregate level using cointegration and JohansenJuselius maximum likelihood error correction modelling approach. Aggregate import volume was found to be cointegrated with relative import prices and real GDP. All these variables including a dummy variable to capture the effect of import liberalization policies were important determinants of import demand for India. Import demand in India was largely explained by real GDP and was less sensitive to import price changes. Low coefficient estimates of dummy variable also suggested little effect of import liberalization policy on aggregate import volume.Shyh Wei Chen (2008) assessed the long run relationship betweenaggregate real import demand with real domestic income and relative prices of Taiwan using quarterly data over 1976:1 to 2004:1.Bounds test by Pesaran et al and UECM were adopted for estimation of the import demand function. Aggregate import volume and its determinants exhibited level long-run relationship. Short run income elasticity indicated a greater negative impact on the trade balance in the short run than in long run.Douglason Omotor (2010) examined the effect of trade policy shift (import liberalization) on Nigeria's import demand function at aggregate level using Johansen Juselius maximum likelihood test of cointegration & estimated the model using VECM mechanism. Cointegration existed between import demand, real income and relative import prices. All factors emerged as important determinants of the import demand function for Nigeria. Significant error correction term indicated a rapid speed of adjustment to equilibrium. Also, import demand was found to be less elastic to import demand price changes and elastic to domestic activity variable (real income).Babatunde and Egwaikhide (2010) reexamined import demand function of Nigeria using unrestricted error correction model over the time period 1980 to 2006. Appropriate critical values from Narayan (2005) were considered to test for a long-run relationship between relative prices, real income and aggregate import demand due to the sample size of the study. Import demand and its determinants were found to be cointegrated in Nigeria. However, the Marshall Lerner condition did not meet and it was concluded that Nigeria's Import demand was significantly driven by economic growth and not relative prices.Dilip Dutta and Nasiruddin Ahmed (1999) investigated the existence of long-run aggregate merchandise import demand function for Bangladesh during 1971-94. Cointegration and error correction modelling approach was applied. Results suggested the existence of a unique long-run equilibrium relationship among real imports, real import prices, real GDP and real forex reserves. Dynamic behaviour of import demand was investigated by 2 types of error correction models viz, Engle-Granger method & Johansen Juselius method. In model 1 real import prices, real GDP and in model 2 real import prices, real GDP, real imports & dummy variables were important determinants of the import demand function.Islam & Hassan 2004) estimated the import demand function for Bangladesh under foreign exchange constraints using Johansen Juselius multivariate cointegration techniques and quarterly time series data from 1974:1 to 1988:4. Cointegration results indicated strong domination of income and relative price variables. High-income elasticity indicated the presence of imports of luxury goods in Bangladesh. However inelastic relative price variable implied ineffectiveness of exchange rate policies as a tool for regulating imports.Yi-Hsien Wang, Jun de Lee (2002) examined the impact of VIX i.e. implied volatility of US market (a proxy for investor's attitude towards risk) on China's imports from ROW using Johansen & Juselius, Engle-Granger, Phillips Ouliaris cointegration tests and ARDL method. It was found that the aggregated imports, domestic income, real effective exchange rate & VIX were cointegrated. Income had a significant and elastic impact on import demand. REER and risk perception had a negative effect on import demand.Augustine Arize (1991) addressed empirically issues of homogeneity in prices, adjustment lag structure and appropriate income response of import demand function

in developing countries. Also, the effectiveness of currency devaluation as an instrument for dealing with BOP crises was examined using quarterly data for Malaysia, Philippines & Thailand. Real income & relative prices significantly influenced real import demand in the Philippines, it is domestic price and real income for Malaysia, and Import prices, domestic prices, real income for Thailand. Dynamic adjustment follows a partial adjustment could not be rejected. Income variable was statistically significant in all countries. Response in the event of a shift from equilibrium was also satisfied for all the 3 countries. Augustine C. Arize and Jan Walker (1992) reexamined the import demand function of Japan using the relatively new procedures of cointegration and error correction modelling to study the impact of real effective exchange rate in addition to traditionally used price of domestic substitutes of imported goods (WPI), price of imported goods, Real GNP on Japan's import demand for 1973:2 to 1985:4. The empirical results suggested that error correction model performed very well. Wallis procedure by including additional lags of the residual from cointegrating regression in dynamic form was used to test for dynamic specification. In addition, all the diagnostic testsindicated a well-fitting import demand model for Japan. M. Adetunji Babatunde and Festus O. Egwaikhide (2009) reexamined the Nigerian import demand behaviour over 1980-2006 using Pesaran's bounds testing procedure. Real GDP and relative prices were considered as important determinants of import demand. However, imports and its determinants were found to be cointegrated but the Marshall Lerner condition could not be met and reallocation of trade flows necessitated large relative price swings but the import demand responded significantly to economic growth.Rezaul Kabir (1988) analyzed the effects of exchange rate changes of Bangladesh on its aggregate imports and exports by estimating the aggregate import and export demand functions. The variables under consideration were real income, domestic prices, price index of imports (specified separately and not as relative prices), nominal effective exchange rate, international reserves as a proxy for strictness of import controls, receipt of foreign aid. Import demand equation was estimated using OLS and Koyck type lag structure. Import & export demand functions exhibited the expected results. This was the first paper in which both import and export demand equations were estimated.

Bayramoglu et al (2016) investigated the long run and short-run elasticity of non-energy import demand of Turkey from 2003:1 to 2015:3 using unknown structural break cointegration procedure. Income elasticity was found to be higher than price elasticity. 2 statistically and economically significant structural breaks were found at the dates of 2006:1 to 2010:3. Also, due to structural breaks price and income elasticities were time varying.

Disaggregated Import demand function

For most of the countries whose aggregate import demand function was estimated it was found that the results were not consistent as expected and thus it was observed that there may be a problem of aggregation bias. Thus, to tackle this issue disaggregation using either of the following two approaches evolved.The studies based on disaggregated function can be classified into two parts first, the import demand function of industries (goods wise) and countries. Second, by disaggregating the variable, for example, the real income variable disaggregated into final expenditure components (decomposed GDP), financial variables etc.

Disaggregation by variables

John S Gafar (1988) estimated the disaggregated traditional import demand function using the log-linear specification to test whether appropriate exchange rate policies were necessary and sufficient for BOP adjustment, whether they must be accompanied by wage restraints, reduction in government spending and monetary contractions. The test was conducted to verify the validity of the traditional import demand specification. Stability of trade relationship was tested using a dummy variable pre and post oil price hike in 1974. Finally, it was tested whether disaggregation in the import demand function produced superior results. However, the results evidenced that exchange rate could be used to correct for BOP disequilibrium. Disaggregation did not produce any superior results and the traditional import demand function performed satisfactorily.Tuck Cheong Tang (2003) investigated the long run relationship of China's Aggregate import demand function for 1970-99 by moulding the conventional specification for import demand function and considered 4 definitions of domestic activity namely GDP, GDP-X

(Senhad Ji,1998), National cash flow (Xu,2002) and final expenditure components (decomposed GDP). Cointegration Bounds testing approach by Pesaran and Johansen Juselius approaches were used. Results indicated the presence of a long-run equilibrium relationship among the volume of imports demanded domestic real activity and relative prices. Tuck Cheong Tang (2004) extended his 2003 study which documented no long-run cointegrating equilibrium relationship among Japanese aggregate imports, real income & relative price of imports. This was due to omitted variable bias. To fill this gap financial variables namely, govt. bond yield, lending rate, bank credit,share prices from 1973:1 to 2000:2 were incorporated along with national cash flow, the relative price of imports & time trend variable in Japan's import demand function. Bounds test, Johansen's multivariate as well as error correction model supported cointegration among the variables for Japan. Financial variables were found insignificant but the establishment of cointegration due to their inclusion evidenced implication of monetary policies on stimulating Japanese demand for imports at least at aggregate levels.Seema Narayan, Paresh Kumar Narayan (2005) estimated a disaggregated import demand model for Fiji using relative prices, total consumption, investment expenditure & export expenditure variables along with traditional relative prices and domestic income for the period 1970-2000 using cointegration bounds testing approach & then using ARDL model to estimate short-run and long-run elasticities. Import demand function is derived within the framework of import substitution theory.Cointegration was evident among variables in import demand model. Mohammed Haji Alias and Tuck Cheong Tang (2000) examined the long run relationship between Malaysian aggregate imports and final demand expenditure components and relative prices using Johansen Multivariate cointegration analysis. An error correction model was also prepared using annual data for 1970-1988. Components of final demand expenditure and relative prices were found to be cointegrated with aggregate import demand both in the short run and in the long run.Tang (2003) applied Xu's (2002) import demand function and reinvestigated the presence of cointegrating relation of Japan's aggregate import demand function from 1973-2000. National Cash flow (GDP-I-G-EX), relative prices (ratio of import price to domestic price) & time trend were considered as important determinants of Japanese import demand. Single equation approach (Engle Granger,1987, Pesaran et al,2001) and system approach (Johansen, 1988) were employed for cointegration analysis. Results suggested an absence of cointegrating relation among variables entering the import demand model thus providing conclusive evidence of unstable Japanese aggregate import demand function.

Disaggregation by industry(goods) and countries

Tuck Cheong Chang (2004) reinvestigated whether or not a cointegrating relation exists in import demand function for 5 ASEAN nations namely Malaysia, Philippines, Singapore, Indonesia, Thailand through Xu's (2002) import demand function for time period (1960-2001). The study used Pesaran's cointegration bounds testing procedure. The volume of import demand, activity variable (proxied by national cash flow) & relative price were cointegrated for Malaysia and Singapore.Giray Gozgar (2014) re-estimated aggregated and disaggregated import demand functions for China over Jan 1993-Sept 2012 using quarterly data of 6 groups of primary and manufactured goods including the period effects of 2008-09. A measure of perception of risk- SKEW index (Skewness index of Chicago Board options), the exchange rate was also included as control variables. Dynamic OLS technique is used to obtain long term parameters. To check the robustness of the parameters cointegration is checked through the Hansen test, park test, ARDL model regressions. GDP was found to be the main determinant of total and disaggregated import demand. Results indicated an absence of aggregation bias for import demand in China.Xiaoling Hu et al (2008) estimated China's Import demand function for steel products using monthly data for the period 1996-2004. Effects of trade liberalization, China's economic activities & the real effective exchange rate of the Chinese economy on China's demand for steel imports were examined. China's imports were found to be cointegrated with its economic activities and real exchange rate tested using the Johansen and Juselius cointegration test.Mayumi Fukumoto (2012) estimated the disaggregate import demand functions of 3 basic classes of good namely Capital goods, Intermediate goods, final consumption goods using data from the period 1988-2005. Relative import prices and different macroeconomic variables namely GDP, disposable income, aggregate consumption, aggregate investment, aggregate exports are adopted for these 3 different classes of

imports. According to bounds testing approach cointegration was found evident and according to ARDL short-run price elasticities are inelastic whereas domestic macroeconomic variables were elastic.

Move towards Panel data approaches

Literature on the field witnessed a shift in the research methodology towards using panel data methods rather than treating the data as time series. Ozturk and Acaravci (2009) estimated the import demand function for 38 Latin American and Caribbean countries based on (annual) data availability using dynamic panel data methods over the period 1975-2005.Consistent with theoretical postulates it was found that demand for imports responded negatively to an increase in relative prices and positively to an increase in real income.

However, the categories that have been created above for the disaggregated studies shall abide by here as well. A separate heading has been created just in order to highlight the transition towards new methodology from the conventional time series data analysis.

Colak, Tokpunar&Uzun (2014) investigated the determinants of sectoral import in 17 manufacturing sectors of Turkey using quarterly data from 1998-2012. Real export, credit growth, real effective exchange rate, industrial production, Euro Dollar parity,working day variable, crisis dummy and seasonality dummy variables were tested using Augmented Mean Group Analysis due to the presence of non-stationarity, parameter heterogeneity and cross-section dependency. Regression results indicated a difference in the elasticities of import demand with respect to industrial production at sectoral levels and the coefficient of the real exchange rate was positive and significant for almost all the sectors.Abbas and Waheed (2018) investigated the macroeconomic determinants(GDP, bilateral distance, bilateral real exchange rate, bilateral export flow, dummy for common language, common border, membership of Gulf Cooperation Council) of import flow to Bahrain with its 42 trading partners using augmented gravity model of panel data, from 2000 to 2016. Imports of Bahrain were found to be more responsive to incomeof trading partners, GDP and export flow of whereas negatively related to relative prices. Among dummy variables, common borders and Gulf economic integration played a significant role.Kim et al (2014) estimated the future soybean import demand from South Korea, China and Japan from the USA and examined the major determinants of import demand from 2011-17 using Ordinary Least Square method. Soybean import demand, world soybean price, Exchange rate, GDP per capita and WTO participation were considered as dependent and independent variables respectively. It was found that US soybean exporters must expand their share in the Chinese soybean market while due to the price sensitivity in the South Korean market the exporters must try to control the production and transportation cost to remain competitive.Sinha (2016) focused on the impact of developmental variables namely infrastructure, human resources, resources, openness, production and market on India's imports using principal component analysis, composite index and panel regression model under Heckscher Ohlin International Trade Theory for 1990-2013.Indian imports were mainly determined by resource and openness and therefore should be given due importance while formulating India's import policy.

II. TESTING THE STABILITY OF THE ESTIMATED FUNCTION

Since a huge body of literature had already been published on the estimation of the import demand function need was felt for testing whether the estimated function was stable or not. Thus, various studies were directed toward this purpose. Tuck Cheong Tang (2001) verified the stability of Japanese aggregate import demand function over 1973-1997 using cointegration bounds testing procedure (Pesaran et al) based on an estimate of VECM. Import demand function was modelled using income and relative prices as its determinants assuming other factors get subsumed within these 2 only. The results of VECM were subject to a battery of diagnostic tests. The variables of interest were found to be cointegrated i.e. import demand function was stable. Also, the Marshall Lerner condition for Japan was satisfied implying the favourable effect of devaluation on the trade balance.Tayyeb Shabbir & Riaz (1991) investigated the structural stability of the aggregate import demand function for 1959-60 to 1987-88. A priori information and switching regressions methodology wereadopted to determine the exact year of structural change in the function. Structural break at the end of 1971-72 was experienced by Pak in a way that

Imports became more sensitive to GND and less to the relative price of imports.Arize, Malindretos, Elias (2004) examined the determinants of real imports for Pakistan by including real imports for Pakistan by including real forex reserves in Pak's import demand equation by comparing equations with and without this variable. Stability of the estimated import demand equation was also emphasized over 1973:2 to 1999:1. REER was recognized as an important variable in the import demand equation for Pak. Multivariate cointegration by Johansen and Stock and Watson (FIML estimators) were used to test for cointegration. Test coefficient of cointegrating relation was estimated using DOLS (Stock and Watson) and Spectral estimator (Phillips). Long and short run structural stability of the import demand function was tested using Hansen and Joint Parameter non-constancy & Variable non-constancy techniques. However, the variables in question were found to be cointegrated and REER was considered as a vital variable. Long run equilibrium relationship between TB and REER indicated devaluation policy as an effective tool for correcting Pak's persistent trade deficit. Tuck Cheong Tang (2008) contributed to the empirical literature by testing for the stability of Japan's aggregate import demand function by applying the rolling windows technique to the bounds testing approach to cointegration and estimating the long-run income elasticity and the relative price elasticity via least squares estimator. Japan's aggregate import demand function was not stable over the sample period 1973:1 to 2007:2 i.e. cointegration prevailed for certain periods (windows) and disappeared for other (windows) periods. Yoichi Matsubayashi et al (2003) empirically analyzed the stability of the aggregate import demand function for G7 countries. The standard cointegration test and a test developed by Gregory and Hansen were performed. The results of standard cointegration tests suggested no stable cointegrating relation between real imports, real GDP and relative import price for all G7 countries. Thus, the stimulation of domestic business conditions did not link the quantity of imports for 5 countries namely, Canada, Italy, Japan, UK, USA as cointegrating relation was established only for France and Germany among the G7 countries.

III CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The research on import demand has travelled a long way beginning from using annual data, traditional Johansen(1988), Johansen and Juselius(1990), Engle Granger(1987) techniqueson cointegration on a large number of developing and developed countries namely Japan, China, Malaysia, Pakistan, India, Srilanka to using quarterly data (obtained through interpolation in case of non-availability of quarterly data), a more robust Pesaran et al (2001) ARDL , UECM techniques and panel data techniques. The latter has two main advantages over the former, one it can be applied to studies having small sample size and secondlyit can be applied irrespective of whether the series is I (0) or I (1).

The model specification of the import demand function also changed over the years ranging from traditional specification taking into account real GDP and relative prices (ratio of import prices to domestic prices) to inclusion of a number of additional variables which may impact import demand like effective exchange rate, national cash flow, time trend, real imports, financial variables viz, lending rate, bank credit, government bond yield& share prices dummy variables to counter structural policy shifts, spread between high yield and high grade corporate bonds and volatility index as a proxy for investors attitude towards risk, real forex reserves, domestic prices and import prices as separate variables and not in relative terms, country's international reserves, foreign aid. Since different components of final demand expenditure have different import contents therefore to counter such aggregation bias the final demand expenditure components were disaggregated into 3 expenditure components namely, final consumption expenditure, investment expenditure and exports in some studies.

Though there is an abundance of empirical literature available on the subject of import demand function from a critical standpoint, it is observed that much of the literature is directed towards using the similar technique of estimating the demand function by only changing the country under analysis. Less amount of work is done onthe third category of the above analysis i.e. testing the stability of the estimated function.Though a positive aspect of the literature is that the evolution of the new techniques has very well countered the aggregation bias by disaggregation by either industry or variable. Techniques using Panel data are evolving over time but they have

not yet gained as much popularity as Pesaran's approach got in the literature.As such, the scope of research on import demand function remains, so it is required to fill the gap and bring out an empirical study with respect to the following points:

1. Much empirical work accounted for the impacts of devaluation, testing the Marshall Lerner condition on the effectiveness of exchange rate revaluation on the external balance can be another area of focus.

2. After the model on import demand has been developed, it can be used for forecasting import demand.

3. Since in models where time trend is included as a variable, it should be taken into account that actual growth is also cyclical therefore to capture secular or trend value of economic activity,the inclusion of actual GDP to trend GDP as a variable can be another area of research.

Thus, to conclude the paper attempts to look into the measurable rationale of import demand function and examine its scope and significance vis-à-vis the magnitude of literature available on the subject.

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