ESTIMATION OF IMPORT DEMAND FUNCTION FOR PAKISTAN

By

Tayyaba Razzaq

61-SE/M.Phil/03

Supervisor

Dr. Abdul Jabbar

Assistant Professor (Research Coordinator), IIIE

DISSERTATION

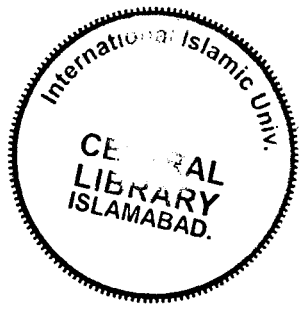
Submitted in partial fulfillment of the requirements for the degree

MASTER OF PHILOSOPHY (M. PHIL) in ECONOMICS

International Institute of Islamic Economics

International Islamic University Islamabad, Pakistan.

2009



Economics
Economics and economic theory
International trade
Import demand
International trade and international commerce

International Institute of Islamic Economics

International Islamic University Islamabad

FINAL APPROVAL

This is to certify that we have read this report, submitted by following student

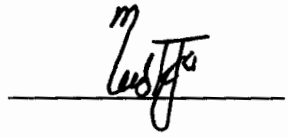
Tayyaba Razzaq (61-SE/M.Phil/03)

To our judgment the report is well prepared and meets all the standards of acceptance for the award of Master of Philosophy (M.Phil) in Economics.

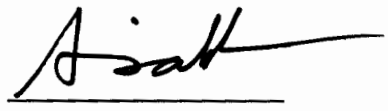
Committee

1. **External Examiner**
   Dr Abdul Qayyum
   Associate Professor/Registrar
   Pakistan Institute of Development Economics
   Islamabad.

2. **Internal Examiner**
   Ghulam Mustafa Sajid
   Assistant Professor/HOD
   Economics and Finance,
   IIIE, International Islamic University,
   Islamabad.



3. **Supervisor**
   Dr. Abdul Jabbar
   Assistant Professor (Research Coordinator),
   IIIE, International Islamic University,
   Islamabad.



DEDICATION

I dedicate my research work "Estimation of Import Demand Function for Pakistan" to my husband and daughters Zaina and Eliza.

ACKNOWLEDGMENTS

First of all, I would like to thank Almighty Allah, The Most Merciful and The Most Beneficent, Who has bestowed upon me all the abilities and talents and, Who made me competent and courageous enough to go through the tough and challenging task of completing my research thesis.

Secondly, I am highly obliged to my thesis supervisor, Dr. Abdul Jabbar (Research Coordinator in IIIE), who guided me with the fullest of his interest at every step of my research painstakingly, supported and motivated me to accomplish my tasks in conducting the research work.

Sir Abdul Rashid Ahmad, Lecturer in IIUI, for his helpful suggestions and technical guidance, particularly in the episode of empirical methodology and empirical estimation for this analysis, without his help may be it is impossible for me to complete this task.

All those people deserve the words of sincere gratitude, who helped me in some way or the other during all the way long carrying out my research on "Estimation of import demand function for Pakistan".

Further, I would also like to acknowledge my parents, my sisters and specially my grandmother, without their support and encouragement, I would not be able to realize my potentials and would never be able to excel in every aspect of life.

Moreover, I would like to pay my sincere thanks and fondest regards to all the other people including my friends and colleagues who gave me their marvelous cooperation without which all my efforts would be in vain, they all deserve sincere credit on my behalf.

ABSTRACT

This dissertation develops a structural econometric model of import demand for Pakistan, with binding foreign exchange constraint. Theoretically based upon rational expectation permanent income hypothesis (RE/PIH).Where representative agent is indifferent between domestic and foreign goods that clearly explain the microeconomic foundation of the import demand models of Pakistan. Our results confirm the implementation of rational expectation permanent income hypothesis (RE/PIH) to Pakistan economy, previous import demand models that do not account for this feature are required to compare with this feature. For the purpose of estimation unit root test is applied to analyze the order of integration of our selected variables, Johanson cointegration test on Maximum Eigenvalue and Trace of the Stochastic Matrix is also used to check the number of conitegration relationships. But the main emphasis of this dissertation is on Autoregressive Distributed Lag (ARDL) approach to cointegration through this technique old theories received a renewed attention. Its comparison with dynamic ordinary least square (DOLS) clearly shows the superiority of our selected technique. Theoretically consistent parameterization of variables overcomes the data problem. Thus it enables the estimation of income and price elasticities with the help of cointegration approach. When compared with the previous literature our results received correct signs, highly statistically significant and credible scale.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background

The econometric analysis of income and price elasticity of import demand has been one of the most active research areas in international economics. It has been accomplished the empirical literature for more than a quarter century. Some of important studies are Houthakkor and Magee (1948), Goldstein and Khan (1985), Carporale and Chui (1999), Oskooee (2005). The main reason for its popularity is its applications to large number of macroeconomic issues, such as exchange rate policy, fiscal implication of tariff reduction strategies as the core part of trade liberalization program, calculation of taxes and interest rate, and the degree to which the trade balance effects a country's growth.

The main issue which is ignored in these studies is about the theoretical foundation or microeconomic foundation of these models, drawn from the optimality condition of an intertemporal maximization program, under the assumptions of rational expectation permanent income hypothesis (RE/PIH). In rational expectation/permanent income hypothesis (RE/PIH) resources are consumed between present and future periods.

Another important issue is mostly neglected in the import demand models, is prevalence of foreign exchange constraint. Where foreign exchange constraint binds every period consumption. The models used this idea combine's traditional model of import demand with the stock of real reserves (Arize 2004), or combines with the sum of foreign exchange receipts and foreign exchange reserves (Moran 1988) , or combines with contemporaneous export receipts (Mazaeri 1995). In these cases foreign exchange variable alone determines the volume of import demand .It creates the problem of near identity, price and income elasticities also receives nonsensical results and is devoid of any behavioral interpretation.

The next point under observation is the concept of 'virtual prices'. As import license and imported goods are used in the secondary market. Therefore secondary market prices are the appropriate prices for imports relevant for consumer optimization. But for most of the developing countries, such price data is not available, same is the case with Pakistan. This study is concerned with modeling aggregate import demand functions in developing countries to reduce such data problems by presenting a "market clearing model"[1] where secondary market clears at the equilibrium prices and it is equally valid where secondary markets are thin or these markets do not exists and the appropriate scarcity prices are the virtual prices as long as the assumption of representative agent is used. We present a two goods representative agent economy for import demand function with binding foreign exchange constraint at administered prices of imports. This model is already applied for two developing countries of South Asian region, India and Sri Lanka (Emran and Shilpi 2001), and is also applied for non durable goods (Clarida 1994) for US economy.

In this study we extend the analysis in the following ways.

1. This study derives a structural econometric equation of import demand. By applying a two goods version (domestic goods and foreign goods) of rational expectation permanent income hypothesis with binding foreign exchange constraints. It makes our model theoretically and empirically implementable.

2. This study applies the autoregressive distributed lag (ARDL) bound F testing procedure developed by Pesaran, Shin and Smith (2001) along with the widely used Johansen approach for the determination of the cointegration rank, and to examine the relationship between import

[1] Terminology used by Winters and Brenton(1993)

demand and its determinants. It is a better[2] estimation technique, old theories received a renewed attention.

3. The long run estimates of autoregressive distributed lag (ARDL) are compared with dynamic ordinary least square (DOLS) method, through the comparison of results and stability analyses of both techniques, we finally concluded that (ARDL) is a better approach for estimation.

4. For estimation most recent data sets are used.

5. Trade liberalization effects are also analyses on foreign exchange reserves variable. By multiplying the dummy of trade liberalization with foreign exchange reserves in the import demand equation[3] .

6. This study tries to overcome the problem of data. Its results are more appropriate than previous studies.

1.2 A renewal of import demand function for Pakistan

This study will be different from previous studies available on Pakistan economy due to following reasons.

1. This study describes the microeconomic foundation of import demand model. It is not available in previous studies of Pakistan. Where representative agent is indifferent between domestic and foreign goods.

2. The derived import demand equation is log linear in the relative price of imports, scarcity premium and an activity variable called domestic

[2] Why ARDL is a better approach than previous cointegration techniques complete detail is given in chapter 5 "methodology" section.

[3] Complete detail is given in chapter 5, "variable discussion" section and Chapter 3 theoritical discussions.

consumptions a renewed form of income elasticity. It is defined as GDP minus exports[4]. Due to this property our results are not comparable with any previous study, because previous studies adopted only GDP or GNP as expenditure or income variable which includes exports. The concept which is discussed in this research work is new for Pakistan economy.

3. To test the existence and the number of the long run relation (s), we use the bonds "F" test developed by Pesaran, Shin and Smith (2001) along with the widely used Johansen approach for the determination of cointegration rank, because Johanson test shows number of relationships and bonds test only shows whether the relationship exists or not and do not show number of relation(s) exists in a specific model. Although bounds testing approach has the advantage that the existence of the long-run relationship among a set of variables can be tested without any prior knowledge about the order of integration of the individual variables.

4. Traditional models of import demand might be inadequate due to absence of long run relationship among the variables (Sinha 1999). This research tries to overcome this problem. A modified form of traditional model is discussed here.

5. When foreign exchange reserves variables is used as a regressor. It creates the problem of near identity. Our results clearly show the one to one relationship among import demand and foreign exchange reserves variable when foreign exchange reserves variable is used as regressor. This study tries to resolve the problem of near identity in the case of Pakistan in our original model with Z* (scarcity premium variable).

[4] Note that GDP is expenditure on domestically produced goods including exports and thus H domestic consumption can be defined as GDP minus export.

6. The empirical results using ARDL and DOLS approaches for the estimation of long run estimates clearly shows the uniqueness of our model presented here.

1.3 Objectives of the study

The main objectives of this study are as follows:

1. To check the implementation of rational expectations/ permanent income hypothesis (RE/PIH) on import demand function of Pakistan.

2. To check the time series properties of the data.

3. To overcome the problem of near identity in the import demand equation, when the foreign exchange constraint in binding.

4. To check the long run estimates with the help of ARDL approaches to cointegration.Comparison of these estimates of ARDL with DOLS methods.

Overview of the thesis

The thesis is organized into seven chapters. Concept of trade policies and policies adopted in Pakistan in different years of development are discussed in Chapter2. In chapter 3 theoretical and empirical models, complete discussion on import demand models, the concept of rational expectation permanent income hypothesis are discussed. In Chapter 4 a brief discussion of the previous studies that analyze the import demand models with rational expectations permanent income hypothesis (theoretical base) or with ARDL approach to cointegration are discussed, few papers on import demand function for Pakistan are also reviewed here. The econometric methodology is described in Chapter 5. This chapter also provides the data discussion and variables detail. The results are presented in Chapter 6 for our three models model I, II and III, Firstly unit root results for

ADF equation includes only intercept and both intercept and trend at level and first difference are discussed to check the order of integration, after this Johansen cointegration results based on maximum eigenvalue and trace of the stochastic matrix are discussed, than bound test results, after that long run estimates of ARDLand DOLS model are discussed all these techniques are used for every model I,II and III separately. The last chapter provides overall conclusion of the study and detailed policy implication from our results.

CHAPTER 2

FOREIGN TRADE POLICIES IN PAKISTAN

This chapter includes certain subsections .Firstly the concept of different protection policies is discussed. Secondly the concept of different trade policies is given where these protection measures are used, a brief discussion is provided on shortcomings and advantages of these trade policies. In the last full detail of different trade policies adopted in Pakistan from its creation to different years of development, and the current situation is also discussed.

2.1 Concept of protection policies

There are many protection issues relating to a small competitive economy like Pakistan. Some of the important issues/protection policies are discussed here.

2.1.1 Tariffs

Governments do employ certain measures such as tariffs to achieve various incomes distributional and other economic and non economic objectives. In the analyses of trade protection tariffs are the starting point of this analyses. But the effects of tariffs are appeared very costly to a small economy, because they divert the resources which are important for productive uses. Tariffs make a distortion in prices that are paid by consumers. So it is require for a small economy to maximize its economic welfare by reducing tariffs or with no tariffs

2.1.2 Non Tariff Barriers

These are few important types of non tariff barriers.

i. Import quota (Import quota is resembled to a tariff (called implicit tariff).It takes the same domestic prices as the quota is imposed. As the market

sharing schemes is equivalence to tariff which is an example of import quota).

ii. Export subsidies (Such type of subsidies is applied in the market of agricultural products and capital goods).

iii. Content protection schemes (These schemes are mostly favorable for domestic intermediate goods producers .They receive specific percentage of their input from domestic industry and the remaining portion will be imported duty free. These schemes differ from both tariff and quota because these schemes allow the final goods producers to obtain imported units at below domestic prices).

iv. Preferential Government procurement schemes (These schemes are equivalent to the production subsidy. If the government's demand for goods is higher than industry's free trade output or the government demand is lesser than the industry's free trade output. In both the cases they do not affect the domestic consumer's prices).

2.1.3 Measurement of Protection to different sectors

For better explanation of this concept we first consider the problem of measuring protection to sectors where some goods are produced for intermediate use. If factors substitutability is limited, then the percentage change in a commodity's value added per unit is an important measure of protection of that commodity's gross output = (output for final demand+ output for intermediate use).

The formula of effective rate of protection is used to measure the protection afforded to a sector's total level of activity. The formula of effective rate protection is.

$$e_j \equiv \frac{V_j - V_j^*}{V_j^*}$$

V_j = Value added per unit of good j in the tariff distorted situation.

V_j^* = Value added per unit of good under free trade.

If there is excessive substitutability among inputs or the main purpose of protection is other than output than the formula of protection is not effective and it is unreliable measures of sector's level of protection[5].

2.2 Concept of trade policies

Countries according to their international trade structure, generally adopted two types of trade policies/strategies and these are:

i. Import substitution strategy/Inward-oriented.
ii. Export Promotion/Outward-oriented.

Most of the less developed countries or the countries at the early stage of their development adopt import substitution strategy. It substitutes the imported goods with domestically produced varieties, and its main aim is to protect the infant industry, that is why this strategy starts with producing consumer goods that do not need a developed technology industries etc. It includes the import controls, high tariffs and quantitative restrictions on imports. The institution that will make this protection is the government by maintaining the exchange rate, interest rate and appreciation of currency. Because through these measures the country reach at the level, at which it can compete with the foreign industries all over the world, and shifted toward export promotion strategy after an import substitution strategy.

[5] For details referred to Vousden (1990)

The export promotion strategies do not differentiate between domestic goods and exports of a country, but it relates the domestic economy to the world economy. The external demand for exports is the main source of activity. It promotes the industries that have export potential. Exporters continuously facing increasing competition, so it is require for them to improve technologies, and quality must compete with the competitors. In the outward oriented strategies the interest rate, inflation and exchange rates are determined in the market.

Import substitution strategy has certain major short comings and these are:

1. This strategy increased a country's dependency upon foreign exchange. The country who is continuously adopting this strategy is facing the problem of shortage of foreign exchange.

2. For the protection of domestic industry, authorities go under pressure by producers to provide imported raw material and capital equipments at low prices. So an overvalued exchange rate system is managed. Which create a balance of payment crises, and is very harmful for a country's export earnings.

3. This strategy provides capital equipment at low prices. It creates serious problems of unemployment, because great number of unskilled labors not absorbed in the modern industry.

4. Higher rates of tariffs and quotas create a price gap between domestic market and international market. It encourages smuggling and unfair means of earning, because it is profitable in this strategy.

5. High rates of tariffs and quotas created artificial scarcity, which promotes black marketing of imported goods.

6. Negative interest rate is adopted in this strategy, because it favors import substitution investment. But this policy discourages domestic saving (Bruton 1989).

As it is mentioned earlier, that every country adopted import substitution (IS) in earlier year of development. Then it moves toward export promotion. It has certain advantages and these are:

1. It gives industries the opportunity to enlarge their market and enjoy benefits by large economies of scale.

2. It makes industries to be contend able in the international market. In this way firms achieve greater x-efficiency.

3. New technologies are adopted in this strategy. It is beneficial for exports. Because this latest technology includes advice on production engineering and aid in product design marketing.

4. This strategy provides self correcting mechanism to adjust the macroeconomics variables i.e. exchange rate. It affects the trade balance.

5. When a country moves from inward oriented to outward oriented strategy. It increases the proper allocation of resources and multiplier effect also, which in turn increase the saving behavior of a country.

6. This strategy is helpful in making efficient use of resources. Because it links the domestic economy to the world economy.

Although it is proved from the theories that export promotion is better policy. But still it is not possible to ignore the import policy of a country. Because trade balance is achieved through the combination of imports and exports. So

it is required to adopt the measures which increases a country exports and reduces its import demand.

2.3 Trade Structure and Policies in Pakistan

Like many other developing countries, Pakistan adopted the import substitution strategy in the early years of development. When Pakistan appears as an independent state on worlds map, its industrial base was very weak. It depends upon a few textile mills, some sugar mills and some cement factories, totally 34 units. The main objective of import substitution strategy was, to replace the domestic demand for imported consumer goods with domestically produced varieties, due to this reason tariff rates for consumer goods were set high than capital and intermediate goods. On the other hand capital and intermediate goods were either freely allowed or very low tariff rates were imposed on these goods. Trade policies mostly favor domestic producers of manufacturing items. They buy their agricultural raw material at below world prices, and sell their final products in domestic industry at above world prices .This extreme form of protection ends from 1952 to 1959.

During the decade of 1960's government began to promote export growth by taking a number of measures to reduce the anti export bias of the trade regime. Firstly, the government introduced the Export Bonus Scheme, which mostly supports the exporters of manufactured goods by exchange rates, which was most favorable for them. Secondly, industries with export potential received special treatment such as preferential access to foreign exchange. Thirdly, automatic renewal of import license for industrial raw material and consumer goods, keeping in view the previous export performance of that unit. Similarly, in the phase of export promotion, free list of imported items is also included. Almost all the requirements for industrial raw material were placed in free list. Despite these measures export bonus scheme covers only 5% of total imports, other efforts are discriminatory in nature .Large scale manufacturing industries grew at an average of 13.4% per annum and manufacturing exports by 11.4% per annum 1.8%

growth of primary goods. Overall total exports grew at an average rate of 7.0% and manufacturing sector share is 43% in 1960 and 67% in 1970.

During the decade of 1970's, trade policy is again favorable for import liberalization and export promotion. Pakistani rupee was overvalued during the 1950's and 1960's which encourage import substitution. In May 1972 Pakistani currency was devalued by 57% to reduce anti-export bias, the exchange rate of Pakistani Rupee with the dollar was at Rs9.90/$.Export Bonus Scheme was eliminated in this decade, because it compensate exporters of selected manufactured items. The third important measure was to cut down the restrictive licensing .Six import lists were converted into a single list which includes items of free entry. But despite these measures BOP is still in deficit because import bill increases a lot due to oil price shocks. Thus exports decreased to an average of 7.0 percent of GDP in 1976-80 to 8.1 percent of GDP during 1972-75.While imports bill increased to an average of 14.1 percent of GDP to an average of 10.1 percent of GDP in the same period.

During the decade of 1980, there was a shift in trade policies from import substitution to the export promotion. Fixed exchange rate system was converted to flexible exchange rate system. Government started a structural adjustment stabilization program, the main purpose of this program is liberalization and deregulation of the economy. This program makes correction in the import licensing procedure. It also address the structural weaknesses in the industrial sector of Pakistan .Between December 1980 to June 1983,about 100 commodities were added into the free list, this free entry list is converted to list of banned items(negative list). Numbers of tariff/ tax changes were implemented in this decade and these are (i) Tariffs rates were adjusted for the newly liberalized items.(ii)Five percent Surcharge on all imports (excluded baggage and parcel post) in June 1983.(iii)Five percent Iqra Surcharge, implemented in June 1986.(iv)Duty free imports of machinery and raw material for the industries have

higher export potential. Tariff reforms were undertaken in June 1987, where tariffs are mostly reduced and in some cases these rates were increase.

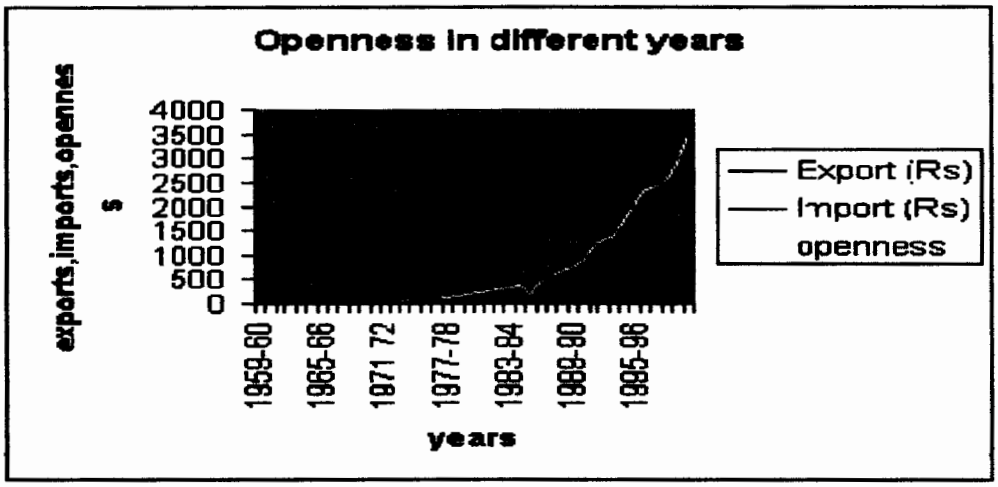
i. The number of tariff slabs reduced from 17 to 10 percent.

ii. Sales tax of 12.5 percent was replaced with previous rates that are varying across the commodities.

iii. Maximum tariff rates reduced from 225 percent to 125 percent and average tariff rate was reduced to 8 percent points in 1987-88.

In 1987-88 trade policy rice and cotton exports were open to private sector and imports of raw material and intermediate inputs to export industries were liberalized, special credit wing for exporters in State Bank of Pakistan is established. Provision of foreign exchange for marketing of goods in abroad is managed. Income tax concession on exports earnings is provided. Introduction of value added criterion in the allocation of textile exports quotas, it is an addition to previous export performance criteria. The result of these policies is, the share of manufacturing and semi manufacturing exports in total exports rose sharply, increased from 58 percent in 1979-80 to 80 percent during 1989-90.However these policies also accelerate import growth, which is 78 percent in 1978-79 and 86 percent during 1987-88. On the whole this decade have special importance, due to the trade liberalization efforts undertaken in this decade, and also there was improvement in the confidence of business circle.

Figure 2.3: Openness in different years of development



During the decade of 1990's import liberalization policies continuously works, as a result imports masses raised a lot in this decade due to import liberalization efforts and due to oil price shock also. Nontariff barriers were removed, restrictive licensing is abolished only few commodities were restricted due to health, safety and religious reasons. Importers were allowed to use their own foreign exchange without any restriction. Maximum tariff rates were reduced from 225 percent in 1986-87 to 87 to 70 percent in 1994-95 and to 45 percent in 1997-98. Tariff reform committee of 1993 have been proposed for Setting a maximum tariff rate of 35 percent for most of the products except chemical and engineering and setting a maximum tariff rate of 50 percent for all items except automobile (265 percent)

Tariff reform committee of 1993 committee recommends that, Import license fee (6 percent) iqra surcharge (5 percent) and flood relief surcharge (1 percent) will be merged with statuary tariff rate, and proposed two options for maximum tariff rate. (i)Nominal tariff rate will be linked as manufacturing position is changed. (ii)Zero rated inputs to export oriented production and tariff rate will be changed in three years starting from 1994-95 .So that industry and labor market adjust to the changes, and there were only 32 products in the negative list and 28 are restricted due to health and safety reasons.

Table 2.3: Maximum tariff rate in different year

1986-87	225%	1997-98	45%
1988-89	125%	1998-99	35%
1990-91	95%	1999-00	35%
1993-94	80%	2000-01	35%
1994-95	70%	2003-04	25%
1995-96	65%	2007-08	25%
1996-97	45%		

Source: Khan (1998), National Tariff Commission.

Greater trade liberalization efforts continue in 2000, maximum Tariff rate reduce to 35 % , average tariff rate on dutiable imports fell from 23% (1996-97) to 17% in (2000-01), average tariff rate on total imports fell from 17% (1996-97) to 11% in (2000-01).Government provide facilities for doing business and improve the exports of Pakistan, and government also made efforts to search new markets for Pakistani traditional and non traditional exports .In 2005 maximum tariff rate is reduced to 25 percent .In the year of 2008-09 central board of revenue proposed to reduce the maximum tariff rate from 25 percent to 20 percent and average tariff rate 0 percent.

CHAPTER 3

THEORETICAL DISCUSSSION

This chapter also includes certain subsections .Firstly, theoretical model of import demand is discussed through this model we can receive the final equation of import demand which is used for estimation. Secondly, idea of import demand function is given, after that criticism on the functional form of import demand and a brief discussion on income and price elasticities of import demand, effect of trade liberalization on import demand are discussed. Thirdly concept of rational expectation permanent income hypothesis is given.

3.1 Theoretical Model

The model of aggregate imports under binding foreign exchange constraint can be used for Pakistan economy. This model is already used for India and Sri Lanka economy by Emran and Shilpi (2001). The rational expectation permanent income model of representative agent is used to derive the import demand function. The representative agent consumes two goods, a home good (H_t) and an imported good (M_t), and the optimization problem is defined by two constraints, first one is budget constraint describing the asset accumulation and the second is an inequality constraint describing the foreign exchange availability constraint. The optimization problem of the representative agent is as fallows.

$$Max[H_t, M_t, A_t]V = E\int_{t=1}^{\infty} e^{-\delta t}\, U(H_t, M_t)d_t$$

Subjected to

$$\dot{A} = rA_t + \tilde{Y}_t - H_t - P_tM_t \qquad (1)$$

$$P_tM_t < F_t \qquad (2)$$

Where P_t = Relative price of imports.

A_t = Assets

$\tilde{Y}_t$ = Labour income

F_t =Total amount of foreign exchange available

r = Constant real interest rate

δ = It shows that the representative agent discounts the future by the subjective rate of time preference

$\dot{A} = \frac{dA_t}{d_t}$ (dot on any variable shows it's time derative)

The control variables are not constrained, so the optimal control path is an interior solution

The current value Hamiltonian function of the optimization problem of the representative agent can be written as

$$L = U(H_t, M_t) + \lambda_t [rA_t + Y_t - H_t - P_t M_t] + \mu_t [F_t - P_t M_t]$$

Here H_t and M_t are control variables because they are included in the objective function which is dependent upon control as well as state a variable which is A_t and λ_t is the costate variable and is called marginal utility of wealth and μ_t is the Langragian multiplier with foreign exchange constraint. Although Hamiltonian function is denoted by H but in this import demand function H variable is used for domestic goods, so for the Hamiltonian function is denoted by L. The maximum principle of the optimization problem is.

$$U_H = \frac{\partial L}{\partial H} = \lambda_t \quad (3)$$

$$U_M = \frac{\partial L}{\partial M} = \lambda_t P_t + \mu_t P_t$$

$$= P_t(\lambda_t + \mu_t) \quad (4)$$

$$\dot{\lambda} = -\frac{\partial L}{\partial A} + \delta \lambda_t = -\lambda_t r + \delta \lambda_t$$

$$= \lambda_t (\delta - r) \quad (5)$$

Following Clarida (1994), it is assumed that U (.) is an addilog utility function.

$$U(H_t, M_t) = C_t \frac{H_t^{1-\alpha}}{1-\alpha} + B_t \frac{M_t^{1-\eta}}{1-\eta}$$

Where C_t and B_t are random strictly stationary shocks to preference

By inserting the Clarida's addilog utility function into the original current value Hamiltonian equation.

$$L = C_t \frac{H_t^{1-\alpha}}{1-\alpha} + B_t \frac{M_t^{1-\eta}}{1-\eta} + \lambda_t [rA_t + Y_t - H_t - P_t M_t] + \mu_t [F_t - P_t M_t]$$

The first order condition of the optimization problem is as fallows.

$$U_H = \frac{\partial L}{\partial H} = H_t^{-\alpha} C_t - \lambda_t = 0$$

$$C_t H_t^{-\alpha} = \lambda_t \quad (6)$$

$$U_M = \frac{\partial L}{\partial M} = B_t M_t^{-\eta} - P_t \lambda_t - \mu_t P_t = 0$$

$$B_t \; M_t^{-\eta} = P_t \lambda_t + \mu_t P_t$$

$$B_t M_t^{-\eta} = P_t \lambda_t \; (1 + \mu_t^*) = \lambda_t P_t^* \qquad (7)$$

Where $\mu_t^* = \frac{\mu_t}{\lambda_t} = \frac{\mu_t}{U_H}$ and P_t^* = Virtual price (Scarcity price at which transaction occur at the shop floor in the Secondary market if the secondary market fails to clear)

These assumptions are used in the model

$$[F_t - P_t M_t] \geq 0 \text{ and } \mu_t [F_t - P_t M_t] = 0$$

By using Equation (3) in Equation (4) we get.

$$B_t M_t^{-\eta} = P_t C_t H_t^{-\alpha} \; (1 + \mu_t^*)$$

The logarithmic form of above equation is denoted by lower case letters

$$b_t - \eta m_t = c_t + p_t - \propto h_t + \ln(1 + \mu_t^*) \qquad (8)$$

In order to derive the long run import demand model, certain steady state conditions were applied in the model and these conditions are

$\dot{A} = \dot{\lambda} = 0$ and for equilibrium price $P_t = P_t^*$ and the total house hold income evaluated at equilibrium price is denoted by Y_t^* and it includes both labour income and assets income

$$Y_t^* = H + P_t^* M \qquad (9)$$

Here Y* = total household income and it includes both labor and assets income. Solving the steady state condition for H_t

$$H_t = Y_t - P_t^* M_t \quad (10)$$

By applying natural logarithm.

$$h_t = \ln(Y_t - P_t^* M_t) \quad (11)$$

By using equation (9) in equation (6) we get

$$m_t = \frac{\propto}{\eta} \ln(Y_t - P_t^* M_t) - \frac{1}{\eta} p_t - \frac{1}{\eta} \ln(1 + \mu_t^*) + \varepsilon_t \quad (12)$$

$\varepsilon_t = \frac{1}{\eta}(b_t - c_t)$ is the composite preference shock.

If the foreign exchange constraint is not binding it shows that μ_t^* is zero and the remaining import demand equation from equation (10) is the same as used by many studies for developed and developing countries which used traditional model of import demand (i.e. D.Sinha(1997,2001). Goldstein and Khan (1985), Houthakker (1984) Bahmani-Oskooe (1986, 2005), W.S. Ho (2004), Faini (1992) and many others).

Y shows the total expenditures which includes expenditures on domestic goods as well as on imported items. So in equation (10) $\ln(Y_t - P_t^* M_t)$ can be defined as GDP minus exports[6]. In traditional import demand models variable Y includes

[6] As mentioned earlier in the "introduction" section that GDP is expenditure on domestically produced goods including exports and thus H_t can be defined as GDP minus export. In previous models of import demand GDP or GNP variables are used as income variable i.e.Houthakker and Magee(1984), Goldstein and khan(1985), Dutta and Ahmed(2006), Paulino and Thirlwall(2004), Mah(1999), Paulino(2002), Khan and Ross(1977), Ooskooee(2005), Metha and Parikh(2005)etc.But here in this study we used GDP minus exports for consumption on home goods ,which is a renewed form of previous studies.

value of GDP or GNP.But here it shows expenditure on home goods, which is achieved by excluding exports from GDP variable ($H_t = Y_t - P_t^* M_t$) , because GDP shows expenditures on domestically produced goods including exports. Our concern is domestic consumption not the exports of a country.

When the foreign exchange constraint is binding. The Kuhn-Tucker theorem requires that $\mu_t > 0$ *so it is* required that $\mu_t^* > 0. \mu_t^*$ Shows foreign exchange availability. But if we use foreign exchange variable in the regression equation it creates the problem of near identity. So real total expenditure ((GDP+import-export)/Foreign exchange available)[7] is used instead of μ_t^* and that new variable is denoted by Z_t .There is no direct effect of Z_t on import demand, but through the medium of μ_t^* and they are positively related $\frac{\partial \mu_t^*}{\partial Z_t} > 0$ .But import demand is negatively related with Z_t.

$$\frac{\partial M_t}{\partial Z_t} = \frac{\partial M_t}{\partial \mu_t^*} * \frac{\partial \mu_t^*}{\partial Z_t} < 0$$

To check the effect of trade liberalization a dummy of trade liberalization Which is one for the period (1973-1986) and Zero for the period (1987-2006) the post liberalization period and it is multiplied with Z_t variable and new variable is denoted by Z_t^*.This procedure is adapted by many studies (Dilip Dutta and Nasiruddin Ahmed (2006) for import demand and Kashyap (1992) for an application to investment).Finally receives the estimable equation of import demand.

$$m_t = \frac{\propto}{\eta} \ln(Y_t - P_t^* M_t) - \frac{1}{\eta} p_t - \frac{1}{\eta} \ln Z_t^*. + \varepsilon_t \qquad (13)$$

$$m_t = \pi_1 \ln(Y_t - P_t^* M_t) - \pi_2 p_t - \pi_3 \ln Z_t^*. + \varepsilon_t \qquad (14)$$

---

[7] Because (GDP+import-export) shows domestic absorption and foreign exchange variable is divided to this, it will help to remove the problem of near identity when foreign exchange constraint is binding.

According to the model the reduced form parameters should satisfy the following sign restriction: $\pi_1 > 0, \pi_2 < 0, \pi_3 < 0$.

Limitation

1. Although imported goods are of two types

    a. Investment goods
    b. Consumable goods.

But here in this model only consumable are incorporated due to limited data availability.

3.2 Import Demand Function

The analysis of import demand is the most researched area in the international economics. The major concern of import demand policies is the responsiveness of imports, with respect to changes in income and prices. Because income and price elasticity have practical importance for policy makers. Import demand functions is estimated at aggregate and disaggregate levels. In the traditional import demand models real imports are determined by domestic income and relative price elasticities.

$$M=f(P, Y)$$

Where Y shows the domestic income and P shows relative prices. When the income and price elasticities of import demand function are constant its functional format of the import demand function is.

$$M = (\frac{P_f}{P_d} E)^{\psi} Y^{\pi}$$

Where P_f shows foreign prices, E is the nominal exchange rate and P_d shows domestic prices, and the ratio of these prices shows relative prices of imports ψ is the price elasticity of import demand and, π is the income elasticity of import demand. Taking log of the above equation and differentiating with respect to time, the import demand function is expressed as:

$$m = \psi(P_f + e - P_d) + \pi(y)$$

The above form is the log linear form of import demand function. In the literature relating to import function, when the import demand model is estimated, nearly all the studies uses log linear form. It gives more appropriate results.

$$m_t = \beta_0 + \beta_1 p_m + \beta_2 y + \mu_t$$

Where P_m shows relative prices (ratio of foreign to domestic prices), Y shows income and , $\beta_1 = \psi$ and $\beta_2 = \pi$ .The expected signs of income and price elasticities of import demand function are $\beta_1 < 0$ and $\beta_2 > 0$. The above import demand function is estimated in many studies for developed and developing countries (i.e. Houthakker and Magee(1984), Goldstein and khan(1985), Dutta and Ahmed(2006), Paulino and Thirlwall(2004), Mah(1999), Paulino(2002), Kwabena and Samantha(2001), Khan and Ross(1977), Ooskooee(2005), Metha and Parikh(2005), Faini(1989)).

Although prices and income are the main determinants of import demand, but some other factors have profound impact on import demand, and these factors are exchange rates, foreign exchange reserves, employment and trade liberalization etc.But in the import demand function of different studies, with income and price variables, some other determinants are also estimated. In this dissertation import demand function is estimated with income and price variables only by excluding other variables[8] and presents a modified form of traditional model, the same import demand function is estimated with an addition of foreign exchange reserves variable and presents the idea of foreign exchange availability formulation , and in the third phase trade liberalization dummy is added to the foreign exchange reserves variable which makes a new explanatory variable, that is scarcity premium which confirms either foreign exchange constraint is binding or not.

[8] Only income and price variables are estimated for the purpose of comparison to the traditional model of import demand, a modified form of traditional model is presented here.

3.2.1 Criticism on the Functional Form of Import Demand Equation

The criticism on traditional import demand model is relating to the definition of price variable. In the traditional import demand functions, real imports are dependent upon a ratio of foreign prices to domestic prices, and both of these price variables are taken in the same magnitude but opposite in directions.

$$m_t = \beta_0 + \beta_1 p_m + \beta_2 y + \mu_t$$

Where $p_m = \frac{P_f}{P_d}$ .So the functional format is written as.

$$m_t = \beta_0 + \beta_1 P_f - \beta_2 P_d + \beta_3 y + \mu_t$$

The main points of criticism are as fallows.

(i) In the case of any individual commodity, prices are weighted differently in the import price index and in the domestic price index (i.e.) the relative price index of air conditioner is increased by 15%, while the import price index increases by 5% ,and domestic price index increase by 2% (ii)it is possible that consumers of any country prefer domestic goods over the imported items , and some other factors like reputation, retail outlets and their servicing effect the consumer preferences. So it is not possible to take ratio of these prices, both effects the import demand and have a separate impact on it.

This criticism is removed, by a simple modification of import demand function. By estimating separately the foreign prices and domestic prices in absolute form, and the new import demand equation is appeared as:

$$m_t = \beta_0 + \beta_1 P_f + \beta_2 P_d + \beta_3 y + \mu_t$$

Where β1 is import price elasticity, β2 is domestic price elasticity and β3 is income elasticity of import demand function. The absolute form of import and

domestic prices are estimated in many studies (i.e. Romeo and Bautista (1978), Thomakos (1997), Khan and Ross (1977), Sinha (2001), Sinha (1997)).

3.2.2 Income and Price Elastcities in Theoretical Framework

In the modern theory of international trade, there are three main frame works[9], which are commonly applied.

i. The neoclassical theory of comparative disadvantage.

ii. Keynesian trade theory

iii. New trade theory.

The neoclassical theory of comparative disadvantage is developed by Heckscher-Ohlin, and it is an extended form of Recardian theory. The main focus is on how volumes of trade, its directions are affected by changes in relative prices. The changes in income are not the main concern of this theory, because they consider employment and income as constant. The neoclassical import demand function is based on the neoclassical microeconomic consumer behavior, and general equilibrium theory. The analytical form of the neoclassical import demand function is defined as.

$$M(P) = D(P, E(P, u)) - S(P)$$

Where M is the real demand for imports, P is the relative price of imports, D is the total demand of importable goods, E is the expenditures at the given price P, and the given utility function u, and S is the domestic supply of importable. Expenditures is equal to income E (P, u) = y(P).The price elasticity of the above import demand function is

[9] For details of this section referred to Dixit(1980)

$$\frac{P}{M}\cdot\frac{dM}{dP}=\frac{P}{M}\cdot\frac{\partial D}{\partial P}-\frac{P}{M}\cdot\frac{PdS}{MdP}-P\cdot\frac{\partial D}{\partial E}$$

The price elasticity is also written in this format

$$e=c-s-m$$

Where e shows the price elasticity of import demand, C shows demand substitution elasticity, S shows the supply substitution elasticity and m shows the marginal propensity to import. The same procedure is used to calculate the foreign price elasticity denoted by e^*.

The Marshall-Lerner condition shows the stability condition of international trade .when the absolute price elasticiticities of domestic prices and foreign prices are greater than one, then the international trade is in equilibrium$|e|+|e^*|>1$.

In the Keynesian trade theory .The Keynesian import demand function is based upon the macroeconomic multiplier analyses. Income and employment are not considered as constant, but the main emphasis is on the income elasticity of import demand in the determination of import demand function. The relationship can be explained by few ratios such as average propensity to import, marginal propensity to import and the income elasticity of import demand.

The new trade theory or the imperfect competition theory is based upon intra-industry trade. It checks the effects of economies of scale, product differentiation and monopolistic competition in international trade. Three approaches are commonly used to check the effect of imperfectly competitive market on international trade. First, is Marshallian approach, in which constant return is linked with the individual firms, and increasing return is related to the industry. Second, is Chamberlinian approach in which industry consist of number of monopolistic firms, new firms are allowed to enter and differentiate their products to break monopolies. So in this case firm cannot get the monopolistic profit, but

they get the normal profit. Third, approach is Cournet approach, in which industry is assumed to consist of only a few imperfectly competitive firms, and each will take each other's output. When we can apply any approach between these three, opening of international trade will increase the market size, decrease the cost, and will result into more output and trade. All the above discussion shows that the new trade theory or the theory of imperfect competition shows a new linkage between income and trade. Trade is expanded by the scale of the output, and if income is used as proxy of scale .Then the role of income in determining imports is very different from Comparative advantage and Keynesian trade theory, in which income plays role for purchasing of goods.

So in the last we are able to say, that import demand is fully explained by income and price elasticities, and the other determinants which effect import demand are subsumed in these two. For example factors behind relative prices are endowment of resources and productive factors, taste, market structure, scale, exchange rates and trade barriers etc. The impact of changes in these factors on import demand will take place through a change in relative prices.

3.2.3 Trade Liberalization and Import Demand Function

In the words of Evans Lewis (2003) trade liberalization can be defined as "A set of domestic and foreign policies aimed at eliminating obstacles to trade or voluntary participation in multilateral processes". The effect of trade liberalization policies on import demand, and also the behavior of import demand elasticities in the periods of economic reforms have been analyzed in different ways.

One is to introduce a dummy variable for trade liberalization, which distinguish the restricted and unrestricted period .In the import demand equation the effect is appeared on the intercept term, and the demand function is shifted in a uniform way, where the restrictions are imposed upon the import demand. This concept is adopted in many studies (i.e. Dutta and Ahmed (2006), Paulino (2002), Paulino (2001)).

Secondly, trade liberalization effect is analyzed the, by simply splitting the data in pre-liberalization and post-liberalization periods. The effect is analyzed in different subsamples, more than two samples are also included. In this way the results of these splitted regressions were analyzed and compared. The results of highly concerned time periods are easily achieved(i.e. Thomakos and Mehmat (1997)) uses aggregate data of 1970-1995 for Turkish economy ,first they estimate import demand equation with full data available, after that import demand elasticities are analyzed in different sub samples 1970-79,1980-95,1970-83,1984-1995 .

Another procedure is to create extra explanatory variables that are combined with the trade liberalization dummy (i.e. Mah 1999) If import demand consist of three explanatory variables income, relative prices and exchange rate, the trade liberalization dummy is added to these entire variable and three new explanatory variables are created, and single dummy variable is also included which effects the intercept term, and the new created explanatory variables affect the variables in original import demand equation.

3.3 Permanent Income Hypothesis (PIH)

The main idea of permanent income hypothesis is developed by Milton Friedman in 1957, and is normally called people based consumption .During consumption peoples keep in mind their 'normal' income, they maintain a constant standard of living although there are fluctuations in their income, these fluctuations have transitory effect on their consumption spending because their consumption depend upon the expectations of overall income of a specific period. This case is very similar to the life cycle hypothesis people level their fluctuations in income by saving during high income periods and by spending their savings in low income periods and overall there is no prominent fluctuation in their income and consumption patterns. This concept is very well explained through the example of a doctor and school teacher before starting their jobs, doctor have high expenditure because he expect to have high income in the future.

The permanent income hypothesis theory suggests that consumer try to level its consumption expenditure through its life time resources. If there is a prominent change appears in the permanent income than its consumption expenditures will also change, otherwise minor changes do not affect long run consumption expenditures.

3.4 Rational Expectation Theory

The theory of rational expectations was developed by John F. Muth of Indiana University in 1961, and this concept is used by Robert E. Lucas Jr and others.

The main idea of this theory is "outcome depends upon the future expectation". This concept is easily explained with the help of examples where many economic situations are discussed, i.e. the price of an agricultural commodity depends upon how many acres farmers harvest, which in turn depends upon the farmers expectations relating price to recognize during harvesting and selling their crops.

Another example is, value of currency and its rate of depreciation depend upon people's expectation relating it. When they expect that certain currency depreciate in future they increase their spending which results the depreciation of currency. Same is the case with bonds and stock market depends upon the behavior of buyers and sellers.

3.5 Rational Expectation Permanent income Hypothesis (RE/PIH)

Hall (1978) makes a combination of Muth's theory of ration expectation and Friedman's theory of permanent income and the new theory is called rational expectations permanent income hypothesis (RE/PIH), this theory suggests that current aggregate consumption is determined by its own one period lagged value and any information which is useful in determining current consumption is already incorporated in last periods consumption, means that the current income

fallows a random walk and its representation is as fallows.

$$c_t = \gamma_0 + \gamma_1 c_{t-1} + \Sigma_{i=2}^{T} Z_{t-i} + e_t$$

C_t = Current period consumption expenditure.

C_{t-1} = previous period consumption expenditure

Z_{t-i} = Vector of any other value (i.e. income, Money balances, unemployment rates or any other) lagged of one period or more that can be useful for the prediction of current consumption.

After that Flavin (1981) extended the views of Hall (1978) by suggesting that unanticipated changes in current income also determine permanent income which directly affects the permanent consumption. He estimates two separate equations one for consumption function and other for income. In the first step Flavin estimates the forecasted income equation and its format

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \alpha_3 C_{t-1} + \alpha_4 C_{t-2} + V_t$$

Here labor income is dependent upon two lagged values of income and consumption and in the second step Flavin estimates the consumption function in the following format.

$$\Delta C_t = \beta_0 + \beta_1 C_{t-1} + \beta_2 (Y_t - EY_t) + \beta_3 EY_t + \mu_t$$

Where changes in consumption pattern is dependent upon previous period consumption and the difference between expected and real labor income.

CHAPTER 4

LITERATURE REVIEW

In this chapter, In the first segment, a review of previous empirical studies that analyze the import demand function is given, in the next stepsummary of all these studies have been presented in tabular form. In the second segment, certain limitations in previous studies have been discussed. In the third segment, uniquess of this research from previous studies is explained.

4.1 Review of the Empirical Literature

I have found few studies relating my topic. These are as fallows.

Winters (1985) explored four models of import determination for three developing countries Malaysia, Columbia and Kenya's empirical methodology. These models are compared between themselves and with two other models of imports in the literature. One model applies the intertemporal analysis to total wealth rather than merely to its foreign exchange component, while the other two relate imports to flows of income or to foreign exchange receipts. The data is collected from international financial statistics, balance of payments statistics and The World Bank debt data covering period 1965-85. Using stratified sampling technique, three developing countries are randomly chosen for analysis. Models are estimated by single equation least square methods. Each country is subjected to same series of specification tests. The results are not entirely satisfactory, suggesting the in temporal approach is quite promising.

Saracog Lu and Iqbal (1986), studied the foreign exchange availability and rationing of imports in developing countries. For estimation simple disequilibrium model of imports for five developing countries, El Salvador, Greece, Thailand, India and Korea, Sample period is different for each country, El Salvador (1953 – 1981), Greece (1952 – 1982), Thailand (1954 – 1982), India (1950 – 1980) and

Korea (1963 – 1983). The disequilibrium model of imports includes both private sector import demand equation and the authorities import rationing equation. The two modes of disequilibrium model are rationing (with quantitative restrictions) and non-rationing (with no or less quantitative restrictions). Time series data was used to obtain statistical evidence. The estimated results confirm the regime switching (periods of both rationing and non-rationing) for all the five developing. The results also provide evidence that rationing period was more common in early years of the study. Another finding was that the authorities varied import restrictions inversely with the country's capacity to import. The estimated price elasticities of import demand showed statistically significant negative value.

Faini et al (1988) studied the import behavior in developing countries by focusing on the impact of import controls. For estimation annual data for the period 1961-1982 is used and OLS method is used for estimation. They analyzed three different aspects. A first aspect is based on the estimation of traditional import demand functions relating import flows to relative price and domestic output. Second aspect is about incorporating the foreign exchange constraints directly in the import demand equation. The third aspect is concerned about direct measures of import control. They studied the cross countries patterns in order to move closer to establish a standard elasticity for countries with similar economic characteristics. The results confirm the higher "measured" income elasticities in developing countries than one and relative prices, significantly effecting the demand for imports.

Moran (1988), analyzed the effect of foreign exchange constraints on imports of countries by expanding Hemphill approach. The expanded approach incorporated to traditional variables (relative price and domestic income) with the variable of Hemphill approach (foreign exchange receipts and international reserves). The four main groups of countries are selected distinguished by World Bank's 1986 world development report. These groups are low income countries, major exporters of manufacturers, non fuel primary commodity exporters and oil

exporters. He developed two main models. The first model introduced two sets of explanatory variables: relative prices and domestic income and foreign exchange receipts and international reserves. The second model developed assumed that import volumes and prices are endogenous. OLS method is used for estimation analyses. The results suggest that price and income effects are important in analysis of import behavior. However foreign exchange constraints are critical in determining imports volumes of developing countries.

Zeldes (1989) examined some of the properties of consumption under the specific alternative hypothesis that individuals optimize subject to a set of borrowing constraints. The time series/cross section data consisting of 10 annual observations per family on food consumption and other variables is obtained from PSID, a large panel of U.S. families. He derived tests in order to shed light on importance of borrowing constraints. Each of the tests involves splitting data observations into two groups and examined group behavior through Euler equation estimation. The results presented suggest that borrowing constraints are important and inability to borrow against future labor income has significant effect on the consumption of population. Which in turns affect the import demand function based on consumer preferences.

Ceglowski (1991) investigated the role of intertemporal substitution in US import demand. Quarterly data is used for empirical analyses from 1968:1 to 1988:4.OLS method is used for estimation. He used a simple model of intertemporal consumption based on permanent income hypothesis, which covers two aspects, one is to consume less today in order to increase future consumption, second is substitution of import consumption with domestic consumption. The variables used for estimation were interest rate, import consumption, income and domestic consumption. Empirical evidence based on US data estimation model produces intertemporal elasticity of consumer imports is about 0.8. This estimate has the possibility of inclusion of importer's purchase and inventory responses to the real interest rate. The value of implied relative price elasticity is also estimated to be

close to one. The results suggest the intertemporal substitution being a factor in import behavior along with being a substitute between domestic and imported goods.

Winters (1993), estimated the import demand function with binding constraint for trade policy to check the effects of quantitative restriction on imports. Import demand function can be estimated on observation for both periods with and without policy. Quarterly disaggregate data is used for UK leather footwear imports and domestics sales for the period Q1:1971 to Q4:1986. Women's and children's footwear are considered separately. OLS method is used for estimation. Seasonal dummies are also included in the estimated equations. The results confirm this findings that cost of rationing are significant, for UK imports of women's and children's leather footwear from Cameron.

Clarida (1993) conducted a study to derive and estimate a structural import demand equation for consumer durable goods by employing a version of rational expectations, permanent income hypothesis. The permanent income hypothesis implies that the demand for non durables and for import durable goods has random pattern. This pattern can be identified with log marginal utility of wealth. The model also implies that the log of unobservable utility index of permanent income must in equilibrium be cointegrated with log non durables consumption. The quarterly data obtained from NIPA for the period 1973:1-1992:1 is used. The results suggest that short run dynamics are assumed to arise from stationary random shocks to real interest rate, import prices and preferences. Similarly the short-run dynamics of the adjustment of durable goods import demand to the long run equilibrium are influenced by cost of adjustment and the aggregation of households' policies. The findings conclude that consumer durables import are price elastic in the long run and permanent income elasticity of imported durable goods demands averages 2.3.

Clarida (1994) used rational expectation permanent income model to develop a structural econometric equation of import demand for non-durable consumer goods. Import demand is dependent upon relative prices, consumption of domestically produced varieties and unobserved shock to taste. Quarterly 1982 dollar data is used beginning from 1967:1 to 1990:2 for non durable consumer goods. Engle and Granger casualty test is applied for estimation. The results show that all variables in the regression equation are cointegrated and they are highly significant with correct signs, and are important for policy analyses.

Reinhart (1995) uses rational expectation permanent income hypothesis based theoretical model. Two separate equations are estimated for imports and exports demand. Import demand is depending upon relative prices of imports and income parameters. Export demand is depending upon relative price of exports and income parameters. These empirical equations are applied on 12 developing countries from three regions Africa, Asia and Latin America. Annual data is used from the period 1970-92. Engle and Granger casualty test is applied for estimation. The results show that income and relative prices parameters are significant for all of these 12 countries.

Emran and Shilpi (1996), estimated import functions under foreign exchange constraint for Bangladesh. Annual time series data for the sample period 1973 to 1993 were used for empirical analysis. The Johansen cointegration technique is used as econometric methodology. The variables taken into the regression equation were income, relative prices and foreign exchange availability. The results illustrate the problem of near-identity in the standard specification of import demand function with binding foreign exchange constraint, along with the superiority of new specification for import demand function.

Amano (1996) examines intertemporal substitution in import consumption of US non durable goods by using permanent income model. Consumer is indifferent between the consumption of domestic and foreign goods. He uses addilog utility function and the concept of preference shock. For estimation he uses quarterly

data for the period 1967:1 to 1993:2. Two approaches are uses for estimation one is Engle and Granger causality test and the second is GMM estimates. The estimation results concludes that intertemporal substitution is an important feature of import consumption and the conventional import demand models that do not account for this feature are required to compare with this feature. Cointegration is a better approach than GMM estimate. Import and domestic consumption estimates are highly significant, with correct signs and well within the range of previous estimates.

Ogaki and Carmen (1998) in their study argued about the misspecification bias as a result of ignoring the intertemporal substitution between non-durables and durables goods. They used quarterly data. For non-durable good, real expenditures on non-durable consumption minus clothing consumption is used. For the durable good they used real spending. The sample period selected is 1947:1 to 1983:4. Granger causality test and GMM estimation techniques are used for empirical analysis. The application of improved inference methods to economic model similar to Hall's Hansen and Singleton indicates less precision in the estimation. The results show that the estimation for the intertemporal elasticity of substitution is positive and significantly different from zero. The results show the empirical evidence against separation of preferences between non durable and durable goods. Finally, the results show the need for the explanation of some puzzling behavior by adding the intertemporal substitution between non-durable and durable consumption goods to standard models of saving.

Antzoulatos and Peart (1998) conducted a study to develop a forward looking model for import demand under a foreign exchange constraint. Three developing countries namely Indonesia, Philippines and Thailand were selected for this study. Sample period was dictated by data availability extending from 1981:1 to 1995:4 for Indonesia, 1977:1 to 1995:4 for the Philippines, and 1976:1 to 1995:4 for Thailand. Ordinary Least Square (OLS) method is used for estimation. The econometric results for these three sample countries were largely consistent with

the model. The results show that the import growth is, on increase in contemporaneous and future export growth, and on a decrease in the error-correction term. The results also confirm the effect caused by import demand on expected time path of future export earnings. It also affects the countries that have low access to foreign borrowing. The findings are found consistent with forward-looking model adopted in the study.

Senhadji (1998) conducted a study to empirically investigate the import demand function. For this purpose they derived a structural import demand equation. The data of 77 countries is obtained from World Bank data base BESD. The time span of data selected is 1960-1993. The small sample properties of OLS and Fully Modified (FM) estimators of short and long run elasticities are analyzed using Monte Carlo methods. The results show the value of short run income elasticities is less than 0.5, while the value of long run income elasticities close to zero. The price elasticity is close to zero in short run but slightly higher than one in the long run.

Croix and Jean-Pierre (1998) conducted a study to examine the non durable imports demand. They considered two-good version of life cycle model by introducing time non-separability in household's preferences. The quarterly time series data used for estimation of model is obtained for USA and France fro the period of 1947-1994(USA) and 1970-1994(France). They integrated the time series characteristics of data into study of a theoretically based dynamic model for non durable imports. They derived a cointegration restriction used for the estimation of curvature parameters of the instantaneous utility function. GMM method is also used to estimate the remaining variables. The investigation of potential parameters (non) constancy of retained specification and estimation results was also a part of analysis. The results confirm the importance of introduction of habits inconstancy in the short run parameters of import demand.

Amano et al (1998) examined Intra-Period and intertmporal substitution in import demand for U.S economy. Using quarterly data1967:1 to 1993:4, they estimated a

two-good version of permanent-income model, a home good and an imported item. The empirical results leading to three tentative conclusions show the intratemporal elasticity of substitution about 1.09. Second, the results from GMM estimation of a dynamic depict the value of intertemporal elasticity of substitution about 1.37. Third, the GMM results in light of examination of estimates for intratemporal and intertemporal indicate the stimulation of net increase (decrease) in domestic goods consumption as a result of appreciation (depreciation) of real exchange rate.

Carporale and Chui (1999), estimated income and relative price elasticity of trade in a cointegration framework for 21 countries .Using annual data 1960-1992. For testing cointegration Johansen procedure is used after that two alternative approaches are applied and they are ARDL and DOLS method. The results confirm the existence of cointegration relationship between growth rates and income elasticity estimates. It shows that faster growing economies have high income elasticity of their exports but lower import elasticies.

Malley and Thomas (2000), used a model of vertical product differentiation in their study to explain doubts about the general validity of import demand function as specified in macroeconomics models. They employed annual data for the period of 1967-95 for the G-3 countries. Empirical methodology adopted in this paper is ordinary least square (OLS). They developed two hypotheses. First hypothesis is about the reduction in the share of total imports as a result of increase in domestic wages. The second hypothesis is regarding the effects of non-wage income on commodity import shares. The empirical results show that both hypotheses are indeed verified for these three countries.

Abrishami and Mehrara (2000), Conducted a study by estimating the demand equations for import of consumer, intermediate and capital goods based on ARDL methodology. The quarterly data (198-1999) was used for estimation. The model of long run and short run demand for imports are analyzed and estimated, using proper selection of criteria for each variable in different groups. The three

variables used for estimation of long run and short run models are market exchange rate, the weighted market exchange rate, and wholesale price index of imports. The results confirm that the variable parallel market exchange rate, best explains the behavior of the different categories of imported goods in Iran. The result also shows proximity of parallel market exchange rate for opportunity cost of importers.

Emran and Shilpi (2001), uses structural econometric model of aggregate imports for India and Sri Lanka. Theoretical model is based upon the idea of rational expectation permanent income hypothesis model of a two good representative agent economy, with binding foreign exchange constraint. Import demand is dependent upon income and price elasticities and foreign exchange availability parameters. To estimate the model time series data is used for the period 1952-99 for India and 1960-1995 for Sri Lanka. ARDL and DOLS method is used for estimation. The estimates of income and price elasticities derived from the model satisfy the theoretical sign restriction and are highly significant for both the countries. The mean of income elasticity is 1.07 which shows long run unitary income elasticity. The mean of price elasticity is -0.72 and foreign exchange availability variable is also highly significant with correct positive signs for both of the countries. Parameters estimates of import demand function are stable and have a little variance. Exchange rate and tariff calculation is important for policy implication.

Ernkle-Rousse and Danial (2002), analyzed the difference of trade price elasticities, based on monopolistic competition and direct estimates of price elasticities in trade equation based upon price indexes and industry levels. In previous studies the direct estimates have low price elasticity, which is near to unity or slightly higher than unity. Indirect price elasticities, i.e. from monopolistic competition have high price elasticities between 3 to 11. The main point of observation is, that difference in results is due to econometric misspecification, or measurement errors in price indexes. Bilateral annual trade

data is used for estimation, for 14 countries, 16 trading partners, and 27 industries for the period 1960 and 1994. Transformed least square and instrumental variables are used for estimation. The results support the recent studies on substitution elasticity estimates using monopolistic competition.

Cheong (2003) investigated the long run relationship between import demand and its determinant for 18 OIC countries. The annual data from 1976 to 2000 is used for empirical estimation. Author used the import demand equation which is derived from dynamic-optimizing intertemporal approach developed by (Xu, 2002). The variables studied are the real activity variable and relative prices. The bond testing approach method is used in cointegration analysis. The conditional ARDL and Error Correction Models are used to examine the level relationship between variables as well as to detain the long run relation of import demand to its determinants. The result confirmed the co integrated value of import demanded, domestic real activity and relative prices of these countries. The results suggest the effectiveness of macroeconomic policies in the long run import demand function. The study also concluded that these countries are not violation of their international budget constraints.

Narayan.P.K and Narayan.S (2005) estimates long run relationship between import volumes, domestic income and relative prices for Fiji in a cointegration frame work. Annual data is used for estimation for the period 1972-1999. For testing cointegration Johansen cointegration test is used after that two alternative approaches ARDL and DOLS method is used for estimation. Results confirm this finding that domestic income has a positive impact on import volumes, while an increase in relative prices reduce import volumes. Growth in income has a significant and elastic impact on import demand in the long run, which suggests that higher growth will induce higher demand for imports.

Ooskooee and kara (2005), estimated the trade elasticities for 28 countries. Import demand is dependant upon income, relative process and exchange rate variable. The same import demand function is estimated in Ooskooee (1986) with OLS

method. Here new estimation technique is used, which is ARDL approach to cointegration, with quarterly data 1973 – 1998 period. The estimated coefficients have unique results for each country. But the general conclusion is that, the sum of trade elasticities is greater than one. It shows that the Marshall-Lerner condition is met and currency depreciation could improve the trade balance in the long run.

Frimpong, Magnus and Fosu (2006), investigated the import demand behavior for Ghana by using disaggregated expenditure components to total national income, and that are total consumption expenditures, investment and expenditures on total exports. Autoregressive distributed lag (ARDL) and bound F test is used for estimation, under the sample period 1970 – 2002. And error correction model is used to separate the short and long run elements of import demand. The results show a positive relationship between the three expenditure components and aggregate import demand. Relative price is also inelastic, but have negative impact on import demand. It is required that Ghana will improve its price competitiveness in external trade to reduce its trade deficit.

Tang (2008) reexamined the cointegration relationship of Japan's aggregate import demand through Autoregressive Distributed lag approach to cointegration. He used rolling windows technique which is applied to the (ARDL) bounds testing procedure. The sample period of quarterly data covers the period of 1973Q1 to 2007Q2. The estimated results show the instability of Japan's import demand function over the examined period. This instability shows the presence of cointegration for certain periods and also its absence for other periods.

Brief literature reviews of previous studies available on import demand function of Pakistan are discussed here.

Sarmad and Mehmood (1987), estimated import demand elasticities for total imports and for 23 import groups also and the determinants of import demand are relative price elasticities adjusted for tariffs and real income. Annual data is used

for estimation for the period 1969-70 to 1983-84. Ordinary Least Square method is used for estimation. Results show that relative price elasticity is low in nearly all cases. These are different from those estimates for developed countries. Income elasticity is high in most of the cases which reflects a greater outward orientation of Pakistan economy during this period.

Sarmad Khwaja (1989) examined the factors influencing the demand for Pakistan's imports at aggregate level and at disaggregates level. Import demand is dependent upon tariff adjusted ratio of price of imports to the domestic price level, real GNP, real foreign exchange reserves and two dummy variables for 1965 war and 1971 war. Annual data is used for estimation for the period 1959-60 to 1985-86 for total imports and for eight import groups also. Box–cox test is used to determine the functional form of import demand equation. Which support the log-linear form of import equation at aggregate and disaggregate level. Ordinary least square(OLS) method is used for estimation. Income elasticity is greater than one in most of the cases and relative price elasticity is less than one in nearly all cases. Relative price elasticity is high only in the case of machinery and transport equipment. Results show that policy of devaluation or of raising tariffs would not be effective to reduce imports or to improve trade balance.

Shabbir Tayyeb and Riaz Mahmood (1991), analyses the effects of structural changes on the import demand function. Import demand is dependent upon income, relative prices, foreign exchange reserves and two dummy variables one for 1965 war and second for East Pakistan separation in December 1971. Annual data is used for estimation for the period 1959-60 to 1987-88. Maximum Likelihood method is used for estimation. Parameters of aggregate import demand function are estimated in two ways. One estimation of import demand function using dummy variables for the whole sample. Secondly by splitting the full sample into two regimes 'Regime 1' correspond to 1959-60 to 1971-72 and 'Regime 2' corresponds to 1972-73 to 1987-88. Because Aggregate Import Demand function experienced a structural break at the end of 1971-72. The nature

of structural change cannot be captured accurately by simply adding a dummy variable. The relative price elasticities are very low as compared to developed economies while in some cases its ratio is high which shows progress has been made in import substitution industries it has led to a uncertain dependence on imported output, higher icome elasticities ratio reflecting a greater outward orientation of Pakistan's economy during this period.

A.H Khan and M.A Hasan (1994), examines the effect of devaluation on external trade. Import demand is dependent upon real income, relative prices, foreign exchange reserves and exchange rate for manufacturing products and industrial raw material. Annual data is used for estimation for the period 1972-1991.Ordinary Least Square method is used for estimation. Income elasticity is greater than one and other elasticity estimates are less than one and have correct signs.

Akhtar Sajjad and Fauzia Malik(2000), estimates the bilateral price, income, real devaluation and real inflation impacts on Pakistan trade performance with it's four major trading partners, i.e USA, UK, Germany and Japan. Quarterly data is used for the period 1982:1 to 1996:4. Three stage least square technique is used for estimation. Results show that income effect is strongest for Germany than for USA. Real devaluation improve trade balance for USA and Germany and trade balance detoriation with UK and Japan. In the case of USA it is the price inelasticity for imports.

Sinha D (2001), examines the effect of import prices, domestic prices and GDP on import demand. Price elasticity is taken into absolute form rather than relative form. Annual data is used for estimation for the period 1970-73.Engle and Granger test is use for estimation. All the variables are cointegrated at I (1). Domestic price elasticity is greater than 2. Other elasticity estimates are less than one. The result shows that all the variables are significant and have correct signs.

Zehra and Aurangzeb (2002), investigate the long run trade elasticities and existence of Marshall-Lerner condition by using Johansen cointegration test. Quarterly data is used for the period 1980-2000. Both import and export demand equations are dependent upon relative prices and income elasticities. Results of import demand shows that income and price elasticities are less than one and have correct signs and Marshall Lerner condition is satisfied in Pakistan economy.

Afzal (2004) estimates the Marshall-Lerner Condition for Pakistan economy employing Johansen cointegration technique using annual data for the period 1960-2003. Equations for imports, exports and trade balance are solved separately. Import demand is dependent upon relative prices of imports, real income and nominal exchange rate. Results show that all the estimates are significant and have correct signs. Finally concluded that devaluation should improve the trade balance in Pakistan. But despite this, the trade balance does not improve significantly. The reason is when devaluations set in motion other forces works and tend to neutralize the effect of devaluation.

Arize.A.C (2004), estimates the traditional model of import demand using real income and relative price elasticities (ratio of real import prices to real domestic prices) and real foreign exchange reserves is also added to the traditional equation. Engle and Granger causality test is used for estimation using quarterly data 1973:2-1999:1 all the variables support the single unit root at 5% level. All the variables are highly significant and have correct signs.

4.2 The Limitations of the Previous Studies

Based on above literature review, it is possible to conclude:

1. Large numbers of studies are available on import demand function, based on rational expectation permanent income hypothesis (RE/PIH). Both for developing and developed countries. This phenomenon is missing for Pakistan economy, because there is no study available for Pakistan, where

consumer is indifferent between domestic/home goods and foreign/imported goods and uses his life time resources.

2. Recently many studies are available Cheong (2003), Tang (2008), employed ARDL approach to cointegration in the import demand function. But theoretical bases of model are not rational expectation hypothesis (RE/PIH).

3. Import demand function whose theoretical basis are rational expectation permanent income hypothesis (RE/PIH), commonly used OLS estimation method or previous techniques of co-integration i.e. Granger Casuality test and Johansen cointegration test.

4. It is required to employ recent cointegration techniques i.e. ARDL approach to cointegration, in the import demand function based upon rational expectation permanent income hypothesis (RE/PIH) model.

4.3 The Main Difference between the Present Study and Previous Studies.

The present study differs from the previous studies in the following ways.

1. In this study import demand function is estimated for Pakistan economy based upon rational expectation permanent (RE/PIH) income hypothesis. Where consumer consumes two goods home/domestic goods or foreign imported goods. Previously no study is available for Pakistan based on these phenomena. So it willbe a new work for Pakistan economy.

2. This study employed most recent technique of cointegration which is ARDL approaches to cointegration in the import demand function.

3. For estimation purpose most recent data is used.

Table 4.1 **A SUMMARY OF RECENT STUDIES ON ESTIMATION OF IMPORT DEMAND FUNCTION BASED UPON RATIONAL EXPECTATION PERMANENT INCOME HYPOTHESIS THEORETICAL MODEL**

Winters (1985)	Ordinary least square (OLS)	Malaysia,Colombia,Kenya	1965 – 1985	Results are not satisfactory which suggests that the intertemporal approach is quite promising.
Saracoglu and Iqbal (1986)	Ordinary Least Square (OLS) Maximum Likelihood estimates	El. Salvador, Greece ,India , Korea and Thailand	E.Sal 1953-1981 Greece 1952-1982 Thailand 1954-82 India 1950-80 Korea 1963-1983	➢ Confirm the regime switching period for five countries. ➢ Import price elasticity is inversely related with country's capacity to import.
Faini (1988)	Ordinary Least Square OLS	28 countries from Latin America and Caribbean Asia Middle East and South Africa, Sub-Sharan Africa, Southern Europe	1961 – 1982	Higher income elasticity for developing countries. Price elasticity is also significant for the policy analyses of import demand.
Moran (1988)	Ordinary Least Square OLS	21 developing countries four group of countries Low income, Major exporters, Nonfuel primary commodity exporter, oil exporters	1970 – 1983	Price and Income effects are important in analysis of import behavior. Foreign exchange constraints are critical in determining import volumes of developing countries.
Zeldes(1989)	Euler equation estimation	USA	1968-1982 (Survey dates)	Borrowing constraints are important and inability to borrow against future labor income has significant impact on consumptions, which effects import demand function also.

A SUMMARY OF RECENT STUDIES ON ESTIMATION OF IMPORT DEMAND FUNCTION BASED UPON RATIONAL EXPECTATION PERMANENT INCOME HYPOTHESIS THEORETICAL MODEL

Ceglowski (1991)	Ordinary least square (OLS) Instrumental variable (IV)	Unites States (US)	Q1: 1968 to Q2: 1988	Intertemporal substitution being a factor in import behavior, along with being a substitute between domestic and import goods.
Winters (1993)	Ordinary least square(OLS)	United Kingdom(UK)	Q1:1971 to Q4:1986	Cost of rationing are significant for united kingdom (UK) imports from Cameron.
Clarida (1993)	Cointegration analyses (Granger Casuality test)	United states(USA)	1973:1 1992:1	Consumer durables are price and income elastic.
Clarida (1994)	Cointegration Analysis Granger casuality Test	United States (USA)	Q1: 1967 to Q2: 1990	All the variables in the import demand equation are cointegrated, and are highly significant with correct signs. That shows that income and price elastities are useful for policy analyses.
Reinhert(1995)	Cointegration Analysis Granger Causality Test	Congo, Kenya, Moroco, Hong Kong, Indonesia, Pakistan, Srilanka, Argentina, Brazil, Colombia, Costa rica and Mexico	1970-1992	Traditional estimates of import have important policy implication for developing and developed countries. Significant and stable for all 12 countries, useful to improve trade balance.
Emran and Shilpi (1996)	Cointegration Analysis Johansen Cointegration Test	Bangladesh	1973 - 1993	The problem of near identity in the standard specification of import demand equation, with foreign exchange constraint. It emphasize for a new specification.

A SUMMARY OF RECENT STUDIES ON ESTIMATION OF IMPORT DEMAND FUNCTION BASED UPON RATIONAL EXPECTATION PERMANENT INCOME HYPOTHESIS THEORETICAL MODEL

Amano(1996)	Conintegration analysis Engle and Granger causality test	USA	1967:1– 1993:2	Intertemporal substitution is an important feature of import consumption. Cointegration is a better approach then GMM estimates.
Ogaki and Carmen (1998)	Cointegration Analyses(Granger Casuality Test, GMM estimates	United States(USA)	Q1:1947 to Q4:1983	Intertemporal substitution between durable and non durable goods creates some puzzling behavior of import demand.
Amano(1998)	Cointegration Analysis and GMM estimates	United States (US)	Q1: 1967 to Q3: 1993	When exchange rates appreciate, it will increase domestic good consumption in an import demand equation.
Croix and Jean Pier(1998)	Generalized method of momentum(GMM) estimates	USA, France	1947-1994 (USA) 1970-1994 (France)	Results confirm the importance of introduction of habits in parameters of import demand.
Senhadji (1998)	Ordinary Least Square (OLS) Fully Modified estimates	77 countries	1960-1993	Average income elasticity less than 0.5 while long run income elasticity closer to zero in short and in the long run it is slightly higher than one.

A SUMMARY OF RECENT STUDIES ON ESTIMATION OF IMPORT DEMAND FUNCTION BASED UPON RATIONAL EXPECTATION PERMANENT INCOME HYPOTHESIS THEORETICAL MODEL

Antzoulatos (1998)	Ordinary Least square(OLS)	Indonesia, Philippines, Thailand	Q1: 1981 to Q4:1995 (Indonesia)Q1:1977 to Q4:1995 (Philippines)Q1:1976 to Q4:1995 (Thailand)	Import growth has valuable impact on contempareneores future export growth and future earnings.
Carporale and Chui (1999)	Autoregressive Distributed (ARDL) approach to cointegration Dynamic ordinary Least square(DOLS	21 Countries	1960 - 1992	Faster growing economies have high income elasticity against their exports but lower import elasticity.
Abrishami and Mehrara (2000)	ARDL Autoregressive Distributed (ARDL) approach to cointegration	Iran	1980 – 1999	Market exchange rate best explains the behavior of the different categories of imported goods.

A SUMMARY OF RECENT STUDIES ON ESTIMATION OF IMPORT DEMAND FUNCTION BASED UPON RATIONAL EXPECTATION PERMANENT INCOME HYPOTHESIS THEORETICAL MODEL

Emran and Shilpi (2001)	Autoregressive Distributed (ARDL) approach to cointegration Dynamic ordinary Least square(DOLS)	India Srilanka	1952-1999 (India) 1960-1995 (Srilanka)	Parameters estimates of import demand function are stable and have a little variance. Exchange rate and tariff calculation is important for policy implication.
Malley and Moutos (2002)	Ordinary Least Square OLS	G-3 countries Germany Japan USA	1967 – 1995	Two points, one is reduction of import volumes increases the real way, second non wage income has effect on import shares are verified for these three countries
Enkle-Roosse and Danial (2002)	Transformed Least Square(TSLS),Instrumental variables(IV)	14 Countries 16 Trading partnets27 industries	1960 – 1994	The results support the recent studies on substituting the elasticity estimates using monopolistic competition.
Cheong (2003)	ARDL Bound test and Error correction model(ECM)	18 OIC countries	1976 – 2000	These countries do not violate their international budget constraint, and macroeconomic policies are effective in the long run import demand. function
Narayan.P.K and Narayan.S (2005)	Autoregressive Distributed (ARDL) approach to cointegration. Dynamic ordinary Least square(DOLS)	Fiji	1972-1999	Higher Growth will induce higher demand for imports, which is directly related with income, and indirectly with price elasticities of import demand.

A SUMMARY OF RECENT STUDIES ON ESTIMATION OF IMPORT DEMAND FUNCTION BASED UPON RATIONAL EXPECTATION PERMANENT INCOME HYPOTHESIS THEORETICAL MODEL

Ooskooee and Kara (2005)	Autoregressive Distributed (ARDL) approach to cointegration.	28 Countries	1973-1998	Sum of trade elasticities is greater than one, it means Marshall Lerner condition is met, and currency depreciation could improve trade balance.
Frimpong (2006)	ARDL Bound test and Error correction model(ECM)	Ghana	1970 – 2002	Positive relationship between the expenditure components and aggregate import demand. Relative price is inelastic it is required to improve its price competitiveness in external trade to reduce its trade deficit.
Tang (2008)	ARDL	Japan	Q1:1973 to Q2:2007	Instability of Japan's import demand function over the examined period.

TABLE 4.2 **A SUMMARY OF RECENT STUDIES ON IMPORT DEMAND FUNCTION IN PAKISTAN**

Sarmad and Mehmood (1987)	Ordinary least square(OLS)	Pakistan	1969-70 to 1983-84	Results show a greater outward orientation of Pakistan economy during the sample period.
Sarmad (1989)	Box-Cox test , Ordinary least square (OLS)	Pakistan	1959-60 to 1985-86	Log linear form is most suitable for import demand function. Policies of devaluation or raising tariffs would not be effective to reduce imports or to improve trade balance.

A SUMMARY OF RECENT STUDIES ON IMPORT DEMAND FUNCTION IN PAKISTAN

Shabbir and Riaz (1991)	Maximum likelihood (ML) estimates	Pakistan	1959-60 to 1987-88	All variables are significant with correct signs which show the effect of structural break on Pakistan import demand.
Khan and Hasan (1994)	Ordinary Least Square OLS	Pakistan	1972-1991	Income elasticity is greater than one, which shows that import demand is income inelastic. All other variables are significant.
Sajjad and Fauzia (2000)	3 SLS	Pakistan, USA, UK, Germany, Japan	Q1: 1982 to Q4:1996	Income effect is strongest for Germany and UK.
Sinha (2001)	Cointegration Analysis Granger Casualty Test	Pakistan	1970-1993	All the variables are cointegrated at I (1). All the variables are significant with correct signs.
Zehra and Aurangzeb (2002)	Co integration Analysis Johansen Co integration technique	Pakistan	1980 – 2000	Marshall Lerner condition is satisfied for Pakistan.
Afzal (2004)	Co integration Analysis Johansen Cointegration technique	Pakistan	1960 – 2003	Devaluation could not improve trade balance significantly, because when devaluation set in motion other forces works and tend to neutralize the effect of devaluation.
Arize (2004)	Cointegration Analysis Granger casualty test	Pakistan	1973:2 to 1991:1	All the variables support the single unit root at 5% level. All the variables are significant and have correct signs.

CHAPTER 5

METHODOLOGY AND DATA

This chapter presents a concise introduction of the empirical methodology employed in this study. This will include a discussion on unit root test, johansen cointegration approach, Autoregressive Distributed Lag (ARDL) approach to cointegration, Dynamic Ordinary Least Square (DOLS). Further it includes the variable discussions that are included in our empirical model, and the discussion about the sample period is also included here.

5.1 Empirical Framework

A number of tests are available in literature to examine the long-run relationship. In most previous empirical studies, the linkages between the said variables have been examined by using the OLS regression analysis. However, some studies employed the Engle-Granger (EG) two-step cointegration approach and Johansen (1988) full-information maximum likelihood technique to explore the long-run relationship. In this study, Johansen's test and ARDL approaches are employed. ARDL provides more robust results than the traditional Cointegration tests. Before proceed to testing cointegration, the study started by testing the time-series properties of the said variables.

5.1.1 Unit Root

Overtime a number of approaches have been developed to test the time series properties. The easiest is to visually examine the data. For many time series, a quick glance at a diagram of the data can tell whether the mean of a variable is increasing over time and that the series is non stationary. The autocorrelation function (ACFs) is also used to examine the behavior of a time series. If the ACFs tend to zero quickly as the length of lag increases, the variable is stationary, if they don't, the variable is non stationary.

However, in this study, we use these two approaches informally and formally the augmented Dickey-Fuller (ADF) test[10] which examines the hypothesis that the variable has a unit root is applied to investigate the properties of a time series. To run a Dickey-Fuller test, estimate the following a first-order autoregressive {i.e., AR(1)} function:

$$X_t = \beta X_{t-1} + \varepsilon_t \qquad (1)$$

Where ε_t follows a white-noise process[11]. The Dickey-Fuller test consists of testing the null hypothesis that in equation (1) $\beta = 1$ against the alternative hypothesis $\beta < 1$. If we are not able to reject the null hypothesis then the stochastic variable X_t has unit root. Alternatively, one can estimate the following:

$$\Delta X_t = \delta X_{t-1} + \varepsilon_t \qquad (2)$$

Where $\delta = \beta - 1$. Thus, testing the null hypothesis $\delta = 0$ is equivalent to testing $\beta = 1$, with alternative hypothesis $\delta < 0$. Acceptance of the null hypothesis, $\delta = 0$, implies that $\beta = 1$ and that X_t follows unit root in its autoregressive component, while rejection of the null hypothesis implies that X_t is a stationary time series. For testing the null hypothesis, under DF and ADF tests, the computed statistic is know as the τ (tau) statistic, whose critical values have been tabulated by Dickey and Fuller based on Monte Carlo simulations.

[10] Pleas refer to Fuller (1976), and Dickey & Fuller (1979, 1987) for the details.

[11] White noise error term follows the classical axioms, namely, it has zero mean, constant variance σ^2, and is non-autocorrelated. If error terms not only are non-autocorrelated but also are independent, then such an error term is called strictly white noise.

The weakness of the Dickey-Fuller test is that it does not take into account the possibility of autocorrelation in the residuals, ε_t. If ε_t is auto-correlated, then the least-square estimators of the equation (2) are not efficient. Dickey and Fuller (1981) suggest the use of lagged variables as additional explanatory variables to approximate the autocorrelation. This modified version of the DF test is known as the Augmented Dickey-Fuller (ADF) test; therefore, the equation (2) transfers as:

$$\Delta X_t = \delta X_{t-1} + \sum_{i=1}^{m} \beta_i \Delta X_{t-i} + \varepsilon_t \qquad (3)$$

Where m is large enough to ensure that the residuals ε_t are white noise. The testing procedure and the critical values are the same as DF test. In practice, DF and ADF test may be based on a standard regression with a constant and a time trend depends on the statistically significance estimators of these terms.

5.1.2 Johansen's Cointegration Procedure

To identify the long-run relationship among the said variable, in first step, Johansen cointegration methodology is used. Consider an m-dimensional Vector Autoregressive (VAR) process, with and without trend, is employed to perform the Johansen (1988) test.

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_m Y_{t-m} + BZ_t + \psi_t$$

$$Y_t = \sum_{i=1}^{m} A_i Y_{t-i} + BZ_t + \psi_t \qquad (4)$$

Where Y_t is a k-vector (n × 1) of I(1) variables, Z_t is a d-vector (n × 1) of deterministic variables, the matrix B contains the exogenous variables that are excluded from the cointegration space, m is the maximum lag, ψ_t is assumed to be k-vector (n × 1) of Gaussian error term, and A_i's are (n × n) matrices of coefficients to be estimated. The above vector autoregressive process can be reformulated into a vector-error-correction form:

$$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots + \Gamma_m \Delta Y_{t-m+1} + BZ_t + \psi_t \qquad (5)$$

Where $\Pi = -[I - A_1 - A_2 - \ldots - A_m]$, $\Gamma_i = -[I - A_1 - A_2 - \ldots - A_i]$

and $(i = 1,2,\ldots,m-1)$. The principal difference between equation (4) and equation (5) is that the time paths of cointegrated variables are influenced by the extent of any deviation from long-run equilibrium as well as by their separate self-feedback pattern plus stochastic shocks and exogenous variables. According to the Granger representation theorem, if Π has a reduced rank $r < k$, then there exist $r \times k$ matrices such that $\Pi = \alpha\beta'$. Where α represents the speed of adjustment to disequilibrium while β is a matrix of long-run coefficients. Thus, the term $\beta' Y_{t-1}$ is equivalent to the error-correction term.

Johansen's test for cointegration centers on estimating the matrix Π in an unrestricted form and then testing whether Π has less than full rank. The number of the independent cointegrating vectors depends on the rank of Π. Johansen's

approach for testing the null hypothesis of no cointegration depends on two likelihood ratio, the trace $\{\lambda_{trace}\}$ and maximum $\{\lambda_{\max}\}$ eigenvalue statistics that are defined as follows:

$$\lambda_{trace(r)} = -T\sum_{i=r+1}^{k}\ln(1-\hat{\lambda}_i)$$

$$\lambda_{\max} = -T\ln(1-\hat{\lambda}_{r+1})$$

Where T is the number of useable observations, r = 0, 1,…,k – 1, and $\hat{\lambda}_i$ is the *ith* largest eigenvalue. The $\{\lambda_{trace}\}$ statistic tests the null hypothesis that the number of distinct cointegrating vectors is less than or equal to p {i.e., $r \leq p = k - 1$} against a general alternative hypothesis: r = k. To determine the number of Cointegrating relations r, we can proceed sequentially from r = 0 to r = k – 1 until we fail to reject the null hypothesis. The $\{\lambda_{\max}\}$ statistic tests the null that the number of distinct cointegrating vectors is r against the alternative hypothesis of

r + 1 cointegrating vectors.

Using simulation studies, Johansen and Juselius (1990) provide critical values for the two statistics; the statistical distribution depends on the number ofnonstationary components under the null (i.e., k – r) and the model setting of drift and trend terms. Below we express the trace statistic procedure hypothesis in more formal ways:

Null hypothesis (H_0): There are at most p cointegrating relations,

$$r \leq p$$

Alternative hypothesis (H_a):

$$r = n$$

Where, r is the number of cointegration vectors and p has values 0, 1, 2,..., n, and n is the number of variables in Y t . The test is performed sequentially with r = 0, 1, 2,..., n. if the null hypothesis of r = 0 at the most is accepted, then testing stops and one concludes that there is no cointegration. Otherwise, the testing procedure continues until for some value p we accept the null hypothesis of r = p at the most. This means there are p cointegrating vectors. Under the maximal eigenvalue test, the hypotheses are:

Null hypothesis (H_0): There are the p cointegrating relations,

$$r = p$$

Alternative hypothesis (H_a):

$$r = p + 1$$

Through the whole above discussion we finally conclude that $\{\lambda_{trace}\}$ and $\{\lambda_{max}\}$ test shows the number of relationships which actually exist in the model.

5.1.3 ARDL Modeling Framework

In addition to the Johansen's coinetgration approach the Autoregressive Distributed Lag (ARDL) modeling approach is used to estimate the import demand function for Pakistan. Unlike the residual based test (Engle-Granger (1987)) and the maximum likelihood based test (Johansen (1991 and 1995) for testing the long-run association. The ARDL approach does not require that the underlying series included in system have same order of integration.

Another advantage of this approach is that the model takes sufficient number of lags to reduce the intensity of serial correlation of residuals in a general to specific modeling framework. Furthermore, a dynamic error correction model (ECM) can be derived from ARDL through s simple linear transformation. The ECM emerges the short-run dynamics with the long-run stable equilibrium without losing long-run information.

The ARDL regression yields a test statistic which can be compared to two asymptotic critical values (upper and lower critical values)[12]. If the test statistic is above an upper critical value at the given level of significance, the null hypothesis of no long-run relationship is rejected regardless whether the orders of integration of the variables are one or zero. Alternatively, if the calculated test statistic is below the lower critical value at given level of significant, the null hypothesis of no long-run relationship is accepted with out considering whether the variables are $I(1)$ or $I(0)$.

However, if the test statistic falls between upper and lower bounds, the result is inconclusive. Another advantage of this approach is that an appropriate specification of the ARDL equation helps to fix the problems of endogenous variables and residual serial correlation. Finally, it performs better than Engle-Granger (1987) and Johansen (1990 and 1995) Cointegration tests in case of small samples13. We begin with an unrestricted VAR in level with an intercept term:

$$X_t = \alpha + \sum_{i=1}^{p} \beta_i X_{t-i} + e_t \qquad (6)$$

[12] These lower and upper lines works as boundaries for stability analyses of CUSUM and CUSUMSQ diagnostic test .If movement of the test statistics is outside the area between the two critical lines, it shows parameter or variance instability(Brown,durbin and Evans,1975)

[13] For details on this, see Laurenceson and Chai (2003)).

Where y_t is a $k \times 1$ vector of variables, which can be either $I(0)$ or $I(1)$. α is a vector of constants and β_i is a matrix of VAR parameters for lag i. The vector of error terms e_t has zero mean and positive definite variance.

Next, following Banergee et al. (1993), a simple linear manipulation of equation (6) allows this VAR model to be written as a vector correction model (VECM). Specifically, it is defined as:

$$\Delta X_t = \alpha + \Psi X_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta X_{t-i} + e_t \qquad (7)$$

Where Δ is the difference operator. Here Ψ is the long-run multiplier matrix and is given by $\Psi = -(I - \sum_{i=1}^{p} \beta_i)$. The sum of the short-run coefficient is defined by:

$$\gamma = I - \sum_{i=1}^{p-1} \gamma_i = -\Psi + \sum_{k=i+1}^{p} \beta_k$$

Where I is a $k \times k$ identity matrix, here k denotes the number of variables included in the system. The diagonal elements of this matrix are left unrestricted. This implies that each of the variables can be integrated of order one or zero. This procedure allows for the testing of at most one long-run relationship and so requires a zero restriction on one of the off diagonals of the γ matrix.

To analyze the long-run effects of the level of the variables on the level of demand for imports, we impose the restriction $\Psi_{ij} = 0$, where $i \neq j$. This condition implies that there is no long-run feedback from import demand, but there is feedback in the short-run. Under this condition, the empirical equation for the import demand function from the VECM of equation (7) can be obtained as:

$$\Delta D_t = \alpha_0 + \alpha_1 t + \Psi_{DD} D_{t-1} + \Psi_{DG} G_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta X_{t-i} + \phi \Delta G_t + e_t \quad (8)$$

Where t is a linear trend and G_t is a $(m \times 1)$ vector of regressor variables. The symbol Δ is the difference operator and ϕ is a matrix of parameters for ΔG.

5.2 Variables Discussion

The data use in the empirical analyses is taken from *International Financial statistics (IMF) CD-ROM and World Bank Development Indicator (WDI) CD-ROM* for the period (1973-2006) annual data.

Table 5.2.1 Creation of Final Variables

Real Imports	M	Import payments in domestic currency (Rupee) deflated by import price index in Rupee.
Domestic income(Consumption)	H	Gross Domestic Product (GDP) minus export payments deflated by consumer Price index (CPI).
Relative Prices	P	Import price index divided by CPI.
Creation of Foreign exchange Reserves variable	F	Foreign exchange available which consists of export earnings, remittances and foreign aid (% of gross capital formation) and beginning of the period foreign exchange reserves, deflated by CPI.

Foreign exchange Reserves	f	Foreign exchange availability (*F*) divided by import price index
Domestic absorption deflated by Foreign exchange reserves	Z	[*real* expenditure ((GDP + imports-exports) /cpi)]/Foreign exchange availability (*F*)).
Trade liberalization dummy	D	1 for the sample period 1973-1987 and zero otherwise.
Trade Liberalization effect on foreign exchange reserves	Z^*	$Z * D$.

5.2.2 Import payments

Real imports (Imports in millions of Rupees divided by import price index) from International Financial Statistics CD-ROM. Statistical data is available in billions of Rupees in the CD-ROM which is converted in millions

5.2.3 Export Earnings.

Export of goods and services in millions of Rupees from *International Financial Statistics CD-ROM.* Statistical data is available in billions of Rupees in the CD-ROM which is converted in millions

5.2.4 GDP

Nominal values of GDP from *International Financial Statistics CD-ROM.* Statistical data is available in billions of Rupees in the CD-ROM which is converted in millions

5.2.5 CPI

From 12 main cities of Pakistan from *International Financial Statistics CD-ROM and* base year of the index no is 2000.

5.2.6 Import price index

Volume of imports from *International Financial Statistics CD-ROM and* base year of the index no is 2000.

5.2.7 Worker remittances

Workers' remittances and compensation of employees, received. From *World Bank Development Indicator (WDI) CD-ROM* .Data is available in billions of US dollars format. This is converted in millions of US dollars, in the next step dollars are converted into Rupees.

5.2.8 Foreign Aid

Aid (% of gross capital formation) From *World Bank Development Indicator (WDI) CD-ROM* in US dollars and in percentage form. After that dollars are converted into Rupees

5.2.9 Foreign exchange reserves

Foreign exchange from *International Financial Statistics CD-ROM* in millions of US dollars. In the next step dollars are converted into Rupees.

5.3 Sample period

The data used in this study for empirical analyses is annual time series data for the period 1973-2006.

CHAPTER 6
EMPIRICAL FINDINGS

This chapter includes empirical results for three models, first is long run import demand function, this original model is compared with traditional model and foreign exchange availability formulation. Every model is separately deal with unit root, Johansen cointegration, and a comparison between long run estimates of ARDL and DOLS. In the last stability of the parameters is analyzed through CUSUM, CUSUMSQ tests.

Empirical Results

The long run demand equation derived in equation (13) implies that m_t $\ln(Y_t - P_t M_t)$, p_t and Z_t are cointegrated under the assumption that the random preference shocks b_t and c_t are strictly stationary. We use the following specifications for the preference shocks b_t and $c_t : b_t = b_o + e_{bt}$; $c_t = c_o + e_{ct}$ where e_{bt} and e_{ct} have zero mean and constant variance. The composite preference shock e can be rewritten as $\epsilon_t = \frac{1}{\eta}[(b_0 - c_0) + (e_{bt} + e_{ct})] = \pi_0 + \epsilon_t$. Combining this with equation (13) we get the final estimating equation for the long rum import demand function.

$$m_t = \pi_1 \ln(Y_t - P_t^* M_t) - \pi_2 p_t - \pi_3 \ln Z_t^* + \varepsilon_t \qquad (14)$$

Equation (14), which forms the basis of our empirical analysis, is estimated for Pakistan using annual time series data. The study covers the periods from 1973 to 2006. As suggested by well-known econometric literature, there are two main issues in the empirical analysis: (i) the validity of the cointegration or stationary restriction embodies in equation (14), (ii) estimation of the cointegrating vector(s).

To test the existence and the number of the long run relation (s), we use the bonds "F" test developed by Pesaran, Shin and Smith (2001) along with the widely used Johansen approach to the determination of the cointegration rank. The bounds testing approach has the advantage that the existence of the long-run relationship among a set of variables can be tested without any prior knowledge about the order of integration of the individual variables.

To estimate the cointegrating vector, the following two alternative approaches are used: (i) ARDL approach, and (ii) Dynamic Ordinal Least Square (DOLS) method developed by Stock and Watson (1993). The alternative methods are used to test the sensitivity of the results with respect to different estimation techniques. For ARDL approach, we adopt the two-step procedure suggested by Pesaran and Shin (1999) where the specification of the ARDL model is chosen by Schwartz Bayesian criterion (SBC) and then in second-step the ARDL equation is estimated by OLS. The Monte-Carlo evidence of Pesaran and Shin (1999) provides significance evidence that this two-step procedure effectively corrects for endogeneity of explanatory variables, and the estimates exhibit good small sample properties. Finally, the stability of the estimated parameters is tested by using Chow test and CUSUM and CUSUMSQ tests.

6.1 Unit Root Test Results

The first step involved in applying cointegration is to determine the order of integration of each variable/series. To do this, we performed the ADF test to test the null of unit root against the alternative of stationary both at level and first differences of real imports (LM), domestic consumption (LH), relative prices (LP) and foreign exchange reserve (LF). The estimated ADF statistics (ADF equation includes only intercept) at level are reported in Table 6.1a. Akaike Information and Schwarz Bayesian Criteria are used to identify the optimal lag length for ADF equation. The optimal lag lengths are given in parentheses.

Table 6.1a: Unit Root Results, ADF Equation includes an Intercept but no Trend

ADF (AIC)	-1.149(4)	-0.743(5)	-0.986(5)	-1.639(1)
ADF (SBC)	-1.149(4)	-0.743(5)	-0.986(5)	-1.639(1)

AIC = Akaike Information Criterion.
SBC = Schwarz Bayesian Criterion.
Values are parentheses are optimal lag length.
The critical value for the ADF at 95% is -2.971

It can be observed from the table that the estimated ADF test statistics are less than critical value at 5 percent level of significance for all the series. It implies that the null hypothesis of a unit root in the level series cannot be rejected. Therefore, it can be concluded that all the series are non-stationary in their levels.

Table 6.1b reports the results of the ADF test when the ADF equation includes both an intercept and a linear trend. It can be seen from the table that all the estimated test statistics are less than critical values at 5 percent level of significance; therefore we do not reject the null hypothesis of non-stationary for all the series. Thus, it can be said that the series neither drift nor trend stationary at their levels over examined period.

Table 6.1b: **Unit Root Results, ADF Equation includes an Intercept and a Linear Trend**

	[redacted]			
ADF (AIC)	-1.738(5)	-1.247(5)	-1.407(5)	-1.596(1)
ADF (SBC)	-2.257(4)	-1.247(5)	-1.407(5)	-1.244(4)

AIC = Akaike Information Criterion.
SBC = Schwarz Bayesian Criterion.
Values are parentheses are optimal lag length.
The critical value for the ADF at 95% is -3.579.

Table 6.1c reports the results of the ADF test for the first differences of the variables. It can be observed from the table that estimated test statistics reject the null hypothesis of non-stationary in favor of the alternative stationary for all the series. Thus, the first differences of all the series appear stationary indicating that all of the variables are integrated of order one.

Table 6.1c: **Unit Root Results at First Difference; ADF Equation includes only an Intercept**

	[redacted]			
ADF (AIC)	-3.984(4)	-3.548(0)	-4.635(0)	-5.633(1)
ADF (SBC)	-5.136(2)	-3.548(0)	-4.635(0)	-5.633(1)

AIC = Akaike Information Criterion.
SBC = Schwarz Bayesian Criterion.
Values are parentheses are optimal lag length.
The critical value for the ADF at 95% is -2.971.

6.2 Estimates of the Long Run Import Model

The next step to estimating the import demand model is to explore a long-run import demand relationship. As mentioned earlier, the bounds tests suggested by Pesaran and Shin (1999) and the rank tests for cointegration developed by Johansen (1995). The specifications of the ARDL and VAR models (lag order and deterministic part) for the tests of cointegration were determined on the basis of the SBC along with the Akaike Information Criterion (AIC). To proceed with this, the SBC and AIC were calculated for lags ranging from one to four for all possible cointegration vectors form models with no intercept and no trend, with intercept and no trend and with intercept and a linear trend. The maximum absolute value of the criterion suggests that an optimal lag length for Model I and II is 3 and for Model III is 2.

Table 6.2a presents the Johansen trace test results to determine the number of cointegration vectors for the optimal lag length suggested by the selection criteria. Log values of import prices, log values of domestic consumption, log values of relative prices and scarcity premium are included in cointegrating vector. The null and alternative hypotheses are given in first and second columns of the table. The estimated F-statistics with their critical values are given in last three columns of the table. The results provide strong evidence of existing cointegrating relationship among the said variables.

In general, these findings are robust to model specifications. However, the numbers of cointegration vectors are vary with model specifications. For example, the results using a specification with only intercept indicate one-cointegration vector for the said variables. Whereas, when the cointegration equation includes both intercept and a linear trend the two-cointegration vectors appear statistically significant.

Table 6.2a: Johansen Cointegration Results based on Trace of the Stochastic Matrix: LM, LH, LP and Z are included in Cointegrating Vector

$r = 0$	$r = 1$	51.889	39.810	61.880	53.480	78.411	58.930
$r \leq 1$	$r = 2$	26.380	24.050	29.926	34.870	42.699	39.330
$r \leq 2$	$r = 3$	11.735	11.030	11.978	20.180	15.198	23.830
$r \leq 3$	$r = 4$	4.239	4.160	4.267	9.160	5.997	11.540

Johansen cointegration results based on Maximum Eigenvalue are reported in Table 6.2b. The results are quite similar to trace test and strongly support the presence of one-cointegration vector when the cointegration equation includes only intercept and two-cointegration vectors when both intercept and a linear trend are included in the specifications. The presence of the cointegration in the said variables implies that these variables have co-movement in the long run. The existence of the long-run equilibrium relationship indicating that the level of domestic consumption, relative prices and the level of foreign exchange reserve are simultaneously playing important role to determine the demand for imports in Pakistan.

Table6.2b: Johansen Cointegration Results based on Maximum Eigenvalue of the Stochastic Matrix: LM, LH, LP and Z are included in Cointegrating Vector

$r = 0$	$r \geq 1$	25.509	23.920	31.953	28.270	35.712	31.000
$r \leq 1$	$r \geq 2$	14.644	17.680	17.947	22.040	27.501	24.350
$r \leq 2$	$r \geq 3$	7.495	11.030	7.711	15.870	9.201	18.330
$r \leq 3$	$r = 4$	4.239	4.160	4.267	9.160	5.997	11.540

The results of the bounds tests are given in Table 6.2c. The F-statistics are calculated by estimating the Model I to Model III with specifications of no intercept and no trend, with intercept and no trend and finally by including both intercept and a linear time trend. The lag length selected by SBC for estimating the bounds "F" tests is two when the model includes neither intercept nor trend and when includes only intercept. However, the criterion suggests the optimum lag length one when the model includes both intercept and a linear time trend. The main objective behind to estimate the bounds "F" tests using different specifications is to test the robustness of the results with respect to different specifications.

It can be seen from the table that results of the bounds "F" tests show that the null hypothesis of no cointegration can be rejected at 5% or less significance level for all different specification. The overall results from the Johansen's cointegration tests and bounds tests thus provide strong evidence in favor of a significant long run relationship among the variables in the import demand model.

Table 6.2c: **Bound Tests for Long-run Relationship in an ARDL Framework**

Model I: $LM = f(LH, LP, Z)$	969.184*	798.103*	640.353*
Model II: $LM = f(LH, LP)$	458.089*	524.893*	449.469*
Model III: $LM = f(LH, LP, LF)$	878.158*	396.589*	616.766*

where LM = log value of imports, LH = log value of domestic consumption, LP = log value of relative prices, LF = log value of foreign exchange reserve, F =foreign exchange reserve and Z = scarcity premium, [((GDP + Imports – Exports)/CPI)/F multiplied by trade liberalization dummy).

* denotes significant at one percent level of significant.

Since there are strong evidence of the existence of a long run relationship among the variables included in the long run import demand model, we estimate the long-run cointegrating relation (long-run coefficients) for import using the ARLD and DOLS single equation estimation methods. The optimal lag length for the ARDL model was chosen by SBC starting from 4 lags. In the case of DOLS estimation, sufficient lags and leads of first difference terms are included in the regression in order to eliminate the problem of serial correlation. The DOLS model involves two lags in case of Model I.

The results from the ARDL and DOLS estimation of the long run demand relationship are reported in Table 6.2d and with intercept no trend criteria is used because it is most suitable for our data. It can be seen from the bottom panel in Table 4, the regression diagnostic tests show that the residuals from the estimated regressions display no problem of serial correlation and/or non-normality in the case of ARDL and DOLS estimated methods[14]. The estimated coefficient for income and relative price satisfy the theoretical sign restrictions over the examined sample period regardless of estimation methods. The estimated

[14] The values are given in the brackets below the test statistics are p-values.

coefficients are highly statistically significant at 5% level of significance in case ARDL and DOLS as well[15]. For income coefficient, the magnitude of ARDL estimate is lightly higher than that of DOLS. The estimates of income coefficient vary from 1.065 (ARDL) to 0.98 (DOLS).

Table 6.2d: Estimates of Long-run Relationships

H	1.065 (7.010)	0.98 (8.139)
P	-0.918 (-4.879)	-0.948 (-1.052)
Z*	-0.219 (-2.234)	-0.014 (-1.080)
Intercept	-2.258 (-1.439)	3.456 (2.734)
Diagnostic Tests		
Serial Correlation Test	3.563 [0.18]	2.362 [0.356]
Normality Test	1.364 [0.506]	0.382 [0.826]

However, the ARDL estimate of relative price coefficient is slightly lower in absolute magnitude compared with the DOLS estimate over the examined period. The ARDL and DOLS estimates of relative price coefficient are -0.918 and -0.948 respectively. The ARDL and DOLS estimates of coefficients of scarcity premium variable have correct negative sign; however, it appears only statistically significance in case of ARDL. This piece of evidence confirms the existence of a binding foreign exchange constraint on aggregate imports before the economic liberalization in Pakistan.

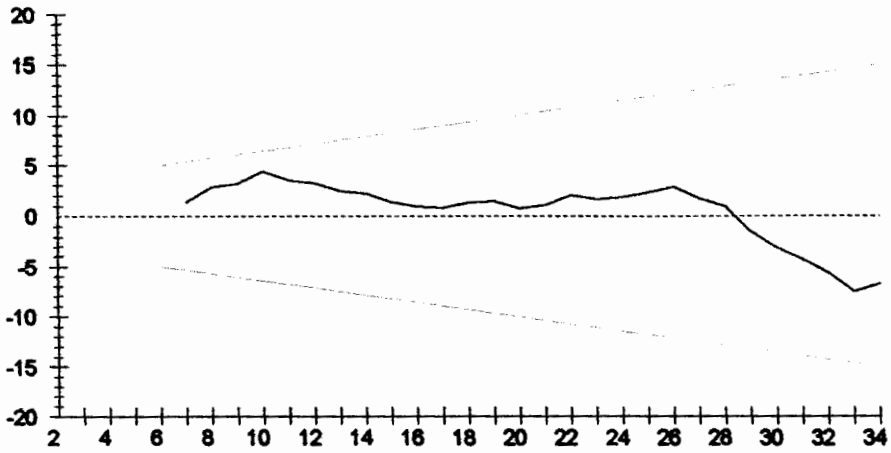
[15] The estimated t-statistics are reported in the parentheses.

6.2.1 Stability of the Estimated Parameters

Instability of the estimated elasticity parameters is a major issue in the policy analysis. For instance, Marquez (2003) reports evidence of parameter instability in the case of income elasticity for U.S. imports. Such parameter instability could result from mis-specification of the long run import relationship particularly when span over a very long time horizon. Therefore, we test for the stability of the estimated parameters from both ARDL and DOLS by using CUSUM and CUSUMSQ tests. According to these tests, the ARDL estimates of the parameter are stable over the time and do show any instability (the estimated F-statistic is 1.78 with P-value (0.15)). The results from CUSUM and CUSUMSQ tests for ARDL estimations are presented in Figure6.2.1a and 6.2.1b.

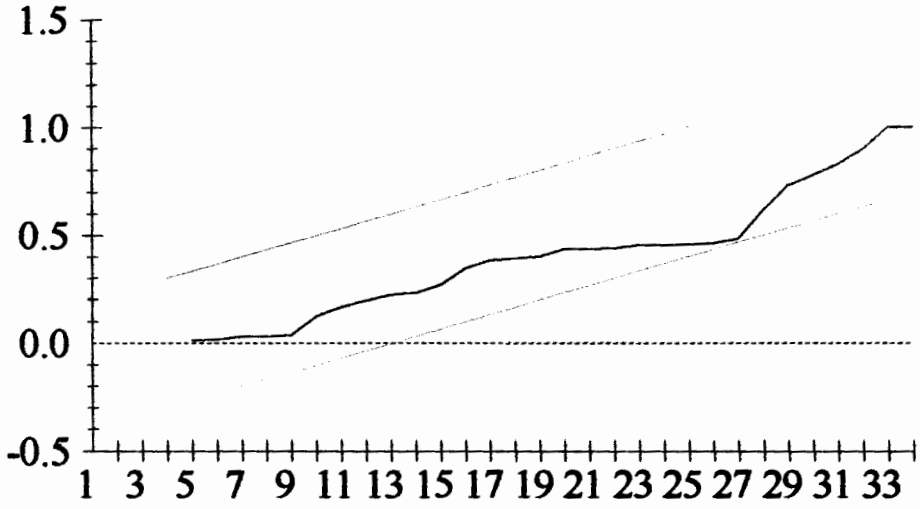
It can be observed from the figures that both of the tests (CUSUM and CUSUMQS) do not provide any evidence of instability in the estimated parameters at 5 percent level of significance for ARDL estimation method. The results from CUSUM and CUSUMSQ tests for DOLS estimations are given in Figure 6.2.1c and 6.2.1d. Since the plot of CUSUM of recursive residuals lies within the critical bound at 5% level of significance, there is no evidence of instability in the estimated parameters for DOLS estimation method. However, as can be observed from Figure 6.2.1d, the plot of CUSUMSQ of recursive residuals is crossing the critical lower bound at 5% level of significance. This implies that the estimated parameters are not stable over the time. Overall, the results from ARDL estimation are relatively better than the DOSL estimations.

Figure 6.2.1a: Plot of CUSUM of Recursive Residuals (ARDL)



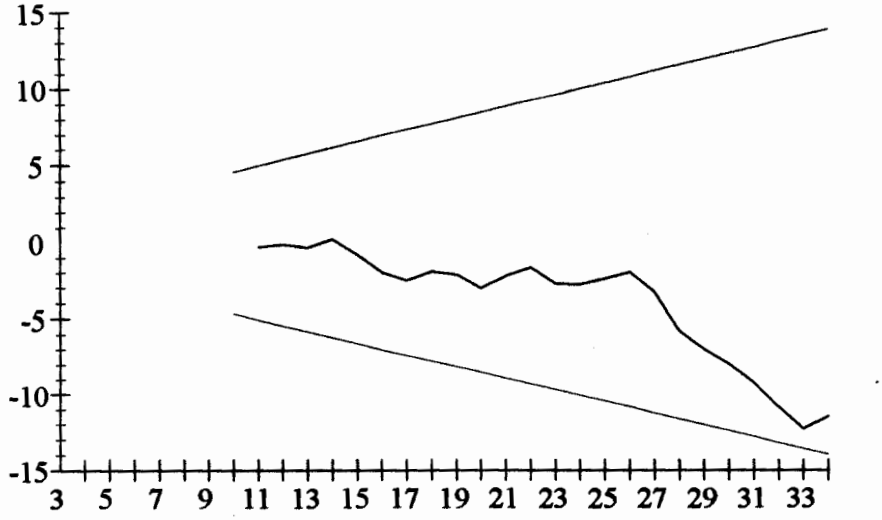
The straight lines represent critical bounds at 5% significance level

Figure 6.2.1b: Plot of CUSUMSQ of Recursive Residuals (ARDL)



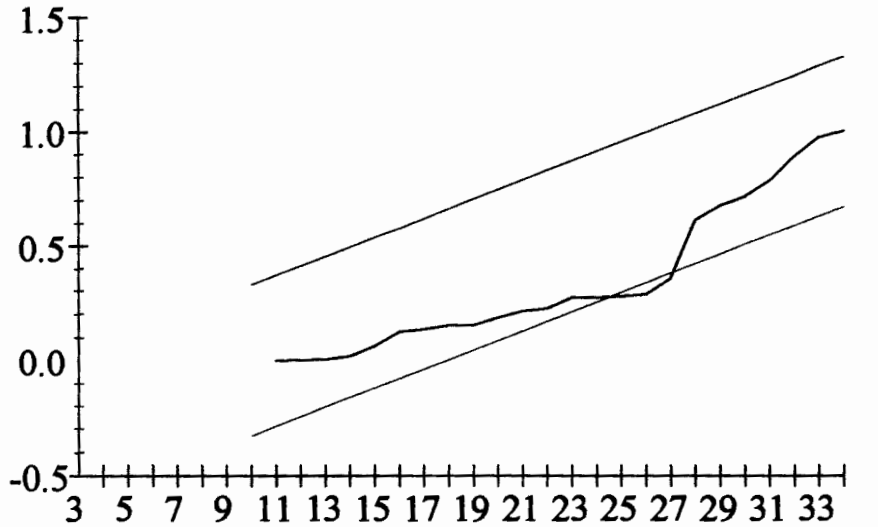
The straight lines represent critical bounds at 5% significance level

Figure 6.2.1c: Plot of CUSUM of Recursive Residuals (DOLS)



The straight lines represent critical bounds at 5% significance level

Figure 6.2.1d: Plot of CUSUMSQ of Recursive Residuals (DOLS)



The straight lines represent critical bounds at 5% significance level

6.3 Comparison with Alternative Models

6.3.1 Modified Traditional Model

In this sub-section, we present the results of the empirical analysis of the modified traditional model (in our case it called Model II). Model II is derived from equation (14) by excluding Z_t^*. We also estimate the Model III which incorporates the foreign exchange availability. It is derived from equation (14) with log of real foreign exchange availability replacing Z_t^*. The general empirical strategy is the same as that followed above.

The AIC and the SBC are used to decide on the number of lags to be included in the empirical models. The prime objective here is to select the optimal lag-length that eliminates any autocorrelation present in the residuals. Initially, the three VAR models i.e., first neither includes intercept nor trend, second includes only intercept and third one includes both intercept and a linear trend in cointegration equation, are estimated with four lags for both of the bounds "F" tests and Johansen's cointegration technique.

The estimated SBC statistics suggest three lags for first model and two lags for second and third models. The estimated trace statistics for the modified traditional model with their critical values are presented in Table 6.3.1a.

Table 6.3.1a: Johansen Cointegration Results based on Trace of the Stochastic Matrix: LM, LH and LP are included in Cointegrating Vector

$r = 0$	$r = 1$	43.484	39.810	52.015	53.480	76.156	58.930
$r \leq 1$	$r = 2$	15.431	24.050	18.502	34.870	24.736	39.330
$r \leq 2$	$r = 3$	3.991	11.030	4.191	20.180	1.948	23.830

As can be observed from table, there are strong evidences for the existence of the long run association among the said variable over the examined period. The estimated trace statistics are significantly grater than the critical values at five percent level of significance for all specifications.

Table 6.3.1b: Johansen Cointegration Results based on Maximum Eigenvalue of the Stochastic Matrix: LM, LH and LP are included in Cointegrating Vector

$r = 0$	$r \geq 1$	28.053	23.920	33.513	28.270	51.420	31.000
$r \leq 1$	$r \geq 2$	11.439	17.680	14.312	22.040	22.788	24.350
$r \leq 2$	$r \geq 3$	3.991	11.030	4.191	15.870	1.948	18.330

The maximum eigenvalue test statistics also provide strong evidence of existence of a long-run relationship among the variables included in traditional modified import model (the results are reported in Table 6.3.1b). Similarly, the bounds "F" tests (reported in Table 6.2c) indicate the existence of a long run relation at 5

percent level of significance for all the specifications. Overall, both the bounds "F" tests and Johansen's cointegration results provide evidence in favor of a cointegration relation and this relation is robust with respect to different specifications.

The long-run parameters of the modified traditional model are estimated by the ARDL and the DOLS methods and are given in Table 6.3.1c and with intercept no trend criteria is used here because it is most suitable for our data.. The results show that the estimates have correct sign when the import equation is estimated from an ARDL model. Both the estimates (income elasticity and price elasticity) are also statistically significant at 5 percent level of significance. It is interesting to note that the magnitude of income elasticity is very close to one. However, the magnitude of price elasticity (-0.658) is significantly less than one in absolute term.

Table 6.3.1c: Estimates of Long-run Relationship in Traditional Modified Model

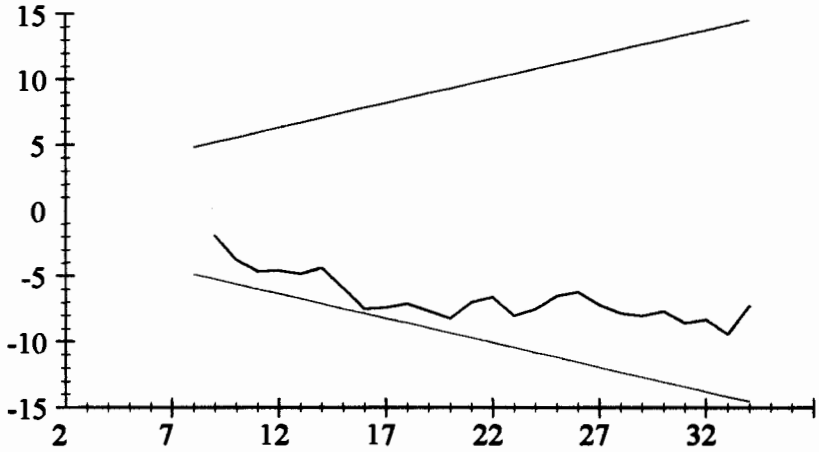
H	1.0015 (7.467)	0.05 (1.235)
P	-0.658 (-4.573)	0.89 (1.035)
Intercept	-1.631 (-1.167)	-2.342 (-1.765)
Diagnostic Tests		
Serial Correlation Test	3.480 [0.062]	2.760 [0.154]
Normality Test	1.328 [0.515]	1.234 [0.768]

Note: t-statistics are reported in parentheses and p-values are given in brackets.

Although the DOLS estimates of income elasticity have the correct positive sign but are statistically insignificant. The magnitudes of income elasticity, according to the DOLS estimates, are also implausibly small (0.05). Regarding price elasticity in case of DOLS estimations, the estimates provide evidence that the price coefficient has a positive sign and is statistically insignificance at the 5% level of significance. By doing the comparison between the both estimation methods, we find that the results from ARDL are relatively better as both the price and income elasticity have the correct signs.

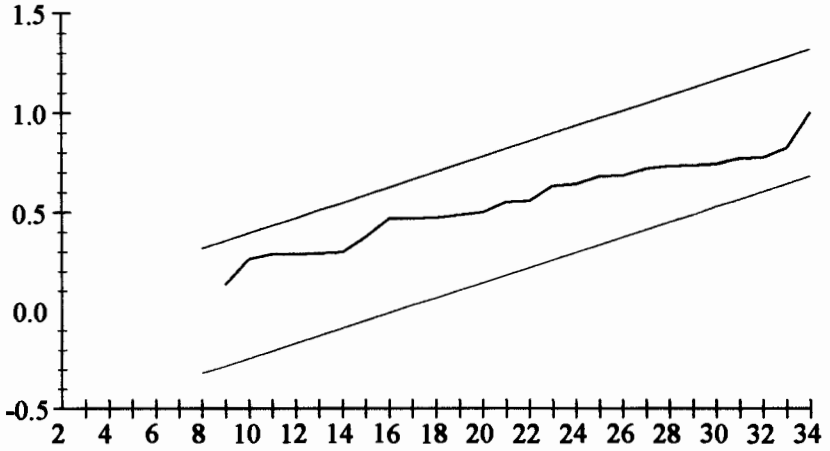
Next to test the stability of the parameters we apply the CUSUM and CUSUMSQ tests for both ARDL and DOLS estimations. The results from CUSUM and CUSUMSQ tests for ARDL estimations are presented in Figure 5 and 6. Both the tests provide strong evidence for the stability of the estimated parameters at 5% level of significance for ARDL estimation method. The results from CUSUM and CUSUMSQ tests for DOLS estimations are presented in Figure 7 and 8. Since the plots of CUSUM of recursive residuals fall out of the critical bound at 5% level of significance, there is evidence of instability in the estimated parameters for DOLS estimation method.

Figure 6.3.1a: Plot of CUSUM of Recursive Residuals (ARDL)



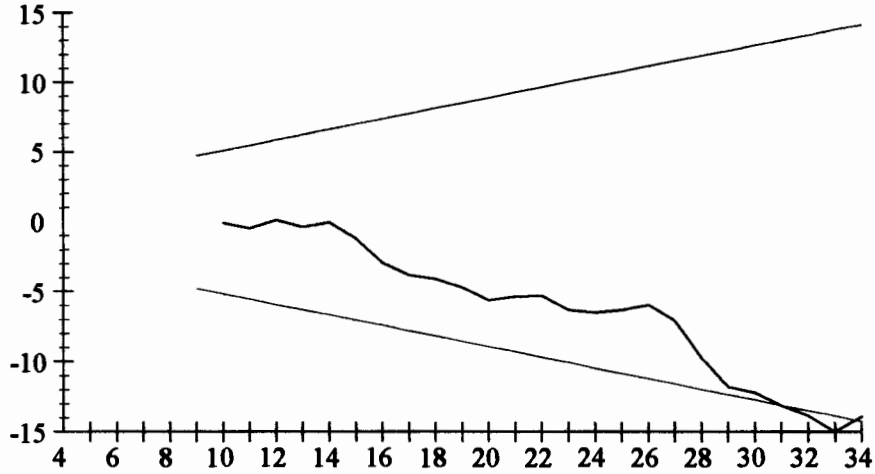
The straight lines represent critical bounds at 5% significance level

Figure 6.3.1b: Plot of CUSUMSQ of Recursive Residuals (ARDL)



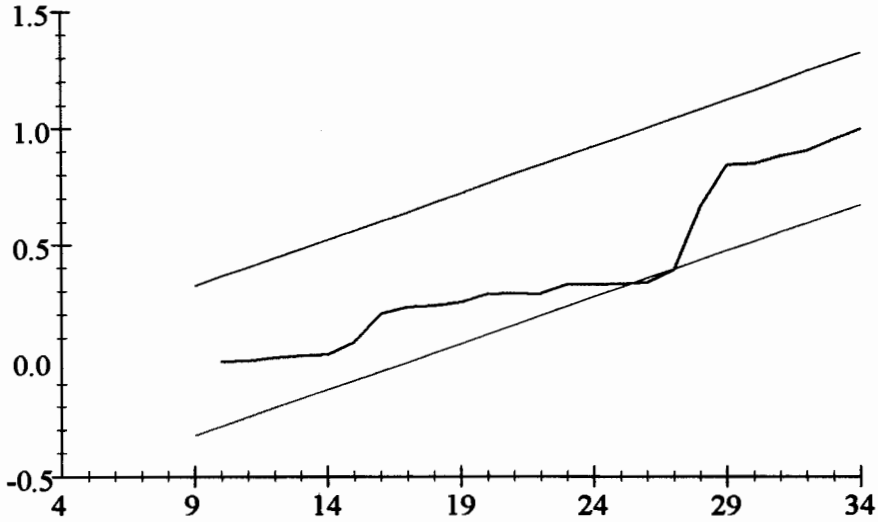
The straight lines represent critical bounds at 5% significance level

Figure 6.3.1c: Plot of CUSUM of Recursive Residuals (DOLS)



The straight lines represent critical bounds at 5% significance level

Figure 6.3.1d: Plot of CUSUMSQ of Recursive Residuals (DOLS)



The straight lines represent critical bounds at 5% significance level

6.3.2 Foreign Exchange Rate Availability Formulation

Finally, we estimated the Model III which incorporates the foreign exchange availability. It is derived from equation (14) with log of real foreign exchange availability replacing Z_t^*. The general empirical strategy is the same as that followed above.

The AIC and the SBC are used to decide on the number of lags to be included in the empirical models. The prime objective here is to select the optimal lag-length that eliminates any autocorrelation present in the residuals. Initially, the three VAR models i.e., first neither includes intercept nor trend, second includes only intercept and third one includes both intercept and a linear trend in cointegration equation, are estimated with four lags for both of the bounds "F" tests and Johansen's cointegration technique.

To estimate the Johansen's cointegration test statistics, we used as suggested by SBC two lags for first model and one lag for second and third models. The estimated trace statistics their critical values are presented in Table 6.3.2a.

Table 6.3.2a: **Johansen Cointegration Results based on Trace of the Stochastic Matrix: LM, LH, LP and LF are included in Cointegrating Vector**

$r = 0$	$r = 1$	101.086	39.810	151.281	53.480	174.404	58.930
$r \leq 1$	$r = 2$	23.100	24.050	29.355	34.870	104.983	39.330
$r \leq 2$	$r = 3$	9.845	11.030	14.011	20.180	19.357	23.830
$r \leq 3$	$r = 4$	3.078	4.160	6.146	9.160	6.999	11.540

The estimated trace statistics are significantly grater than the critical values at five percent level of significance for all specifications in case of at least one cointegrating vector. Thus, we can conclude that there is a unique long-run statistically significant association among the variables included in cointegration regression. However, as can be observed from table, the estimates with specification of both intercept and linear trend provide evidence of the significance of second cointegrating vector as well. Since the first cointegrating vector has the highest eigenvalue, we consider the only first one to estimate the long-run coefficient. To confirm the evidence of the existence of the long-run relationship, we employ the maximum eigenvalue test to identify the significant number cointegration vectors. The estimates are reported in Table 6.3.2b.

Table 6.3.2b: Johansen Cointegration Results based on Maximum Eigenvalue of the Stochastic Matrix: LM, LH, LP and F are included in Cointegrating Vector

$r = 0$	$r \geq 1$	35.986	23.920	71.925	28.270	69.421	31.000
$r \leq 1$	$r \geq 2$	15.256	17.680	15.343	22.040	55.626	24.350
$r \leq 2$	$r \geq 3$	8.766	11.030	9.865	15.870	12.358	18.330
$r \leq 3$	$r = 4$	3.0788	4.160	6.146	9.160	6.999	11.540

As can be seen from the table, the maximum eigenvalue test statistics also provide strong evidence of existence of a long-run relationship among the variables. The bounds "F" tests estimates, reported in Table 6.2c, provide strong evidence of the existence of a long run relation at 5 percent level of significance for all the specifications. Overall, both the bounds "F" tests and Johansen's cointegration results provide evidence in favor of a cointegration relation and this relation is robust with respect to different specifications.

The long-run parameters with foreign exchange availability formulation are estimated by using the two alternative methods (ARDL and the DOLS) and with intercept and no trend criteria is used because it is most suitable for our data.. The estimates are reported in Table 6.3.2c. The income and price elasticity estimates for ARDL estimation method bear the sign according to described by theory (positive in case of income elasticity and negative for price elasticity) and are statistically significant at the 5% level of significance. The income and price elasticity magnitudes are 1.018 and -1.197. The income elasticity is close to one which clearly shows the strength of the near identity problem. One the other hand, the estimate of price elasticity is significantly higher than one. The ARDL

estimate of the coefficient of foreign exchange availability is relatively small however, it has correct sign. It is highly statistically insignificant at the 5% level of significance. Finally, the estimates of diagnostic tests provide evidence that the residuals for ARDL estimation are normally distributed and free from the problem of serial correlation.

The DOLS estimates of income and price elasticity have right signs and are statistically significance at conventional level of significance. However, both estimates are significantly lower as compared to ARDL estimates. The income elasticity is 0.779 which is less than one as well as than the ARDL estimate of income elasticity. Similarly, the estimate of price elasticity (-0.945) is considerably less than the ARDL estimate of price elasticity in absolute term. Quite contrary to the ARDL estimates, the DOLS estimate of the coefficient of foreign exchange availability is relatively small and has also implausibly negative sign which does not match with the theory. It is, however, statistically insignificant at the 5% level of significance.

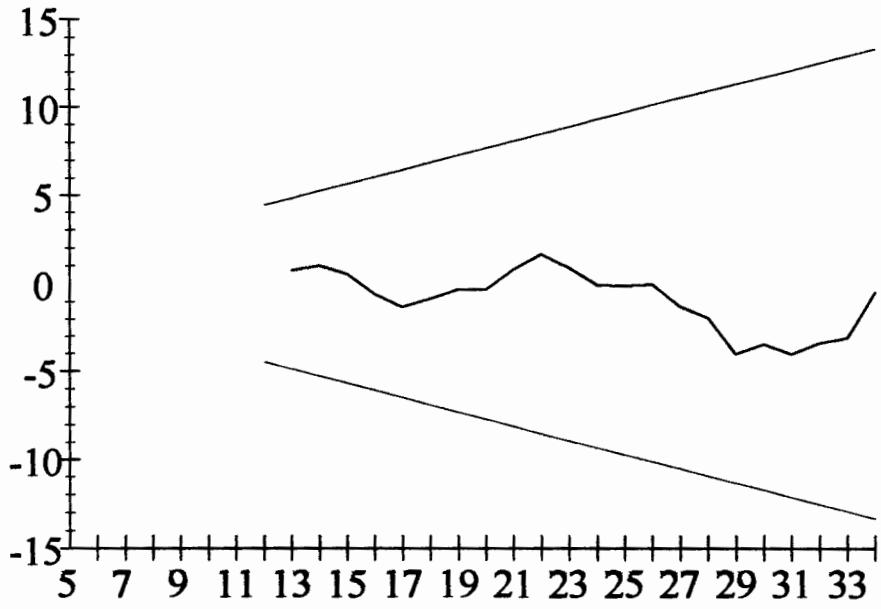
Table 6.3.2c: Estimates of Long-run Relationship in Foreign Exchange Availability Model

H	1.018 (7.224)	0.779 (6.116)
P	-1.197 (-6.847)	-0.945 (-5.345)
F	0.472 (2.935)	-0.239 (-1.416)
Intercept	0.318 (0.191)	-0.506 (-0.417)
Diagnostic Tests		
Serial Correlation Test	2.180 [0.156]	3.170 [0.189]
Normality Test	0.328 [0.786]	0.543 [0.762]

Note: t-statistics are reported in parentheses and p-values are given in brackets.

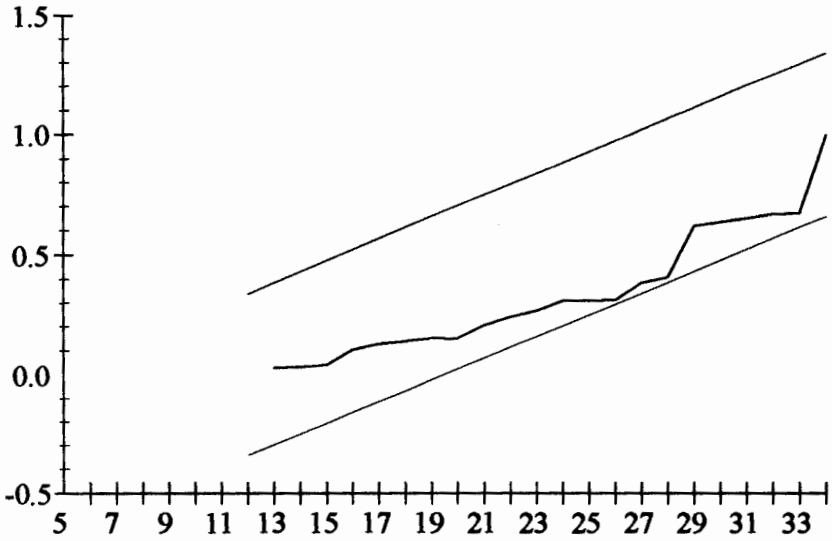
Next the CUSUM and CUSUMSQ tests are used to test the stability of the estimated parameters for both ARDL and DOLS estimations. The results from CUSUM and CUSUMSQ tests for ARDL estimations are presented in Figure 6.3.2a and 6.3.2b. Both the tests provide strong evidence for the stability of the estimated parameters at 5% level of significance for ARDL estimation method. The results from CUSUM and CUSUMSQ tests for DOLS estimations are presented in Figure 6.3.2c and 6.3.2d. Since the plots of CUSUM of recursive residuals fall out of the critical bound at 5% level of significance, there is evidence of instability in the estimated parameters for DOLS estimation method.

Figure6.3.2a : Plot of CUSUM of Recursive Residuals (ARDL)



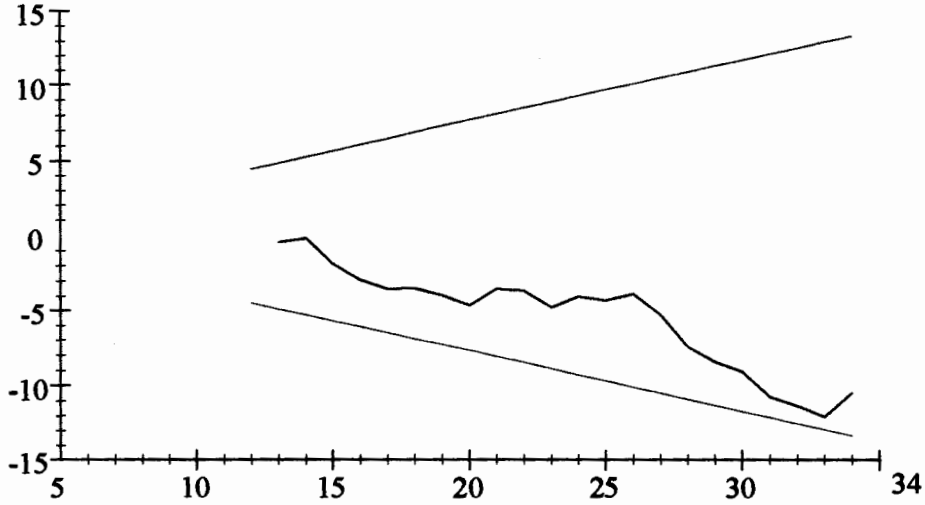
The straight lines represent critical bounds at 5% significance level

Figure 6.3.2b: Plot of CUSUMSQ of Recursive Residuals (ARDL)



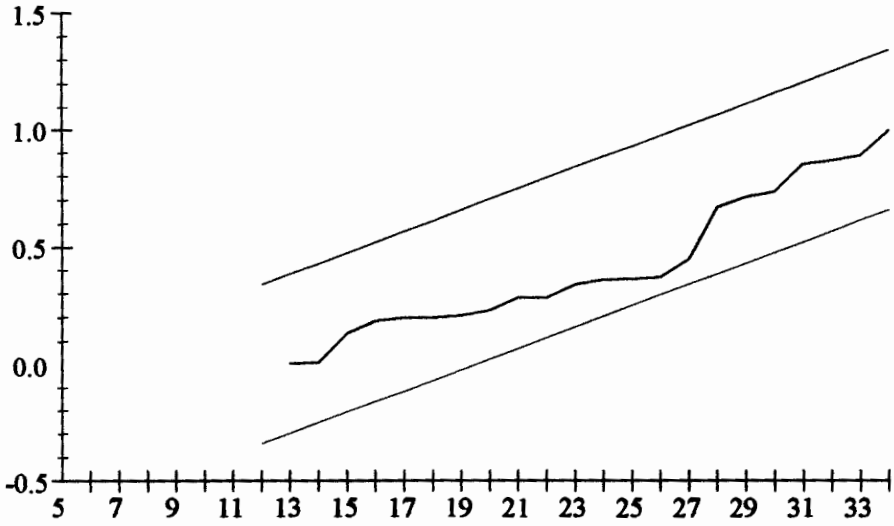
The straight lines represent critical bounds at 5% significance level

Figure 6.3.2c: Plot of CUSUM of Recursive Residuals (DOLS)



The straight lines represent critical bounds at 5% significance level

Figure 6.3.2d: Plot of CUSUMSQ of Recursive Residuals (DOLS)



The straight lines represent critical bounds at 5% significance level

CHAPTER 7

CONCLUSIONS AND POLICY IMPLICATION

7.1 Conclusion

The main objective of this paper is to describe the microeconomic foundations of import demand model for Pakistan. For this purpose a simple model of rational expectation permanent income hypothesis is used to derive an import demand equation. This is an extension of previous work by (Clarida (1994), Cegolowski (1991), Emran and Shilpi (2001)).But for Pakistan it is a new effort which is theoretically and empirically implementable. Pakistan economy had historically been characterized by trade and exchange rate interventions, and is continuously facing data problem relating 'virtual prices'. For empirical analyses annual time series data is used and there are two main issues to analyze.

i. The validity of cointegration or stationarity analyses of variables in the final equation of import demand used for estimation.

ii. The estimation of the cointegration vector.

To test the existence and the number of the long run relation (s), we use the bonds "F" test developed by Pesaran, Shin and Smith (2001) along with the widely used Johansen approach for the determination of the cointegration rank. To estimate the cointegrating vector, the following two alternative approaches are used:

i. Autoregressive Distributed Lag (ARDL) approach.

ii. Dynamic Ordinary Least Square (DOLS) approach.

Finally, the stability of the estimated parameters is tested by using CUSUM and CUSUMSQ tests.

This estimation procedure is applied on three models. Model I is our actual model which shows the long run estimates of import demand equation. Model II is derived from original import demand equation by excluding Z_t^*, shows a modified format of traditional model. Model III incorporates the foreign exchange availability. It is derived from original import demand equation with log of real foreign exchange availability replacing Z_t^* . The general empirical strategy is the same as that followed above.

The empirical results shows strong evidence of the existence of a long run relationship among the variables included in the long run import demand models I, II and III. When long run estimates of (ARDL) approach to cointegration are compared with (DOLS) methods. It confirms the superiority of our selected model. Because at certain situation (DOLS) estimates gave non sensional results i.e. In the long run estimates of modified traditional model(Model II) relative price elasticity receives positive sign ,which is against the sign restriction embodied in theoretical and empirical models. In the case of ARDL results appeared significant with correct signs. In the stability analyses CUSUMSQ of long run import demand (Model 1) is appeared as non stable although stable in the case of ARDL.

The long run estimates of expenditure on home goods (GDP-exports) and price elasticities are highly significant and follow the sign restriction embodied in the theoretical and empirical model. Although our results are not comparable with any previous study for Pakistan, because theoretical background is different. But still if we compare the magnitude and effectiveness of our results. These results are more appropriate and have important policy implications. The mean of activity variable (GDP-exports) called consumption on home goods is 1.065.

This variable shows a renewed form of income elasticity[16]. The neoclassical economic theory implies that long run income elasticity should be equal to one, and if it is slightly higher than one than it is supported by new trade theory. The activity variable in our selected model shows unitary income elasticity. For the improvement of trade balance it is required to adopt certain measures, which cause a reduction in income elasticity.

The mean of relative price elasticity is -0.918. It is closer to one and is greater than all previous studies presented in Pakistan [Arize (2004, Zehra (2002)] using aggregate data. Importance of relative price elasticities is confirmed from the previous literature, because increase in world trade each year has been caused by price related factors, such as reduction in tariff rates as a result of trade liberalization efforts, exchange rate policy, the reduction in long run transportation cost or pricing strategies at firm and industry level.

The ARDL estimate of the cofficient of scarcity premium is also significant with correct sign. It confirms the presence of a binding foreign exchange constraint on aggregate import demand ,before the period of trade liberalization .In the stability analyses, all the variables are appeared stable between the lower and upper bond.

The results confirms the validity of modified form of traditional model, But when we remove the variable of scarcity premium ,the elasticity estimates receives lesser values as compared to our original empirical equation (14), and in the case of foreign exchange reserves results appeared significant and follow the sign restrictions, but it creates the problem of near identity.So finally concluded that

[16] As mentioned earlier in chapter 3"Theoretical Model" that in previous models of import demand GDP or GNP variables are used as income variable i.e.Houthakker and Magee(1984), Goldstein and khan(1985), Ooskooee (2005), But here in this study we used GDP minus exports for expenditures on home goods ,which is a renewed form of previous studies.

our selected model is implementable for Pakistan economy and is important for policy analyses in the number of areas ,such as exchange rate policy, tariff reduction programs and calculation of optimal taxes.

7.2 Policy Implication

After receiving estimation results the policy implications are as follows.

7.2.1 Domestic consumptions (H)

The mean of the said variable is 1.065 which shows unitary income or domestic consumptions elasticity. As domestic consumptions increases it will increase the import demand for Pakistan. This creates detoriation in the trade balance. So it is required for authorities to adopt certain measures which reduces the domestic consumption (i.e. by raising taxes or by transferring pressure to exchange rate). Relatively slow domestic consumption may be easily adjusted which trade balances.

7.2.2 Relative Prices

The practical and theoretical importance of price elasticities in well known in economic literature. The mean of elasticities price elasticity is -0.918 which is closer to one. It shows that prices have a significant affect on import demand of Pakistan. As prices decreases it will increase the import demand of Pakistan. It is required to depreciate the currency, so that price increase and import demand decreases. Depreciation policy will improve the overall trade balance of Pakistan.

7.2.3 Scarcity Premium

By the inclusion of this variable in import demand equations the results of the import demand equation are more effective than previous studies. When it is eliminated from the modified traditional model. The income and price elasticity

estimates received lesser values. So it has important impact on all the determinants of import demand.

7.2.4 Foreign Exchange Reserves

As mentioned earlier the insertion of foreign exchange reserves variables in import demand equation creates the problem of near identity. This phenomenon is confirmed from our results.

BIBLIOGRAPHY

Abrishami, H and M. Mehrara (2000),'ARDL Approach to the Demand for Disaggregate Import: the case of Iran'. Iranian Economic Review.

Afzal.M (2004),'Estimating Long run Trade Elasticities in Pakistan: Acointegration Approach', The Pakistan Development Review 43:4 757-770.

Akhtar Sajjad and Fauzia Malik (2000),'Pakistan Trade Performance Vis-à-vis Its major Trading Partners', The Pakistan Development Review 39:1 37-50.

Amano, R. and T.Wirjanto (1996), `Intertemporal substitution, imports and the permanent income model', Journal of International Economics, 40, 439-4579

Amano, Robert A, Wai-Ming Ho and Tony S.Wirjanto, (1998). 'IntraPeriod and International Substitution in import Demand.' Working paper No. 84. Center for Research on Economic Fluctuations and Employment, Canada.

Antzoulatos Angelos A. and S. Peart (1998) 'Import Demand Under A Foreign Exchange Constraint', Research Paper No.9810, Federal Reserve Bank of New York.

Anaman A.K and S.M. Boffong (2001). 'Analysis of Determinants of Aggregate Import Demand in Brunei Darussalam from 1964 to 1997', Asian Economic Journal (2001). Volume 15, No. 1 pp. 61-70.

Arize.A.C (2004),'Foreign Exchange Reserves and import Demand in a developing Economy: the case of Pakistan,' International Economic Journal 18-2 259-274'.

Bautista M Romeo (1973). 'Import Demand in Small Country with Trade Restrictions' Oxford Economic Press, New series , Vol 30, No. 2 (July, 1978) pp 199-216.

Banerjee, Anindya, Juan J. Dolado, J. W. Galbraith, and David F. Hendry (1993),'Cointegration, Error Correction, and the Econometric Analysis of Non-stationary Data' Oxford University Press.

Brown, R.L, J.Durbin and J.M.Evans,'Techniques for Testing the Constancy of Regression Relationships Over Time', Journal of the Royal Society 37, Series B(1975):149-192.

Bruton H. (1989),' Import Substitution. Handbook of Development Economics II',pp 1601-1644.

Caporale, G.M and M. Chui (1999), `Estimating income and price elasticities of trade in a cointegration framework', Review of International Economics, 7, 254-264.

Ceglowski, Janet. (1991),'Intertemporal Substitution in Import Demand', Journal of international Money and Finance. 10, 118-130.

Cheong, Tuck tang (2003), 'Aggregate Import Demand Function for Eighteen OIC Countries: A Cointegration Analysis'. IIUM Journal of Economics and Management 11, No.2: 167-95

Cheong .A.C,'Elements of Dynamic optimization'Mc Graw Hill, Inc.

Clarida, Richard H (1993), 'Permanent Income, Import Prices, and the Demand for Imported Consumer Durables: A Structural Econometric Investigation', NBER working paper series No.4437.

Clarida, R. H. (1994),'Cointegration, aggregate consumption and the demand for imports: A structural econometric investigation', American Economic Review, 84, 298-308.

Croix, D. and Jean-Pierre (1998),'Intertemporal Substitution in Import Demand and Habit Formation' Journal of Applied Econometrics 13, 589-612.

Dickey, D. A. and W. A. Fuller (1979),'Distribution of the Estimators for Autoregressive Time Series with A Unit Root', Journal of the American Statistical Association, Volume 74, Pages 427-431.

Dickey, D.A., Fuller, W.A. (1981),'Likelihood ratio statistics for autoregressive time series with a unit root,' Econometrica 49 1057-1072.

Dixit, A. and Norman, V. (1980),'Theory of International Trade' Cambridge University Press.

Economic Survey of Pakistan Various issues

Emran, M.S. and F. Shilp (1996).'Foreign Exchange Rationing and the Aggregate Import Demand Function', Economic Letters 51 (1996) 313-322.

Emran, M.S. and F. Shilp (2001),'Estimating Import Demand Function in Developing Countries: A Structural Econometric Approach with Applications to India and Sri Lanka,' World Bank Research Group' Working Paper Series.

Engle R. F. and C. W. J. Granger (1987),'Cointegration and Error Correction, Representation, Estimation and Testing', Econometrica, Volume 55, Pages 251-277.

Erkel-Rousse, H and D. Mirza (2002): `Import Price Elasticities: Reconsidering the Evidence', Canadian Journal of Economics, May, 2002.

Faini, R, L. Pritchett, and F. Clavijo (1992), 'Import demand in developing countries, in M. Dagenais and P. Muet ed. International Trade modeling, Chapman and Hall,NY and Melbourne, 279-297.

Flavin, Marjorie (1981),'The Adjustment of consumption to changing expectations about future income', Journal of Political Economy 89:974-1009.

Frimpong, J Magnus and O.Abayie, E Fosu (2007), 'Aggregate Import demand and expenditure components in Ghana: An econometric Analysis', Munich Personal REPEC Archive paper No 599 November (2007)

Fuller, W. A (1976),'Introduction to Statistical Time Series', New York, John Wiley and Sons.

Goldstein, M and M. Khan (1985), 'Income and price effects in foreign trade,' in Handbook of international economics, (Elsevier, Amsterdem).

Hall.R.E (1978),'Stochastic implications of the Life Cycle-Permanent Income hypothesis: Theory and Evidence' ,Journal of Political Economy 86:971-987.

Houthakker H.S and S.P.Magee (1984), 'Income and Price Elasticities in World Trade'. Development Economics, Volume 14(1984) pp 351-258.

Johansen (1988),'Statistical Analysis of Cointegrating Vectors', Journal of Economic Dynamic and Control, Vol.12, pp 231-54.

Johansen, Soren, and Katarina Juselius (1990), 'Maximum Likelihood Estimation and Inference on Cointegration – With Applications to the Demand for Money.' Oxford Bulletin of Economics and Statistics 52: 169-210.

Johansen, et al, (1991),'Estimation and Hypothesis Testing of Cointegration Vector Autoregressive Models', Econometrica, Vol. 59, 1551-1580.

Johansen, Soren (1995),'A Stastistical Analysis of Cointegration for I(2) Variables," Econometric Theory, Cambridge University Press, vol. 11(01), pages 25-59, February.

Johansen, Soren (1995),' Likelihood-Based Inference in Cointegrated Vector Autoregressive Models', Oxford, Oxford University Press

Khalid A. M. (1994), 'Empirical Tests of the Rational Expectations Permanent Income Hypothesis; Evidence from Pakistan' Pakistan Development Review33:4 Part II(Winter 1994)pp 1043-1053.

Khan A.H and M.Aynul Hassan (1994),'Impact Of Devaluation on Pakistan External Trade: An Econometric Approach,' The Pakistan Development Review' 33:4 1205-1215.

Khan A.H(1998),'The experience of Trade Liberalization in Pakistan' The Pakistan Development Review'37:4 Part II(Winter 1998) pp,661-685.

Laurenceson, J. and Chai, J.C.H (2003),' Financial Reform and Economic Development in China', Edward Elgar, Cheltenham. Publishing, Inc., UK, 2003, ISBN 1-84064-988-7 Journal of Asian Economics 2005, vol. 16, issue 2, pages 341-342 eco/

Marquez, Jaime (2003), `U.S. Imports ", *Mimeo*, Federal Reserve Board

Mah J. S. (1999), 'Import Demand Liberalization and Economic Development.' Journal of Policy Modeling 21(4), 497-503.

Malley, J and Thomas M. (2000),'Vertical Product Differentiation and the Import Demand Function: Theory and Evidence', Working Paper No.387, CESifo, Germany

Mazeri, A, (1995),'Imports under a foreign exchange constraint: the case of Islamic Republic of Iran', IMF, WP/95/97.

Mehta R. and A. Parikh (2005), 'Impact of Trade Liberalization on Import Demand in India. A Panel Data Analysis for Commodity Groups', Applied Economics Volume 37 pp. 1851-1863.

Moran, Cristian (1988). "Imports under a Foreign Exchange Constraint", Working Paper WPS 0001, The World Bank.

Murray.T and Peter.J.Ginman(1976),'An empirical examination of the Traditional Aggregate Import Demand Model',The Review of economics and Statistics,Vol.58.No 1(Feb1976)pp 75-80.

Narayan.P.K and Narayan.S (2005),' Estimating income and price elasticities of imports for Fiji in a cointegration framework', Economic Modelling, 22(2005)423-438.

Ogaki and Carmen (1998),'Measuring Intertemporal Substition: The Role Of Durable Goods',Journal of Political Economy, Vol.106, no.5.

Oskooee M. B (1986), 'Determinants of International Trade Flows', Journal of Developments Economics. Volume 20(1986), pp. 107-123, North Holland.

Oskooee M.B, (2.005),' Income and Price Elasticities of Trade: Some new Estimates',The International Trade Journal. Volume 109, No. 2. Pp 165-178.

Paulino A.S (2000),'Trade Liberalization and Trade Performance in the Dominican Republic,'IDS working paper

Paulini A. U. santos (2002), 'The Effects of Trade Liberalization on Imports in selected Developing Countries',World Development Volume 30 No. 6 pp. 959-974.

Paulino A. S. and A. P. Thril Wall (2004), 'The Impact of Trade Liberalization on Exports, Imports and the Balance of Payment of Developing Countries'. The Economic Journal. Volume 114, (February) pp. 50-27

Pesaran, M. H and Y. Shin (1999), `An autoregressive distributed lag modelling approach to cointegration analysis,' *Econometrics and economic theory in 20th century: theRagnar Frisch centennial symposium,* eds. S. Strom, Cambridge University Press, Cambridge

Pesaran, M. H., Y. Shin, and R. Smith (2001), `Bounds testing approaches to the analysis of long run relationships', Journal of Applied Econometrics, 16, 289-326.

Razafimahefa I.F and S. Hamori (2005),'Import Demand Function from Madagascar and Mauritivs', Journal of African Economics, Volume 14 No. 3, pp. 411-435.

Reinhart, C, (1995), 'Devaluation, relative prices, and international trade', IMF Staff -papers, 42, 290-312.

Romer.D,'Advance Macro Economics'

Sinha.D (1999),'The Marshall-Lerner-Robinson condition and the trade elasticities in five Asian countries', mimeo, Macquarie University and Yale University.

Sarmad Khwaja (1987),'Disaggregated Import Demand Function for Pakistan', Pakistan Development Review XXVI No 1(71-80).

Sarmad Khwaja (1989), 'The Determinants of Import Demand in Pakistan', World Development 17:10 1619-1625.

Saracoglu, Rusdu and Iqbal M. Zaidi (1986).' Foreign Exchange Constraints and Imports in Developing Countries, 'Working Paper No. WP/86/11, International Monetary Fund.

Senhadji, A, (1998): 'Time series estimation of structural import demand equations: a cross-country analysis,' IMF Staff Papers, 45, 236-268.

Shabbir Tayyeb and Riaz Mahmood (1991),'Structural Change in the Import Demand Function for Pakistan,'The Pakistan Development Review 30:4 1159-1168.

Shabbir Tayyeb and Riaz Mahmood(1991) ,'Structural Change in the Import Demand Function for Pakistan,'The Pakistan Development Review 30:4 1159-1168.

Sinha.D (1997),'Aggregate Import Demand Function for Pakistan', Atlantic Economic Journal 1997 volume 2003:2.

Sinha.D and T. Sinha (2000),'An Aggregate Import Demand Function for Greece', Atlantic Economic Journal. Volume 28, No. 2 pp. 196-211.

Sinha.D (2001),'Aggregate Import Demand Function for Greece', Atlantic Economic Journal 2001 volume 29:2

Stock, James and Mark Watson,(1993), `A simple estimator of cointegrating vectors in higher order integrated systems ', Econometrica, 61, 783-820.

Thomakos Dimitrios.D and Mehmet A ulubasoglu (2000), 'The impact of Trae liberalization on Import Demand'. Journal of Economics and Social Research 4(1), 1-26..

Vousden .N (1990),'The economies of trade protection' Cambridge university press USA

Winters, L. Alan (1985), 'Imports of Developing Countries: An Empirical Model of intertemporal allocation And Financial constraints', World Bank Staff Working Papers No. 740.

Winters, Alan, L, and Paul A. Brenton (1993), `Modelling quantitative trade restrictions: rationing in the Rotterdam model' De Economist, 141, 112-126.

WTO trade policy reviews (1995): First press release, secretariat and government summaries Pakistan: February 1995, PRESS RELEASE PRESS/TPRB/1, 8 February 1995.

WTO trade policy reviews (2002): First press release, secretariat and government summaries Pakistan: January 2002, PRESS RELEASE PRESS/TPRB/185 25 January,2002.

Zehra Aftab and Aurangzeb (2002),'The Long Run and Short-run Impact of Exchange Rate Devaluation on Pakistan Trade Performance.

Zeldes, Stephen P (1989), "Consumption and Liquidity Constraints: An Empirical Investigation" The journal of Political Economy, Vol.97, No.2. , pp.305-346.