



## Trade Liberalization Effects on Import Demand: The Pakistan Experience using Bilateral Trade Data

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**Abstract:** *The fundamental objective of this study is to estimate for basic trade elasticity and assess the impact of trade liberalization on Pakistan's import demand in bilateral case for a sample of selected countries. In sample, countries are selected from both the developed and developing world on account of their greater share in Pakistan's total imports. The method of autoregressive distributed lag model with a new strategy is performed using annual data for the time period of 1982-2016. Results indicate that co-integration exist in all bilateral cases. The domestic income is statistically significant determinants both in short and long run with expected positive signs and their estimates are highly elastic. The estimates of income coefficient range from 1.54 to 7.42 which indicate that as the economy grows, Pakistan, imports from trading partners also surge with greater velocity. The price is according to the expected signs i.e. negative and insignificant in most cases, except in the case for Japan and Indonesia where it is significant but inelastic i.e. the coefficient value is looking less than 0.6 in all cases. In nutshell the trade liberalization impact is looking positive and statistically significant in many country cases. However, these effects are different for each era of trade liberalization and vary from country to country level. This is indeed the case, where different import policies need to implement rather than a single trade policy to supervise excessive imports of the country.*

**Keywords:** Import demand, trade liberalization, ARDL and Pakistan.

## Introduction

In this research, the fundamental objective is to estimate for basic trade elasticity and assess the impact of high trade liberalization on imports demand of Pakistan in the bilateral case for a sample of selected countries during the period 1982-2016. Our sample comprises of eight countries and - consist of both developed and developing countries, namely China, Germany, India, Indonesia, Japan, Malaysia, United Kingdom and United State of America. The sample selection is made on account of their greater share in Pakistan's import, their persistent attachment in bilateral trade and based on information available on trend that have been occurred in import behavior in last decade. By observing past trade data, Pakistan had on the average, a very low growth in its volume of exports than the volume

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of imports. In the year 2015-16, Pakistan’s total imports were around US\$47 billion and total exports amounted US\$20 billion. In short, country’s demand for imported goods has the largest proportion than the foreigner demand for Pakistan’s exported goods which is in the vanguard of contributing to huge trade deficit of the country.

The observed data also expose that Pakistan’s imports originate from few destinations and around 50 percent of Pakistan’s imports sourced from selected developed and developing countries. Typically Pakistan has persistent economic ties with some of the developed countries, especially with USA, UK, Japan and Germany since last few decades. However, some developing countries have yet to be established as major trading partners of Pakistan including China, India, Indonesia and Malaysia etc. In the past, imports from these developing countries were low but it has gained the pace, signaling a great concern for Pakistan economy. For instance, the share of imports from China has increased from 7.3 % in year 2003 to 27 % in year 2015 which is continuously growing further. This high imports from China ranked it as the top import partner of Pakistan since last decade. Similarly, the share of imports from UK, Japan and Germany has shrunk while for India and Indonesia it has increased. Pakistan’s import share of selected countries is presented in table-1.

Table 1  
Selected countries import share as percentage  
of Pakistan’s total imports

Country	2003	2005	2010	2015
USA	6.0	6.1	4.3	4.4
UK	3.1	2.9	1.7	1.4
Japan	6.6	6.5	4.2	3.9
Germany	4.4	4.6	2.6	2.2
China	7.3	9.4	14	25
India	1.7	2.3	4.2	3.8
Indonesia	2.0	2.7	1.8	4.6
Malaysia	4.6	2.9	5.5	2.1

Note: data is extracted from Trade Map-  
International Trade Statistics.

If we observe data for the last three decades, inevitably Pakistan’s real imports from these selected developing countries on average depict increasing trend while from developed or advanced countries a falling trend is reflected. Thus, overwhelmingly, it is imperative to have the knowledge of bilateral imports demand elasticity for efficient management and growth of the economy. For policy valuation and implication, we require reliable estimates of import demand responsiveness to price and expenditure or income level. Since in the prior works conducted by [Houthakker and Magee \(1969\)](#); [Afzal and Ahmad \(2004\)](#); [S. Khan, Ali, and Shah \(2013\)](#), it was emphasized to estimate import demand of a country on aggregate level. Instead, many other studies undertaking trade analysis using disaggregated data by source of supply to reduce the ‘aggregation bias’ problem. Literature proposes that trade elasticities on bilateral basis are useful to expand trade policies and international bonds as well ([Marquez, 1990](#); [Bahmani-Oskooee, 1998](#); [Bahmani-Oskooee & Goswami, 2004](#)). So far, the parameters estimates of bilateral trade equations have the advantage of giving supplementary level of details which can also be relevant in analyzing

policy questions.

Moreover, Pakistan seeks free and fair trade with these counterpart developing countries. In addition to be the members of World Trade Organization, some of these countries are tied with Pakistan in bilateral free trade agreements as well. Since 2000, Pakistan has established bilateral free trade agreements with China, Indonesia, and Malaysia in order to promote the trade volume. The extent literature reports that there is significance impact of trade liberalization on trade flows in developing countries. Empirically the effects of high trade liberalization on exports were found mixed in literature i.e. some studies have shown positive effects of trade liberalization on exports whereas others have concluded little impact of trade liberalization on exports demand (Nur, Wijeweera, & Dollery, 2007). Instead, A. Santos-Paulino and Thirlwall (2004) are of view that the impact of trade liberalization is relatively more influential in import behavior of the country and studies generally support for positive impact of trade liberalization on import demand. In the specific case of Pakistan, (Afzal, 2001; S. Khan, Khan, & Shah, 2014; Zakaria, 2014) have examined the impact of trade liberalization on imports demand. These studies were focused on aggregated import demand ignored the disaggregate level. Akhtar and Malik (2000) estimated country's bilateral import demand only for four major trading partners. Haider, Afzal, and Riaz (2011) estimated Pakistan's bilateral import demand for developed and Asian neighboring countries. Alam and Ahmad (2011) estimated Pakistan's imports from major sources, including US, UK, Germany and oil exporting countries. Therefore, despite this seminal work, no recent studies have examined the impact of trade liberalization in disaggregate import demand.

On principle of parsimony, eight of the largest trading partners of Pakistan are considered. Particularly, as stated these countries contribute more than 50 percent in Pakistan's total imports. Oil exporting countries are excluded, because import demand for crude oil is neither income nor price elastic (Ziramba, 2010). Other countries are excluded because either their share is smaller or bilateral data are unavailable for relevant variable. The contribution of this research study to the existing literature is twofold. First, to the best our knowledge this is the first study to estimates the country's bilateral import demand and to provide reliable import demand elasticity estimates. Estimates would be more reliable since they do not suffer from aggregation bias over import sources. If they are different from that of aggregate imports price and income elasticity since trade policies that are based on aggregate import demand estimates can be misleading. Second, the analysis is carried out for extended period of time and follows a new strategy in the model selection stage. Unlike the previous studies, given a maximum lag length we first apply the bound testing of co-integration and diagnostic tests to all possible models, and then determine the subset of models satisfying both the co-integration and all diagnostics. Finally, in order to analyze the impact of liberalization, this study use trade liberalization as additional variable to the basic income and price variables, which is not included in the previous research work relevant to bilateral import demand in Pakistan's context?

To this end, structure of the study is organized as follows. Section two sets out brief review of literature related our study. Section three discusses the model specification. Data and sources of data are explained in the fourth section, followed by a discussion and interpretation of empirical results. The last section has sum up the conclusion of the study.

## Related Literature Review

As we stated earlier in this article, substantial research works exists on import demand as well as on the impact of trade liberalization, however, in this section we review the most related and important literature. Several studies are significant in the context of aggregate import demand. Such as, [M. S. Khan \(1974\)](#) estimated export and import demand for 15 developing countries, including Pakistan. This study was based on two-stages least square. In import demand, relative import price and domestic income were the main explanatory variables. In results, he found that price elasticity of imports tends to be high and income elasticity is on the low side. [Senhadji \(1998\)](#) studied import demand function using cross country analysis. He found that the average price elasticity is higher than one in long run and close to zero in the short run. Similarly, he found income elasticity on average close to 1.5 in long run and 0.5 in short run. [Dutta and Ahmed \(2004\)](#) studied aggregate import demand behavior for India during 1971-1995. They used the methodology of co-integration. In import demand regression for India, import volume is found to be co-integrated with income level of India and relative import price. In their conclusions -import demand is largely explained by domestic income and relatively less sensitive to the changes in import price.

[A. U. Santos-Paulino \(2002\)](#) examined the impact of trade liberalization on import demand of developing countries, utilizing dynamic panel data techniques. They conclude that domestic income and relative import price are significant determinants of import demand. Further it was revealed that the elimination of trade policy distortions has strong and positive impact on import growth. [A. Santos-Paulino and Thirlwall \(2004\)](#) simultaneously examined the impact of trade liberalization on export growth, import growth and the balance of payments of 22 developing countries. They found that the impact of trade liberalization on import growth was more than the export growth. A few studies have been conducted to analyze the impact of trade liberalization on Pakistan's import demand; examples of studies are [Afzal \(2007\)](#); [S. Khan et al. \(2014\)](#); [Zakaria \(2014\)](#), however, all these studies examined and confined to evaluate the impact of trade liberalization on import demand at aggregate level using different data set and methodology.

Alternatively, several studies have estimated import demand at bilateral level. Some of studies examined bilateral trade between the US and one or more of its trading partners, for instance, [Cushman \(1990\)](#); [Bahmani-Oskooee \(1998\)](#). Other than US, studies are also carried out for bilateral trade analysis at country level [Bahmani-Oskooee, Goswamil, and Talukdar \(2005\)](#) for Canada, [Wang and Ji \(2006\)](#) for China and [Liu, Fan, and Shek \(2007\)](#) for Hong Kong, [Uz \(2010\)](#) for Turkey and [Murad \(2012\)](#) for Bangladesh.

Nevertheless, few studies have been conducted for the analysis of bilateral trade flows in Pakistan as mentioned in introduction of the study. [Haider et al. \(2011\)](#) estimated bilateral imports and exports demand for Pakistan with major trade partners and some Asian countries, including USA, UAE, Japan, Bangladesh, India, China and Sri Lanka. They used ordinary least square (OLS) techniques for empirical findings. They found that income and exchange rate are important determinants of foreign trade. [Alam and Ahmad \(2011\)](#) examined the response of Pakistan's import demand in bilateral case for major trading partners while using quarterly data for the period of 1982 to 2008. They

employed the methodology of autoregressive distributed lag model with conducting the bound test for the null hypothesis of all no co-integration. Their results conclude that income elasticities are all significant but vary in magnitude, thus bearing less importance for developing countries. Moreover, despite these seminal work, no recent studies have examined the impact of trade liberalization in disaggregate import demand considering the bilateral import demand for Pakistan. Therefore, this study aims to fill the gap and study bilateral import demand between Pakistan and its major trading partners from developed and developing countries. This progress of the study would fill the gap and add a new research to the existing literature on the important issue of trade liberalization and imports.

## The Model Specification of Bilateral Import Demand

The analyses of aggregate import demand model usually include size of the income and relative price of the imports (Houthakker & Magee, 1969; Thirlwall, 1979). According, the key parameters for import demand are the income and price elasticity estimates. Generally, a nation gross domestic product is used to measure for income elasticity. However, in bilateral analysis literature uses real bilateral exchange rate to measure the sensitivity of import demand to import prices (Bahmani-Oskooee & Brooks, 1999). The interest of this study is an estimation of bilateral import demand elasticities for Pakistan with trade partners. According to the standard theory of import demand, the import function specification for Pakistan at time  $t$  is written as:

$$IMPO_{it} = A \left( \frac{P_f EX}{P_d} \right)_{it}^{\gamma} GDP_{it}^{\pi} \quad (1)$$

Taking log of the variables at both side, and deflating imports (IMPO) and gross domestic product (GDP) by their respective prices, constant and error term are incorporated. Consequently, we can assume that for Pakistan the empirical model for estimation of the long run parameters estimates in bilateral case gets the following equation form:

$$\ln RM_{it}^{Pak} = C_0 + \gamma \ln RER_{it} + \pi \ln RGDP_{Pak.t} + \epsilon_t \quad (2)$$

Where in equation (2), RM represents real imports, RER symbolize real exchange rate and RGDP is the real gross domestic product. The subscript of “ $it$ ” in dependent variable of the model means imports of Pakistan from country  $i$  at  $t$  time and in explanatory variable thus reflects the country’s bilateral exchange rate with selected trading partner at time  $t$ . The coefficient  $\gamma$  and  $\pi$  represents price and income elasticity. Conventional models of import demand assume that the coefficient of real exchange rate is negative i.e.  $\gamma < 0$  and of domestic income is positive i.e.  $\pi > 0$ . Furthermore, we have taken natural log at both side of the model as we know from literature that double log gives appropriate results and suitable to discuss.

Following A. Santos-Paulino and Thirlwall (2004); Ziramba (2010), we extended equation (2) by adding dummies variable (for year of significant trade liberalization or for trade agreements between trading partners) to capture the effects of trade liberalization or trade

agreements in country's bilateral import analysis. A dummy takes the value of zero for the period before trade liberalization and the value of 1 for the year of high liberalization and afterward. Though it was in mid-eighties that the Pakistan's government formally started to liberalize trade policy, its effectiveness or more openness of the country is tested by choosing the year of 1992 in trade models (A. Santos-Paulino & Thirlwall, 2004). Later on, Wacziarg and Welch (2008) surveyed that Pakistan's trade policy is looking more liberalized in 2003 and afterwards, compare to the year 1992. The dummy coefficient is assumed to be positive in all cases. Accordingly, this gives an extended estimating import demand equation as following.

$$\ln RM_{it}^{Pak} = C_0 + \gamma \ln RER_{it} + \pi \ln RGDP_{Pak.t} + \sigma DLIB + \rho DTA + \epsilon_t \quad (3)$$

Finally a trend variable is included in model where the aim is to control the effects of time trend in import demand bilaterally. To allow for trend variable in model, the following import demand specification is considered to be estimated.

$$\ln RM_{it}^{Pak} = C_0 + \gamma \ln RER_{it} + \pi \ln RGDP_{Pak.t} + \sigma DLIB + \rho DTA + \tau T + \epsilon_t \quad (4)$$

In this final selected model, the variable *DLIB* represents dummy for liberalization, *DTA* represent dummy for bilateral trade agreement and *T* represent time trend of analysis. The coefficient value of  $\gamma$  is expected to be less than 0, while  $\pi$ ,  $\sigma$  and  $\rho$  are expected to be greater than 0.

The specified equation is estimated using autoregressive distribute lag model (ARDL) approach to provide long run parameter estimates of the relationship between variables. We adopted this new and latest approach due to two reasons. First, pre-test of unit root is not compulsory for application of ARDL (Pesaran, Shin, & Smith, 2001). Second, the small sample bias could be addressed using unrestricted error correction bound test (Mah, 2000). Usually, this ARDL estimation involves two steps. In first stage we can find the long run relationship or co-integration among variables of the model using unrestricted error correction model. The model in this step includes lag length of the first differenced variables and the lagged level of variables. Then F-statistic is tested against the lagged level variables of the model. If a value of F-statistics is greater than the critical values at upper bound, this suggests to reject the null hypothesis of no co-integration. In the next step, the long and short run parameters are estimated for concerned variables of the model.

Following Pesaran et al. (2001), the import demand function in equation (3), is expressed in the following error correction modeling framework:

$$\begin{aligned} \Delta \ln RM_{i,t} = & \alpha_0 + \sum_{i=1}^m \alpha_{1,i} \Delta \ln RM_{i,t-1} + \sum_{i=0}^n \alpha_{2,i} \Delta \ln RER_{i,t} + \sum_{i=0}^p \alpha_{3,i} \Delta \ln RGDP_t + \\ & \delta \ln RM_{i,t-1} + \gamma \ln RER_{i,t-1} + \pi \ln RGDP_{i,t-1} + \sigma DLIB + \rho DTA + \tau T + \epsilon_t \end{aligned} \quad (5)$$

Generally, the appropriate lag length is specified and then tested for the existence of co-integration in the model. However, here we follow a new procedure to estimate the model

with the aim to put forth policy implications based on reliable and meaningful results. Normally, the procedure is to find different possible model of co-integration by applying a model selection criterion i.e. Akaike Information Criteria (AIC) or Schwarz Information Criteria (SIC). Therefore, instead of applying a model selection criterion to the set of different possible models having the same regress and and regressors, as often performed in the literature, we employ the criterion for those models of subsets which satisfy both the diagnostics and co-integration in constitution. For this, we proceed in the following manner. First maximum lag length of difference variables in regression (4) is required to be set. In the next step, models are estimated for each possible combination and those combinations which satisfy all the diagnostic and co-integration tests have been selected. The selected combinations are tested for co-integration, based on F-statistics. Lastly, to recognize the optimal model, Schwartz criteria have been used to all selected combinations that satisfy the basic two requirement i.e. diagnostic test and co-integration. Once we come up with the optimal model selection then we proceed for the long run and short run estimation of parameters for the annual data (1982 - 2016).

## Data and Sources

The dependent variable import demand is constructed as nominal import from import partner expressed in millions of rupees divided by import unit value and data were obtained from Pakistan Economic Survey and direction of trade statistics. Real income is Pakistan Gross Domestic Product at market price divides by GDP deflator (with base year 2010=100), expressed in millions of rupees. Data for real income is extracted from publication of State Bank of Pakistan ‘A Handbook of Statistics 2015’ and Pakistan Economic Survey 2016-17. Real exchange rate is equivalent to the product of nominal exchange rate and ratio of import unit value divide by country’s wholesale price index i.e.  $ER_i * MUV / WPI$ . Data for real exchange rate indicators are obtained from international financial statistics and Pakistan Economic survey (various issues).

## Empirical Findings

To test for long run relationship among variables in model of import demand bilaterally, we have used data over the period 1982-2016 and employ autoregressive distributed lag model i.e. developed by [Pesaran et al. \(2001\)](#). Prior to the application of ARDL, we test for unit root in all variables of the import demand functions. The integration properties of all variables are tested by using augmented dickey fuller (ADF) test. The choice of lag length in regression of ADF is made using the Schwarz Criterion. ADF test results for the individual time series at level and at first difference are shown in table-2:

Table 2  
Augmented Dickey Fuller Test-Statistics Results for all Selected Variables

Variable	At Level	AT First Difference	Order of integration
	ADF Test Statistic	ADF Test-Statistic	
RGDP	-2.3063 (0.419)	-5.584* (0.000)	I(1)
RM <sub>US</sub>	-2.976 (0.153)	-5.609* (0.000)	I(1)
RER <sub>US</sub>	-2.756 (0.222)	-6.649* (0.000)	I(0)
RM <sub>UK</sub>	-2.637 (0.267)	-6.539* (0.000)	I(1)
RER <sub>UK</sub>	-1.801 (0.682)	-5.008* (0.001)	I(1)
RM <sub>JAPAN</sub>	-2.029 (0.273)#	-6.051* (0.000)	I(1)
RER <sub>JAPAN</sub>	-1.959 (0.302)	-4.262* (0.002)	I(1)
RM <sub>GERMANY</sub>	-2.683 (0.249)	-6.181* (0.000)	I(1)
RER <sub>GERMANY</sub>	-1.576 (0.781)	-5.632* (0.000)	I(1)
RM <sub>CHINA</sub>	-1.883 (0.641)	-5.998* (0.000)	I(1)
RER <sub>CHINA</sub>	-1.807 (0.678)	-5.013* (0.001)	I(1)
RM <sub>INDIA</sub>	0.035 (0.994)	-2.367* (0.388)	I(1)
RER <sub>INDIA</sub>	-1.773 (0.695)	-5.270* (0.008)	I(1)
RM <sub>INDONESIA</sub>	-1.187 (0.668)#	-7.480* (0.000)	I(1)
RER <sub>INDONESIA</sub>	-2.503 (0.324)	-6.268* (0.000)	I(1)
RM <sub>MALAYSIA</sub>	-1.958 (0.602)	-4.968* (0.002)	I(1)
RER <sub>MALAYSIA</sub>	-3.587** (0.046)	-7.321 (0.000)	I(0)

Note: all variables are in natural log, RM stand for real imports and RER stands for real exchange rate. The bracket values are probability values or p-values. ADF test used trend with constant. The ADF test-statistic value is compared with critical values. ADF Critical values are -4.26 and -3.557 at 1% and 5%, respectively. The \* and \*\* represents 1% and 5% level of significance. #. Test used constant and no trend specification. ADF critical value at 5 % is -3.557.

Each ADF test includes the results of estimation with constant and trend using Schwartz criteria. In brackets, I (0) indicate the absence of unit root and I (1) denote the existence of unit root. The results show that most of the variables are stationary at first difference and integrated of first order when include both trend and intercept. They all contain unit root at 5 percent of significance at level except for real exchange rate in case of Malaysia, where the variable is stationary at level at 5 %. By observing the p-values, none of the variable is stationary at 5 % level, instead of the RER of Malaysia. Moreover, real imports from Japan and Indonesia become stationary at 10 % level of significance. However, by including constant only and using Schwartz Criteria (SC) then both imports from Japan and Indonesia becomes non-stationary even at 10 percent level of significance as reported in table at level. In conclusion, the results in last column of table-2 show that all variables of the study are integrated of first order at 1 percent or 5 percent respectively except RER integrated of zero order for US.

## Testing for Long Run and Short Run Relationship

To test for long run parameters and short run dynamics, the bilateral models of imports demands are estimated by using the procedure of ARDL. Under this approach, we confine the analysis to a certain steps. The method of bound test is employed and tested for the existence of co-integration in all specified regression of imports models. In case, if the test results are significant, it can be said that there exist a long run relationship in the model.

In this paper, as stated in section of methodology that we employ a new strategy to



estimate for optimal lag model. Having adopted the procedure of new strategy, we have found the optimal lag model for each bilateral import demand function in equation (4). The model of optimal lag combination and their respective F-test are shown in table-3 as given.

Table 3  
ARDL Bound Test Results, Pakistan's major importing countries  
(Null Hypothesis: No Long Run Relationship Exist)

Country	F-statistics	Optimal lag model	Upper bound C.V		Conclusion
			With trend	With no trend	
USA	5.52	ARDL (1,0,0)	5.06***		Co-integration
UK	7.201	ARDL (1,0,0)	5.85**		Co-integration
Japan	5.897	ARDL (1,0,0)	5.85**		Co-integration
Germany	10.115	ARDL (1,0,0)	7.52*		Co-integration
China	12.77	ARDL (1,1,3)		6.36*	Co-integration
India	5.079	ARDL (3,0,0)		4.85**	Co-integration
Indonesia	11.526	ARDL (3,0,4)		6.36*	Co-integration
Malaysia	7.839	ARDL (1,0,3)	7.52*		Co-integration

Note: The, \*, \*\* and \*\*\*, represents 1%, 5%, and 10% level of significance, respectively. C.V stands for critical values.

Table-3 indicates that the test statistics values are significant and greater than upper bound critical values in all cases. Hence, there is co-integration among RM, RER and RGDP. In other words, there is long run relationship among variables in all bilateral imports demand for USA, UK, Japan, Germany, China, India, Indonesia and Malaysia. Accordingly, all specified model exhibit co-integration and thus we can precisely interpret their results for long run and short run. Long run and short run equilibrium results for the study eight selected importing countries are shown in table-4 and table-5, respectively.

### Long Run Parameter Estimates of Bilateral Import Demand

Long run parameters estimates for the Pakistan's major importing countries are given in Table-4. In all import functions, the coefficient of income elasticity has the expected sign as the results produces consistently positive import demand income elasticity for all the major importing countries. However, the magnitudes of coefficient are different for the countries. For instance, in case of US and Japan, the size of coefficients of income elasticity is 3.8 and 4.8, while it is relatively low for the UK and India and high in magnitude for the Germany and Malaysia. We also observe that the income coefficient are elastic in all cases which imply that if the country income level increases by one percent, then the country import demand from trading partner will increase by more than one percent.

Moreover, the coefficient of real exchange rate in all import regressions possesses negative sign, except for Malaysia. As for RER, we observe that the coefficient is not statistically significant, except for Japan and Indonesia. The coefficient of dummy in most cases produce expected positive sign which indicates that the process of trade liberalization has significant impact on imports of trading partners. Further, a variant dummy is also important in bilateral case. The initial era of trade liberalization is not much important in all cases. The second era of trade liberalization is influential in most cases. In case of China

only bilateral agreement is effective to increase import demand. Instead of liberalization dummy, the time trend is also significant in case of all selected developed countries as the result indicates a falling trend over the time. In case of developing countries time trend has not much significance therefore, excluded from the model, except in the case for the Malaysia.

Table 4  
Co-integration Results for Major Importing Countries of Pakistan

Country	Estimated Model					
<b>USA</b>	-34.35* (-3.51)	- 0.15T** (-2.56)	- 0.46RER (-1.12)	+ 3.98RGDP* -4.43	+ 0.45D03** -2.28	
<b>UK</b>	-24.55** (-2.75)	- 0.16T* (-4.69)	- 0.05RER (-0.17)	+ 2.95RGDP* -3.47	+ 0.21D92*** -1.95	+ 0.34D03** -2.61
<b>Japan</b>	-41.88* (-3.57)	- 0.15T* (-7.32)	- 0.57RER** (-0.75)	+ 4.45RGDP* -6.15	+ 0.33D03** -3.21	
<b>Germany</b>	-47.37* (-5.41)	-0.22T* (-7.32)	- 0.17RER (-0.75)	+ 5.09RGDP* -6.15	+ 0.51D03* -3.21	
<b>China</b>	-24.34* (-9.84)	- 0.09RER (-0.74)	+2.69RGDP* -12.04	+0.52D07* -4.52		
<b>India</b>	-6.44* (-6.98)	- 0.09RER (-0.53)	+ 1.54RGDP* -18.8	+ 0.26 D03** -2.75		
<b>Indonesia</b>	-26.40* (-21.05)	- 0.38RER* (-5.33)	+2.56RGDP* -27.96	+0.32 D92* -3.72		
<b>Malaysia</b>	-74.88** (-2.73)	- 0.39T* (-3.84)	+ 0.42RER -0.94	+ 7.72RGDP* -2.99	+ 0.98D03* -3.08	

Note: The, \*, \*\* and \*\*\* represents 1%, 5% and 10% level of significance, respectively. The bracket values are t-test values against the respective parameter estimates.

### Short Run Parameter Estimates of Bilateral Import Demand

Short run parameter estimates for selected importing partners are shown in table-5. The results reveal that most of parameter estimates in entire cases exhibit expected signs, such as income elasticity and price elasticity carry positive and negative signs respectively. The elasticity of income is relatively large than the price elasticity, suggesting that domestic income can significantly affect Pakistan import demand bilaterally. The other variables, namely time trend and dummy for trade liberalization also exhibit significance but the import demand is not elastic with these variables.

The coefficient of adjustment parameters or the error correction term in the import demand function carry expected signs and are also statistically significant in all selected import demand function. The speed of adjustment is high in the case of USA, UK, Japan and Germany where the values of ECT are 0.76, 0.72, 0.84 and 0.74 respectively. This implies that more than 70 percent of the deviation from the long run equilibrium level can be adjusted annually. However, in case of developing countries mostly the speed of adjustment is modest as the value of ECT is equal or less than 0.70. Only in case of Indonesia this value is 1.41, implies that there is over correction from the long run equilibrium, but not an actually unstable one. Table-5 also reflects the diagnostic test results of estimated import demand. The results reveal that the selected models are correctly specified and free from data problem like heteroscedasticity and serial correlation. From the diagnostic

tests, none of the test statistics show significance.

Table 5  
Results of Short Run Parameters Estimates and Error Correction Term

Variable	USA	UK	Japan	Germany	China	India	Indonesia	Malaysia
D(RM(-1))							0.257** -2.190	
D(RM(-2))							0.233** -2.790	
D(RER)	-0.350 (-1.19)	-0.034 (-0.17)	-0.479** (-2.36)	-0.139 -0.790	-0.970* (-4.96)*	-0.060 (-0.59)	-0.542* (-6.28)*	0.225 -0.770
D(RGDP)	3.05* (2.95)	2.116** (2.50)	3.739* (3.32)	3.793* -3.930	4.750* -5.010	1.070** -2.650	4.200** -2.620	-1.210 (-0.54)
D(RGDP(-1))								-4.560** (-2.84)
D(RGDP(-2))					5.150* -4.080			-4.260 (-1.72)
D(RGDP(-3))							6.273* -4.180	
D92		0.15 (1.78)					0.451* -3.950	
D03	0.342 -1.890	0.245** (2.05)	0.281** (2.55)	0.384* -2.950		0.184* -2.920		0.53** -2.300
D07					0.360** -2.710			
Trend	-0.113*** -1.97	-0.116** (-2.78)	0.44375	-0.163* (-3.81)				
ECT(-1)	-0.764* (-2.86)	-0.717* (-4.765)	-0.841* (-4.45)	-0.745* (-5.11)	-0.690 (-4.45)	-0.701** (-2.67)	-1.411* (-10.57)	-0.535* (-2.85)
<b>Diagnostic Test</b>								
<b>R-square</b>	0.669	0.890	0.788	0.795	0.988	0.985	0.980	0.863
<b>Adj. R2</b>	0.610	0.866	0.751	0.758	0.984	0.983	0.970	0.816
<b>D.W.</b>	2.120	1.980	1.910	2.300	1.950	2.010	2.460	2.150
<b>F-test</b>	11.32	36.61	20.93	21.68	251	449.4	99.8	18.24
<b>Normality</b>	1.500 [0.470]	0.210 [0.890]	1.100 [0.570]	0.940 [0.620]	1.120 [0.56]	0.130 [0.930]	0.350 [0.830]	1.870 [0.390]
<b>LM-test</b>	0.770 [0.470]	0.740 [0.480]	0.330 [0.720]	1.410 [0.240]	0.080 [0.92]	1.050 [0.360]	1.620 [0.210]	1.670 [0.210]
<b>ARCH-test</b>	0.320 [0.57]	0.120 [0.730]	1.700 [0.190]	0.002 [0.950]	0.780 [0.280]	2.690 [0.110]	0.650 [0.420]	1.300 [0.260]
<b>RESET-test</b>	0.02 [0.890]	0.490 [0.480]	2.120 [0.140]+	2.640 [0.110]	0.030 [0.840]	0.120 [0.720]	0.430 [0.510]	1.400 [0.240]
<b>SIC</b>	-0.0171	-0.929	-0.451	-0.754		-1.637	-0.128	-0.134

Note: The \* and \*\* represents 1 percent and 5 percent level of significance. Bracket values are t-test values. The Chi-square values of the test statistics in square bracket, + Number of fitted term is 2.

Table-6 compare the import price and income elasticity of this study with those of previous studies of aggregate import and disaggregate import demand of Pakistan. This study is relevant to the import demand in the case of Pakistan. Therefore, the cross countries results are not included in the table. The estimated elasticities of import demand

functions are consistent with the price elasticity of existing literature and conflicting with the income elasticity of aggregate models. Instead, the results are looking consistent in bilateral case for the same nature of countries. The difference in income elasticity may correspond to the bias of aggregation in aggregate import demand. Already we have stated that the parameters estimates of bilateral trade equations have the advantage of giving supplementary level of details which can also be relevant in analyzing policy questions.

Table 6  
Price and Income Elasticity of Pakistan's Import Demand in Previous Research

Previous Study	Import Function		
	Type	Price Elasticity	Income Elasticity
Aftab (2002)	Aggregate	(-.69), (0.87)	(0.79), (0.91)
Afzal (2007)	Aggregate	(-0.03), (- 0.04)	(1.01), (1.08)
Zakaria (2014)	Aggregate	(-0.58), (1.11)	(0.26), (0.39)
Haider et al. (2011)	Bilateral	(0.40), (0.30),(0.40),(-0.07)	(0.16), (5.60), (1.00), (2.30)
S. Khan et al. (2014)	Aggregate	(-0.68), (-0.71)	(1.72), (1.97)

Source: Author's compilation from given references

Note: The last two-column shows price and income elasticity estimates of reference studies in column-1.

## Conclusion

This research study has estimated import demand function using bilateral import data between Pakistan and its major eight trading partners. The trading partners are selected from both the developed and developing countries excluding oil exporting countries. All bilateral imports demand function are estimated using autoregressive distribute lag model with a new strategy adopted in part of model selection based on annual data for the period of 1982 to 2016.

This study is novel in nature and contributes to the extent literature in two different ways. First, the import demand elasticities are obtained by estimating Pakistan's bilateral import demand for both the major developed and developing trade partners by considering the effects of high trade liberalization and trade agreements. Second major contribution is the adaptation of new strategy in model selection as employing the framework of autoregressive distributed lag methodology. More precisely, the selected model is optimal because it is from the set of those estimated models that satisfy the condition of co-integration and diagnostic check as well.

The empirical results reported in this article allow us to illustrate various conclusions. In the very first stage, the application of autoregressive distribute lag method support the long run relationship between Pakistan and each of its major importing partners from the selected countries. Second, in the measurement of trade elasticity, the price effect is according to the expected sign i.e. negative, except Malaysia. The price elasticity is found insignificant in most cases, except in the case for Japan and Indonesia where it is significant but inelastic. Third, the domestic income is statistically significant determinant both in short and long run with expected positive sign. Its effects are highly elastic indicating that as the economy grows, Pakistan, imports from trading partners also surge with greater velocity. Fourth, as we are interested in trade liberalization effects in bilateral import de-

mand. We have examined the effects of variant liberalization stages in all bilateral case and found significant changes as a result of high liberalization policy. However, these effects vary from country to country level. The result for first era of trade liberalization is significant only in two countries (UK and Indonesia), while the second era of trade liberalization yield significant impact on larger numbers of countries. The bilateral agreements exhibit insignificant impact, except for the China. The impact of high trade liberalization is rather small but highly significant and positive in many country cases. Thus, the implication of these results is that a single trade policy to improve the external trade balance will not prove effective for Pakistan policy makers. Instead of the uniform trade policy, the bilateral policy can be designed to influence the country's import demand in the desired way.

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