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Intermediate Import Demand Under Liberalized FTA Regime With China : A Case Study For Pakistan

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	Abstract
<p>Choudhry Sohail Ahmed Senior Lecturer, Institute of Business Management (IoBM) sohail.ahmed@iobm.edu.pk</p> <p>Aamir Hussain Siddiqui* Assistant Professor / Research Economist, Applied Economics Research Centre University of Karachi, Karachi 75270, Pakistan aamir.siddiqui@aecr.edu.pk</p>	<p>With the emerging trend of globalization in the world, Pakistan also took the advantage and entered in signing trade agreements with neighbouring countries. These agreements used to strengthen the economic welfare and gain from trade. This study attempts to evaluate the impact of Pak-China Free Trade Agreement (FTA) on import demand at dis-aggregated level of intermediate goods using time series data from 1990 to 2023. For analyzing this impact of FTA on import demand, we developed two models, one model with only FTA dummy and the other model with an interaction dummy of FTA with relative import price. In this study we employed the ARDL bound testing approach developed by Pesaran (2001) and found cointegration relationship among the variables. Long run result findings show that all the variables including FTA dummy influencing import demand more significantly and positively in first model, whereas in second import demand is highly elastic with respect to GDP, but less elastic with relative import price. The positive result for relative import price is different, which may be in this case of sectoral import demand of intermediate goods. It empathizes the needs of intermediate goods as a necessary goods to meet the production requirements irrespective of import prices. Whereas foreign exchange reserves only significant with FTA dummy model but insignificant in the interaction dummy (FTA with relative price) model. Long run result indicates that FTA has favorable effect on imports when economy adjust fully. In short run, we found FTA impact is insignificant in the current period but significant in the lagged period.in both the models. The value of real GDP is highly elastic in the long run which means that as GDP grows, the import demand for intermediate goods will also grow in Pakistan. Because the intermediate goods comprises of industrial inputs used in production. As policy recommendation, Pakistan should produce those goods that will increase exports rather than in domestic consumer goods, otherwise there will be a high trade deficit in the economy.</p>
Keywords:	bilateral trade, China, FTA, Cointegration, Disaggregate import demand JEL Classification : F14; F15; C22

Introduction

1. INTRODUCTION

International trade is well known as the primary engine for the economy with growth and development. The early theories in international trade presented by Adam Smith, 1776 and David Ricardo, 1817 argue that the nations can get gain from trade by specialization and exchange of goods. But with the formation of GATT in 1948 and its transformation into WTO in 1995, the world has been moving towards a global change of free trade regime. Free trade regime is a part of liberalization which focus on trade reforms like removal or elimination of tariff, quotas on imports, and subsidies. It may also take place in terms of free accession in the market as by decreasing monopoly and oligopoly power, and by creating free trade zones among nations. In recent past decades, the importance of free trade agreements is reflatd either through bilateral agreement or through multilateral or regional agreements in the form of tariff reduction or elimination import duty on trade volume between countries. The assessment of the impact or implication of FTAs on import and export demand helps the policymakers to design trade policies in a better manner.

It has been observed that imports tend to respond more rapidly than the exports in response to trade liberalization, which usually leading to short-run imbalances in the current account. Therefore, due to this argument, the analysis of import demand functions has remained an active area for research. This reflects policymakers' concerns about addressing the issue of trade deficits, and managing the exchange rate volatility, by designing effective trade policies (Ahmed, 2011; Ali and Chani, 2013).

There are a number of studies which investigated the impact or influence of trade liberalized regime on import performance through import demand elasticities with respect to income and import price. This theoretical relationship has been examined by (Melo & Vogt 1984 ; Mwega , F.M 1993 ; Omlo, S.W 1999 ; Santos-Paulino and Thirlwall 2004 ; Goldstein and Khan 1985 ; Sarmad K 1989) . As a standard model import is estimated by using income (GDP) and relative import prices (see for example, Bahmani-Oskooee (1986), Bahmani-Oskooee and Niroomand (1998), Senhadji, (1998), Sinha (1999, 2001), among others). However, some studies included, real exchange rate and foreign exchange redserves availability as an explanatory variable in order to reflect a binding foreign exchange constraint [see for example, Emran and Shilpi (2001), Mazeri (1995), Moran (1989)].

Pakistan is a developing country and is one of the fast growing economies of Asian region for some past years. Pakistan is not an exception case in terms of international tendency to make FTAs with different countries. During the last two decades, Pakistan has materialized various trade agreement with many Asian countries including China which is most growing economy in the world. Pakistan by birth has very close and brotherhood relationship with China.

The economic ties between China and Pakistan strengthened through the Pakistan-China Free Trade Agreement. In November 2006, the Govt. of Pakistan and China signed a Free Trade Agreement which came into effect in July 2007. Both countries agreed to promote greater openness in various sectors through liberalized trade regimes. The aim of the agreement was to enhance bilateral trade through gradually eliminating tariffs and other trade barriers between the two countries. As China has become Pakistan's one of the largest trading partners, particularly in the import of machinery, industrial supplies, and intermediate goods that are essential for domestic production and manufacturing activities (Government of Pakistan, 2020). Therefore, it becomes important to investigate whether the reduction of tariffs and other trade barriers under the Pak-China FTA agreement has affected Pakistan's import demand at aggregate and at sectoral level.

Import demand functions are usually modeled by taking income and prices of imports to domestic prices.. Reinhart (1995) analyzed import and export equations for several countries and found that imports, income, and ratio of import to domestic prices often exhibit cointegration and may exhibit long-run relationships through cointegration. Similarly, Senhadji (1998) examined import demand functions for various countries and identified income and relative price variables as key determinants of import behavior (Reinhart, 1995; Senhadji, 1998). Other studies emphasize that trade liberalization can facilitate access to imported goods. The intermediate goods used as inputs which may improve productivity and industrial competitiveness. Therefore it is important to analyzed impact of FTA on import demand of intermediate goods. For example, Goldberg et al. (2010) found that imported intermediate inputs significantly contribute to productivity growth and technological upgrading in developing economies.

The rest of the research study analysis comprises of these sections : Section 2 for literature review for study on import demand of intermediate goods. Section 3 describes methodology and theoritical framework and model specification. Section 4 presents the empirical findings with results outcomes. Section5 is for final conclusion and policy recommendation.

2. LITERATURE REVIEW

Xueting Sun et al. (2023) examine how the agreement CAFTA (CHINA-ASEAN FTA) affects trade in intermediate versus final goods by employing gravity model with a policy dummy variable. The study finds that CAFTA significantly boosts trade volume in both, intermediate and final goods, but the effect is stronger for intermediate goods. The findings suggest policymakers should facilitate intermediate goods trade through improved logistics, customs procedures, and rules of origin to maximize FTA benefits, while noting the study's limitations in advanced econometric techniques and broader comparative analysis.

Kathuria and Kumar (2021) investigated determinants of import demand in India. They employed both linear and non-linear ARDL approaches on disaggregated import demand framework. using annual data from 1995 to 2017. The study analyzed the effects of gross capital formation, final consumption expenditure, exports, and relative prices on import demand. The results of the linear ARDL model confirmed a long-run cointegrating relationship among the variables, with gross capital formation, exports, and relative prices exerting significant positive effects on imports,

while final consumption expenditure was significant only in the long run. The study concluded that import demand responds asymmetrically to price movements, highlighting the importance of incorporating non-linear dynamics in import demand analysis and suggesting that policymakers should consider these asymmetric effects when designing trade and exchange-rate policies.

Nomfundo Portia Vacu (2019) studied the determinants of import demand in Ghana. They employed ARDL bounds testing approach to estimate short and long run elasticities of import demand. They used aggregate expenditure components and use relative import price variable with foreign reserves as explanatory variables. A dummy variable for trade liberalization in each import demand category is used. The study concludes that import demand determinants differ significantly across import types, highlighting the importance of dis-aggregated analysis for more effective and targeted trade policy formulation. The empirical findings for intermediate import demand suggest that the two main spending of government, and of investment have positive relationship in the short and long-run with import demand of intermediate goods. Whereas, only in the long-run, the determinant of foreign reserves with consumption expenditures are positive determinants.

Fukumoto (2012) developed empirical model for capital, intermediate, and consumer goods import demand in China. They estimated long run and short run elasticities of import demand by employing ARDL Bound testing approach using annual time series data of 1988-2005. A dummy variable is also included in the model to access the China's WTO accession in 2001. Empirical finding shows cointegrating relationship of the import of capital goods with GDP and investment, and the imports of intermediate goods with exports. Findings indicate that intermediate goods and capital goods' elasticities are inelastic for long-run results. Whereas, in case of consumer goods import demand, it is elastic in the long run.

Tellaech and Mexico (2019) estimated intermediate goods import demand in Mexico. The study is the motivation due to Mexico's increasing integration into global markets and its continuous reliance on imported intermediate and capital goods, particularly after trade liberalization. The study conducted using monthly data for the period from 2000 to 2019. The technique of VECM is employed to ascertain long run equilibrium, and short-term fluctuations by estimating import demand elasticities. The determinants such as income, import prices, and domestic prices exhibit a stable long-run relationship. Result findings show that real income is the most important determinant with positively significant elasticity. The price variables show different results, low elasticity for import prices which show less sensitiveness, whereas, the domestic prices show comparatively stronger impact, indicating the substitution effects between domestic and foreign goods in Mexico.

Sofajan (2017) conducted study to know how policy of trade liberalization through tariff and quota reduction influencing trade volume in Indonesia. He employed Johanson cointegration technique using quarterly data for the period from 1986 to 2014. A dummy variable and interaction dummy variable was used to evaluate trade liberalization impact on import demand. Results show that the coefficient of relative price of imports is inelastic and is statistically significant. This means that price influences imports demand weakly. On the other hand, world and domestic income estimates from models show up significant and positive impact on import demand. For liberalization trade impact through export taxes and import duties shows significant impact on import volume. Further results show that, there is inelastic, negative impact of import duties on imports in the long-run, but it is very influential in the short-run which means that trade liberalization policies have positive impact on import demand.

Gaalya et al. (2017) examined how trade openness effect import demand in East African Countries. They estimated import demand function for intermediate, capital and consumer goods, as well as for aggregate level import demand for the time period from 1994 to 2012. They applied technique of Fully Modified Ordinarily Least Square and Dynamic Least Square estimation for panel data to estimate import elasticities. To capture the effect of trade openness, they employed the average tariff rate and ratio of trade to GDP measure in the model. The empirical results from panel cointegration found that, higher tariff rates reduce import demand of both aggregate/disaggregate levels, whereas, increase in income, prices, and exports leads to higher import demand. The coefficient of average tariff rate used as a measure for trade openness is negative and statistically significant. Their values are inelastic, which means there is a smaller influence of reducing tariff rates on imports of EAC countries.

Malik et al (2018) conduct study to examine the determinants of Pakistan's import demand at disaggregated level across key sectors—consumer, capital, and intermediate goods. They focused on 26 major commodities at 3-digit SITC classification. The GMM (instrumental variable) technique was employed for the period from 1982 to 2010. They identify explanatory variables like relative import price, GDP and exchange rate as the more prominent factors for 26 selected categories in consumption and production. The results also reveal that income elasticity is highest for capital and intermediate goods, reflecting Pakistan's dependence on imported machinery, technology, and raw materials for industrial growth, while price elasticity is relatively low, indicating limited substitution possibilities in the short run. Furthermore, he identifies that macroeconomic instability, currency depreciation, and trade policy changes significantly influence Pakistan's import patterns, highlighting the vulnerability of its import structure to external shocks.

Toh et al (2009) investigated how free trade agreements effect bilateral trade flows in Singapore for the period 1980 to 2007 using gravity type model with cross country panel data. There are two main contributions to this study. First one is policy-relevant case study which provides understanding how specific bilateral FTAs have impact on trade in a highly trade-dependent economy which are deeply integrated into global value chains. The second one is by analyzing imports and exports separately and considering sectoral differences. Finally, the study findings give empirical evidence strongly for the supporting view that FTAs have diverse, context-specific effects rather than a uniform impact across all sectors, i.e FTAs generally enhance trade volumes, though the magnitude and direction of impact vary across trading partners and sectors.

3. METHODOLOGY

3.1 Theoretical Framework and the Model Specification

According to theory, the import demand estimation based on imperfect substitution model specifies that the real income Y , and relative import price are the main determinant. So the standard form is as follows:

$$M_t = f(PM_t / PD_t, Y_t) = \alpha_0 + \alpha_1 RIMP_t + \alpha_2 Y_t + u_t \quad \text{----- (1)}$$

Where M_t is the import demand ; PM_t and PD_t are the import and domestic price respectively. $RIMP$ is the relative import price = ratio of PM_t / PD_t , and Y is the real GDP.

Following [Carone (1996) / Bahmani Oskooee and Niroomand (1998) / Santos-Paulino and Thirlwall (2004) and Santose--Paulino (2005) ; Narayan and Narayan (2010)] the model can be modified by adding another important explanatory variable foreign exchange reserves in log linear form as follows:

$$LMINT = \alpha_0 + \alpha_1 LRIMP_t + \alpha_2 LGDP_t + \alpha_3 LFRES_t + u_t \quad \text{----- (2)}$$

Now, as the basic purpose of this study is to analyze the impact of FTA on import of intermediate goods from China under FTA agreement. Therefore, this dummy FTA which works as an exogenous variable is added to evaluate its impact on intermediate imports demand between these two countries. This variable assumes dichotomous values, 0 and 1.

The import demand literature signifies the importance of dummy FTA as it not only impact directly on import demand but its impact can indirectly be observed through the interaction dummy with price and income (Hoque et.al 2010). The theoretical reasoning for these dummies is that it can change the sensitivity of import demand to change in import price and real income. Following Ho and Wong, (2003) who used two interaction dummies to evaluate their impact both in short run and in long run for policy implication. In this research study, we developed two model equation to analyze this FTA impact on intermediate goods imported as follows:

$$LMINT = \alpha_0 + \alpha_1 LRIMP + \alpha_2 LGDP + \alpha_3 LFRES + \alpha_4 FTA + \mu_1 \text{-----(3)}$$

$$LMINT = \alpha_0 + \alpha_1 LRIMP + \alpha_2 LGDP + \alpha_3 LFRES + \alpha_4 (FTA * RIMP) + \mu_2 \text{-----(4)}$$

where the coefficients $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ are the respective long-run elasticities of import demand for intermediate goods for each explanatory variable in the model. The expected signs of the variables are, $\alpha_1 < 0$, $\alpha_2 > 0$, $\alpha_3 >$ or < 0 , $\alpha_4 >$ or < 0 . These two model will be empirically tested separately for the time period 1990 to 2023, by employing cointegration based on ARDL Bound Test developed by Pesaran et.al (2001). All the variables are measured by taking 2015=100 base year. The description of study variables and their sources are presented in next section.

3.2 Data

Data used for analysis of impact of FTA on intermediate import demand between Pakistan and China covering the period 1990– 2023 were collected from various secondary sources. Import data is collected from WITS and UNCOMTRADE using BEC classification concordance with HS codes. The value of intermediate goods at BEC classification collected at 3 digit level (SITC) Revision 2 for the period of 1990 to 2023. Data for real gross domestic product, import value index, real foreign reserves , GDP deflator, CPI were collected from WDI, World Bank, various publications of State Bank of Pakistan, Pakistan Statistical Bureau, and Ministry of Finance. For analysis, all the real variables are measured in 2015=100 base year. For analyzing the impact of FTA on import demand, a dummy variable FTA assuming the value “0” for the period 1995 to 2006 and ‘1’ for the period 2007 to 2023.

3.3 - Estimation Technique

3.3.1 - Unit Root Test

As a first step, it is necessary to test the stationarity of all series at level or at first difference. For this, unit root test was carried out to determine the order of integration at level or at first difference. It helps to avoid and reduce the possibility of getting spurious results from OLS estimation. Further, we have chosen the orders of the lags in the ARDL model using Akaike’s information criterion (AIC) for the optimal number of lags, which has given robust outcome unit roots are tested.

Among all the unit root test, DF- GLS (Dicky-Fuller Generalized Least Square) test is considered to be more powerful and efficient than other conventional test. Therefore we employed DF-GLS test for determining unit root and order of integration .The results of DF-GLS are presented in Table 1.

3.3.2 The ARDL Bound Testing Approach

The ARDL Bound test by [(Pesaran et al.(2001)] is applicable and more suitable for our case study. This approach is appropriate due to many reasons. It is applicable to small sample size as for annual data. It also applicable when series are of mixed order. Therefore we employed this framework and investigated short run and long run coefficients which represents the elasticities of imports. Following Pesaran et.al (2001), the UECM version of the ARDL model for import demand model equation 3, can be expressed as follows:

$$D(LMINT)_{t=\alpha_0} + \sum_{i=1}^{n1} \alpha_{1i} D(LMINT)_{t-1} + \sum_{k=0}^{n2} \alpha_2 D(LRIMP)_{t-1} + \sum_{i=0}^{n3} \alpha_3 D(LGDP)_{t-i}$$

$$+ \sum_{i=0}^{n4} \alpha_4 D(LFRES)_{t-1} + \alpha_5 (LMINT)_{t-1} + \alpha_6 (LRIMP)_{t-1} + \alpha_7 (LGDP)_{t-1} + \alpha_8 (LFRES)_{t-1} + \alpha_9 (FTA)_t + \varepsilon_t$$

where D for first difference, and L for Logarithm, i = number of lags, ε_t = white noise error term, α_0 is the constant, α_5 -- α_8 , are, long-run coefficient from ARDL model, and α_2 -- α_4 are short-run coefficients.

$$D(LMINT)_{t=\alpha_0} + \sum_{i=1}^{n1} \alpha_{1i} D(LMINT)_{t-1} + \sum_{k=0}^{n2} \alpha_2 D(LRIMP)_{t-1} + \sum_{i=0}^{n3} \alpha_3 D(LGDP)_{t-i}$$

$$+ \sum_{i=0}^{n4} \alpha_4 D(LFRES)_{t-1} + \alpha_5 (LMINT) + \alpha_6 (LRIMP) + \alpha_7 (LGDP) + \alpha_8 (LFRES) + \alpha_9 (FTA * RIMP)_t + \varepsilon_t$$

If the results of the ARDL Bound test prove that the variables are co-integrated, then it is the confirmation of stable long-run relationship exist between the variables. Now we can proceed our study further to estimate the short run dynamic by applying the following error correction model.

$$D(LMINT)_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_{1i} D(LMINT)_{t-1} + \sum_{k=0}^{n2} \alpha_2 D(LRIMP)_{t-1} + \sum_{i=0}^{n3} \alpha_3 D(LGDP)_{t-i}$$

$$+ \sum_{i=0}^{n4} \alpha_4 D(LFRES)_{t-1} + \delta_1 (ECM)_{t-1} + u_t$$

Where ECM is the error correction term and δ_1 is the coefficient of error correction term.. This coefficient δ_1 is very important because it shows the speed of adjustment toward the long-run equilibrium if the economy bears an economic shock. This coefficient should be significant with negative sign.

A first step for the ARDL estimation is to find general ARDL equation of the UECM version with appropriate decided lags. Then from this equation, we need to run ARDL Bound Test to determine the existence of a long-run cointegrating relationship among the variable. With the estimated F-statistic value, we check the null hypothesis whether all the long run coefficients are jointly equals to zero at significance levels (1% or 5% or 10%) or not. The estimated F-statistic compare with lower and upper bound critical values. If it is greater than upper bound, then we reject null hypothesis and conclude that all the variables of the model are cointegrated. If F-statistic is less than lower bound, then we accept the null hypothesis and conclude that variables are not cointegrated.

In this study we also conducted diagnostic test for the correct specification of model under study.

The following test with null hypothesis are as follows:

- (i) Serial correlation(Breusch- Godfrey) ---> H0:No serial correlation exists
- (ii) Heteroskedasticit(Breusch-Pagan-GodfeLM) ---> H0:The residual are homoskedastic.
- (iii) Normality(Jarque-Bera) ----> H0:The residuals are normally distributed.
- (iv) Ramsey RESET -----> H0:The model is correctly specified.
- (v) CUSUM -----> H0:Coefficients are stable over the period.
- (vi) CUSUMSQ -----> H0:Recursive residual variance are satble.

4. - Empirical Finding and Results

4.1- Unit Root Test

The DF-GLS unit root test result are shown in Table 1. The DF-GLS results show mixed order of integration . Therefore, on the basis of this result, we will employ ARDL Bound test in the next section.

Table -1 DF-GLS Test Result

Variable	Level		First Differnce		Integrartion
	Intcpt (pvalue)	Trend and Intcpt (pvalue)	Incpt (pvalue)	Trend and Intercept (pvalue)	
LMINT	-0.462199 (0.6478)	-2.175197** (0.0389)	NA	NA	I (0)
LGDP	-0.297192 (0.7687)	-3.408643** (0.0021)	NA	NA	I (0)
LRIMP	1.045645 (0.3036)	-1.565538 (0.1273)	-2.727786** (0.0126)	-3.354820** (0.0030)	I (1)
LFRES	-1.004735 (0.3226)	-2.127245 ** (0.0412)	NA	NA	I(0)

** significance at 5%.. Estimated from Eview12

4.2 Cointegration for Model Equation 3

Model equation no. 3, developed o analyze FTA’s impact on import demand of intermediate goods. Empirical results in Table-2A show the calculated value of F-Statistic(9.34), greater than from both lower I(0) and upper I(1) bound value at 5% level of significance. As the F-value is greater than I(1) value, so we reject the null hypothesis “H0: no level relationship “ is rejected and conclude that cointegration exists. It means that there is long-run relationship among the dependent intermediate imports with the explanatory variables as, relative import price, real GDP and foreign reserves in the long run keeping other things constant.

Table 2 A: Bound Test Result

Test Stat	Value	Signif	I(0)	I(1)
F -Statistic	9.34007	10%	2.45	3.52
k	4	5%	2.85	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Estimated from Eview12

The economic interpretation can be stated as, in Pakistan intermediate goods imports are systematically linked to explanatory variables as defined in the model, such as real income, import prices, and on foreign reserves as well as on the trade policy changes. Further more, the market forces works in the economy to bring imports back towards their long run trajectory. The deviation in from equilibrium position in the short run is considered as temporary which happen due to any short-run economic shock.

4.3 ARDL Long-run Estimates for Model Equation 3

After the confirmation of long run relationship from previous result, the long-run estimate using ARDL approach are estimated. Table-A3 presents long-run estimates. It is evident that GDP, relative price ratio, foreign reserves , FTA dummy exerts a prominent effect on intermediate imports in Pakistan from China during specified period of 1990 to 2023.

Table 3 : Estimated Level Equation Cointegrated Coefficients

Regressr	Coeff	Std. Err	T-Stat	Prb
LGDP	4.371986	0.383060	11.41331	0.0000
LRIMP	1.235132	0.157287	7.852716	0.0000
LFRES	0.167919	0.075893	2.212575	0.0376
FTA	0.375157	0.135535	2.767977	0.0112

Estimated from Eview12

Log run coefficient represents the elasticities of all explanatory variables with respect to import demand. The values of elasticities are positive but significant. Like GDP coefficient which is 4.3719 is highly elastic. This means a 1 % change or increase in real income will cause 4.37% change or increase in imports as a long-run behavior, keeping other factors constant So the GDP plays an important role for import demand in the long run. It means that in case of Pakistan, as there is a higher economic growth , that will definitely cause an up rise in this sector of import demand (intermediate goods) in the long run.

Result for relative import price shows positive coefficient which is against the expected sign. This shows even though relative prices rises, import of intermedaite goods also rises. Why this happen in this case? One reason might be demand for intermediate inputs has more importance by the firms, irrespective of prices. Some other reasons may be that if the country imports the necessities goods like petroleum , machinery and industrial inputs (these are parts of intermediate import demand) or if the domestic alternative are unavailable, so that import demand still rises. This positive sign result coherent with the result obtained by Khyati. K, et.al (2021) . The of coefficient import relative price ratio is 1.23 which means that a 1% increase in relative import price ratio will cause an increase by 1.23% in long-run keeping other thing constant.

For foreign reserves long run elasticity is positive and significant but it is inelastic (0.167). this shows that a1% increase in foreign reserves will cause 0.16 % increase in import demand in the long run, ceteris paribus. This means increase in foreign reserves increases imports less than proportionately. The impact of FTA is positive and significant with a value of 0.375, which means the bilateral free trade agreement with China revealed a positive impact in the long run.This can be interpreted as that in the presence of FTA or by the implementation of FTA intermediate goods' import increases with China. This increase is 0.37 times and significant. This value is lower than 1, so we can say that Pakistan is not getting much more benefit due to FTA as it should be. If this value is greater than 1, then we can say that FTA impact is strong and significant in the long run.

4.4 ARDL Error Correction Model for Model Equation 3

On the basis on cointegration, we can further proceed for ECM model. In Table 4 presents ECM results for the chosen ARDL Model for imported goods in Pakistan.

ECM Regression

Table 4 Case 3: Unrestricted Constant and no Trend

Regressor	Coefficient	Standard Error	T-Ratio	Prob
C	-18.95846	2.572971	-7.368315	0.0000
D(LRIMP)	0.483058	0.121323	3.981583	0.0006
D(LFRES)	0.219337	0.046244	4.743047	0.0001
D(FTA)	0.134749	0.105934	1.272013	0.2167
D(FTA(-1))	-0.504684	0.110024	-4.587054	0.0001
CointEq(-1)*	-0.783904	0.105473	-7.432242	0.0000
R ² Square 0.797149 Adjusted R ² 0.758139 DW-statistic 1.855337				

Estimated from Eview12

Table 4 exhibit short run dynamics results for intermediate import demand form China under FTA regime. The ECM (-1) term's coefficient shown negative and significant value as it is desirable for error correction term. This is one of the most important finding for further analysis. This shows the existence of long-run cointegrating relationship among the variables. The value of coefficient shows the speed of adjustment from short run to long run equilibrium. In other words system converges back to its equilibrium after the shock. The value of -0.7839 means that about 78.39 % of the disequilibrium make correction by each current period of time, or we can say that about 78% of the disequilibrium returns to equilibrium in within 9 (78% of a year) month time of a year.

From Table 4 above, short-run results for relative import price (0.4830) having positive sign, which is against the expected sign. This result is matched by the study of Khyati. K, et.al (2021) results. It means that the needs for the imported intermediate inputs still remain even when the price increases. Furthermore, it is inelastic and significant, which means that changes in import demand responds to less than proportionately to the changes in relative import prices. In other words a 1% increase in the relative import price brings about 0.483 % rise of imports in intermediate goods.

The coefficient of foreign reserves (0.2193) showing positive and significant impact on import demand. As this value is inelastic, so it means that a 1% increase in foreign reserves, holding other factors constant leads to the 0.21% increase. Although foreign reserve are the primary needs to finance imports by the government. But the government may hold these reserves for other purposes, like to pay foreign debt or to stable exchange rate in the economy.

The results for FTA are important to interpret because the objective of the is to analyze the impact of FTA on intermediate imports. The coefficient of D(FTA) and D(FTA(-1)) represents the current period and one period lagged change in FTA respectively. Their interpretation should distinguish between immediate effect and lagged effect of the FTA. The positive coefficient of D(FTA) indicates that the implementation of the FTA is associated with a positive contemporaneous (current period) effect. However, this effect is insignificant which means that there is insufficient evidence to conclude that FTA has an immediate effect on intermediate import demand in Pakistan from China. The coefficient of FTA is 0.1347, which shows that a 1% increase in FTA boost the import demand by less than 1%, i.e, a rise of 1% change causes 0.134% rise in imports of intermediate goods.

Whereas inc case of D(FTA(-1)), the lagged effect of FTA having negative sign but significant coefficient which means that after one period of time, FTA is associated with the reduction in import demand of intermediate goods. The value of this coefficient is - 0.5046 , which means a 1% rise in lagged FTA will reduce the import of intermediate goods. This result may arise if the firms initially increase imports when the FTA implemented as it reduce trade barriers. After that, when the firms have built inventories, or take the advantage of new market access may decrease import demand. In other words, imports may decline in the following time period as firms work through accumulated inventories and import demand returns to normal levels.

4.5 Estimation Result for Model Equation 4 (FTA with Interaction Dummy) :

The model equation 4 is developed to examine the impact of interaction dummy of FTA with relative import price. This model provide insights that in the presence of FTA , i.e, how the changes in import prices effect imports in presence of FTA form China. The following are the steps for ARDL bound test approach.

4.5.1 Cointegration for Model Equation 4 (FTA with Interaction Dummy) :

For determining,whether there exist long-run relationship in Equation No. 4, the ARDL bound test results are presented in Table 5A (Appendix). The resulted value of F-Statistic 8.72 indicate it is higher than from the lower I(0) as well as from the upper I(1) bound value at 5% level of significance. This make conclusion for having the presence of cointegration and existence of long-run relationship among the variables.

Table 5 A: Bound Test Result

Test Stat	Value	Signif	I(0)	I(1)
F -Statistic	8.72909	10%	2.45	3.52
k	4	5%	2.85	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Estimated from Eview12

4.5.2 ARDL Long run Estimates for Model Equation 4

By applying coefficient diagnostic test for finding long-run coefficients using ARDL approach., the following Table 6 describes the output of result findings as follows:

Table 6 Estimated Level Equation Cointegrated Coefficients

Regress	Coeffi	Std-Err	T-Ratio	Prb
LGDP	4.716106	0.348865	13.51844	0.0000
LRIMP	1.252406	0.182510	6.862135	0.0000
LFRES	0.125470	0.087399	1.435599	0.1652
FTARIMP	0.188726	0.097482	1.936006	0.0658

Estimated from Eview12

Long run elasticities values are highly elastic for GDP as well as for relative import price. These coefficients representing long run elasticities. They are positive as well as significant except for foreign exchange reserves. Again, the same result for GDP are obtained. GDP strongly influences import demand for intermediate goods. This coefficient of income elasticity is 4.7161, which means that a 1% change in GDP will cause a 4.7 % change in intermediate import demand. Its significance at 5%, make more stronger this argument that GDP is one of the import determinants. This positive sign result is matched with the study conducted by Khyati. K, et.al (2021) results for disaggregated import demand function in India. The positive sign of the LRIMP may be because of the fact the Pakistan's intermediate import items consist of the items she needs as a matter of necessity. In other words, the reason for positive relative import price means that the firms may imports intermediate inputs (machinery and equipment etc.) even there is high import price because of prime need for these goods. As well as we can say that the import demand for intermediate goods becomes driven more by production requirements than by price consideration.

The long run elasticity for foreign exchange reserves is positively insignificant and is inelastic. Its value is 0.1254, which means 1% increase in foreign reserves will cause 0.12% increase in import demand. The result for interaction dummy is important to interpret. Its coefficient is positive and significant, which means in the existence of FTA, a 1% change in relative price will cause a 0.18% change in imports form China in Pakistan. The foreign reserves is considered as the crucial factor for the payment of import bill. But its inelastic and insignificant value lesser its role for import demand in Pakistan.

4.5.3 - Error Correction Model for Model Equation 4:

After analyzing the long run results, we now perform error correction model in ARDL approach. The results of short-run coefficients are presented in Table 7 below.

ECM Regression

Table 7 Case 3: Unrestricted Constant and no Trend

Regress	Coeff	Std Err	T-Ratio	Prb
C	-18.18092	2.553659	-7.119558	0.0000
D(LRIMP)	0.473189	0.129862	3.643770	0.0014
D(LFRES)	0.184710	0.046126	4.004457	0.0006
D(FTARIMP)	0.043894	0.063601	0.690147	0.4973
D(FTARIMP(-1))	-0.276282	0.061200	-4.514404	0.0002
CointEq(-1)*	-0.702830	0.097860	-7.181994	0.0000
R ² Square 0.789627 Adjusted R ² 0.749171 DW-statistic 1.98070				

Estimated from Eview12

The dynamics of short-run presented in Table 7 for import demand model equation 4. The interaction dummy variable impact exhibit the short run dynamics results for imports of intermediate goods form China under FTA regime. The ECM (-1) coefficient as required is negative as well as significant. This confirms the long-run adjustment from disequilibrium position. The speed of adjustment is about 70% from short run to long run equilibrium. This coefficient tells us that speed adjustment is about 70% means it takes about 7 months to return back to equilibrium position. The short run result for the coefficient of relative import price is 0.4730, which is similar as we found in case of import demand model equation 3 with FTA dummy. it is also positive, inelastic and significant, It has same interpretation as describe in that previous model 3 for FTA dummy case.the interaction dummy required interpretation.

As in this model we want to see the effect of interaction dummy FTA with relative price on import demand in the short run. The coefficient of the D(FTARIMP) is positive but insignificant. This mean that in the current period the FTA and relative price interaction has associated with a positive impact on import of intermediate goods from China, but its insignificance show that FTA does not immediately alter the responsiveness of imports to the changes in relative import prices. However for the coefficient of D(FTARIMP(-1)) the impact after one period of FTA implementation indicate FTA reduces the effect of relative import price on import on intermediate goods. In other words there is a weaker effect of this increase on imports of intermediate goods. This finding implies that importers require time to adjust to the new trade environment, after which higher relative import prices exert a relatively weaker influence on import demand.

The short run results for the foreign reserves (0.2193) is also positive and significant impact on import demand for intermediate goods in from China in Pakistan. As this value is inelastic, so it means that a 1% increase in foreign reserves, holding other factors constant leads to the 0.35% increase in import demand for intermediate goods. Although the foreign reserve are the primary needs to finance imports by the government. But the government may hold these reserves for other purposes, like to pay foreign debt or to stable exchange rate in the economy.

Diagnostic Test

For supporting the research findings, we conducted diagnostic tests. Table 8, shows the results for serial correlation and heteroskedasticity . For serial correlation, the value of F-statistic is statistically insignificant at 5% level of significance, therefore null hypothesis of no auto correlation is accepted. Similarly, for heteroskedasticity, the value of F-statistic 0.2619 which also insignificant, which means there is no heteroskedasticity problem in the model.

Table 8 : Serial Correlation and Heteroskedasticity Test:

Serial Correlation Breusch-Godfrey LM Test :			
F-Statistic	1.174102	Prob. F(2,20)	0.3295
Breusch-Pagan-Godfrey Heteroskedasticity Test			
F-Statistic	0.261967	Prob. F(9, 22)	0.9787
Obs*R-squared	3.097435	Prob.Chi-Square(9)	0.9603

Estimated from Eview12

Table 9 : Ramsey RESET Test Result

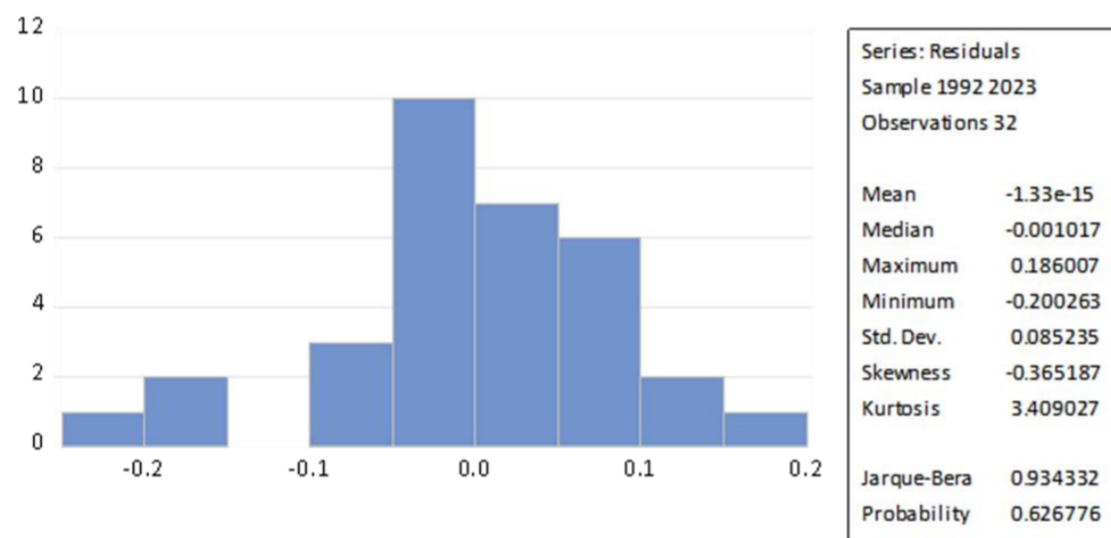
Value	df	Prob.
t-statistic	0.814873	21
F-statistic	0.664018	(1, 21)
Likelihood ratio	0.996170	1
F-test summary:	<u>Sum of Squares</u>	<u>df</u>
Test SSR	0.007263	1
Restricted SSR	0.236963	22
Unrestricted SSR	0.229700	21
LR test summary	<u>Value</u>	
Restricted LogL	33.08338	
Unrestricted LogL	33.58146	

Estimated from Eview12

The Ramsey RESET test used for correctly functional form and specification of the model is presented in Table 9. Results indicate that the F-value of (0.6640) is also not significant at 5% level of significance therefore we accept the null hypothesis of no specification error in the model.

Jaque-Bera Normality Test

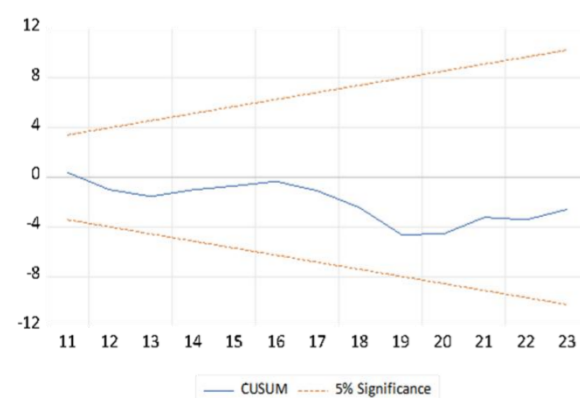
Fig 1

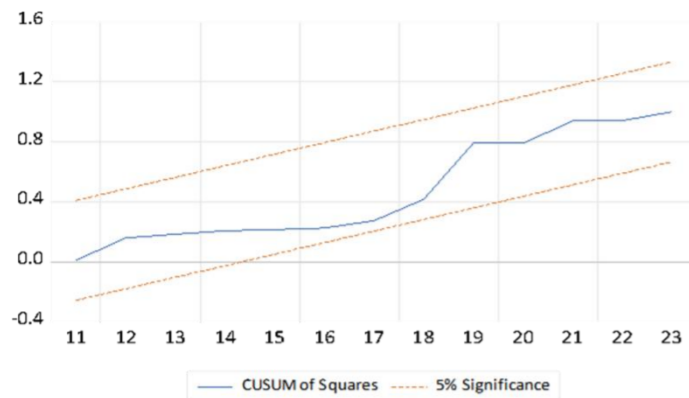


The above Fig 1 shows that the Histogram Normality test for residual for the ARDL model. The value of Jarque-Bera coefficient (0.9343) with p-value (0.6267) confirm the acceptance of null hypothesis that error or residuals are normally distributed.

Stability of the Coefficients

The policy implication and recommendation is important part in any research study. The stability of import demand function for effective trade policy. The stability of the estimated coefficients are tested by employing CUSUM and CUSUMSQ stability test to the estimated ARDL model. Fig 2 shows the graph of CUSUM and CUSUMSQ test. This shows that the long run coefficient of the intermediate import demand elasticity are stable. The displayed plots are correctly specified within the critical bounds limits at 5% level of significance. We can state very safely, that the estimated coefficients of the estimated import demand function are stable and the free from structural breaks.





5-Conclusions with Policy Recommendations

This study is conducted to explore the impact of FTA between China and Pakistan during the period 1990 to 2023. The main theme of the study was to evaluate the potential impact of FTA for imports of intermediate goods in Pakistan from China for the specified period. In this study, we developed two models, one with single FTA dummy with explanatory variables and other with interaction dummy between FTA and relative import price. For analysis we adopt the ARDL framework invented by Pesaran et al. (2001). For analysis, this approach is considered to be suitable in order to determine the existence of cointegrating relationship and the error correction mechanism for the import demand with FTA, as it was adopted in some other studies at international level. In this research, we estimated the import demand elasticities at sectoral level goods with respect to real income, relative import price and foreign exchange reserves. Empirical results for both models show the presence of cointegration relationship. The long run coefficient representing elasticities with respect to import demand are positively significant for all the variables.

Real Income elasticity is found to be more proportionally larger as compared to elasticity of relative import price. Real GDP found to be more prominent determinant as findings indicated that a 1% increase in income causes about 4 % increase import demand in long run, keeping other factors constant. The high elastic and significant income elasticity reflects the greater degree of openness of the Pakistan economy regarding its intermediate imports (as found by Tambi,1998).

The result for relative import price elasticity in the long run is positively significant and greater than 1, i.e. elastic. This elastic value means, a high competitiveness of imports and a high import substitution capacity in the Pakistan economy in the long run. This could be in sectoral import demand of intermediate goods (a portion of aggregate import) which constitute necessary items like industrial inputs, etc.

Results findings for FTA shows positive and significant impact on import demand of intermediate goods, which means the bilateral free trade agreement with China is beneficial in the long run. In the short run its impact is positive but insignificant, whereas its lagged effect is significant in the short run. Foreign reserves impact is positive and significant both in the short run and as well as in the long run. But its coefficient shows inelastic value, which means any change in foreign reserves causes less than proportionate change in import of intermediate goods in Pakistan. As a policy recommendation, the government should adopt and formulate a consistent policy to getting benefit of FTA not only in imports but also in exports with China. Also GDP growth impacting import demand that may cause trade balance issue in the economy.

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