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IMPORT DETERMINANTS AND POTENTIAL MARKETS OF PAKISTAN: AN APPLICATION OF PPML GRAVITY MODEL

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Abstract: The present study examines import determinants of Pakistan with the top 28 trade partners from 2002 to 2018. To achieve this objective, the augmented gravity model of trade has been applied by incorporating both time-variant and time-invariant variables. In addition, the analysis quantifies the impact of free trade agreements (FTA) signed by Pakistan with China and other trade partners. The results show that along with income and distance, FTA, common language, and common border plays an essential role in imports of Pakistan with its main trade partners. In addition to identifying trade determinants, the impact of adherence to a particular trade agreement was also examined. The results indicate that FTA signed by Pakistan with China and other trade partners has created trade opportunities for participating countries, highlighting the importance of trade liberalization for the long-run development of the country.

Keywords: Import flow; trade agreements; gravity model; panel data; PPML.

JEL CODES: F0, F1, F69, C5.

1. Introduction

Trade is an integral part of efforts for the development and growth of an economy. Economists right from Adam Smith have advocated trade as an important determinant for economic growth (Salvatore, 2005). In the present-day world, multiple countries like China, India, Hong Kong, Singapore, South Korea, Taiwan, and others have achieved higher economic development with the help of

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international trade. This high level of development with the help of international trade has motivated many developing countries, including Pakistan, to adopt the same path from the 1990s (Mahmud, Hamid & Hamma, 2015). However, the main problem of Pakistan and other developing economies during these years has been dependence on a few commodities and trade partners.

Pakistan's economy, given its size, contributes a small percentage to merchandise trade and world capital flows. From the composition of commodities traded between Pakistan and the world, its high dependence on textiles and apparel makes it a labor-intensive economy. In the case of the direction of trade, the five main export partners are the USA (16.1 %), China (7.6%), UK (7.3%), Afghanistan (5.7%), and Germany (5.5%) (WITS World Bank, 2020). From the side of imports, China, with 24.1%, dominates the list, followed by UAE (14.4%), Saudi Arabia (5.4%), the USA (4.8%), and Indonesia (4.1 %) (WITS, World Bank, 2020). This data shows that the export market is more diversified than imports, with China supplying around one-fourth of total import requirements. This ever-increasing dependence on a particular country for import requirements can negatively impact the economic development of a country in the long run.

The available literature on trade direction urges for greater diversification in terms of the basket of traded goods and markets to achieve the objective of sustainable development. From time to time, the government of Pakistan took several steps to benefit from the liberalization process, including signing many trade agreements with partner countries. These agreements include free trade agreements with Sri Lanka (2005), China (2006), Indonesia (2006), Malaysia (2007), Mauritius (2007), and Afghanistan (2010) (Abbas & Waheed, 2019) and regional trade agreements like South Asian Free Trade Agreement (SAFTA, 2007) to benefit from regional trade. Among these trade partners, China has emerged as the largest trade partner of the country in recent years. However, the effect of these agreements is yet to be verified empirically. Therefore, it would be interesting to examine the trade creation and diversion of FTA signed with China compared to other trade agreements and trading partners. Taking into account the empirical work of (Abbas & Waheed. 2019; Montant, 2019), the present study attempts to examine import determinants of Pakistan. It also examines the trade creation and diversion of the FTA signed with China and explores potential import markets of Pakistan. In addition, the study would provide a comprehensive framework for the country to diversify its import market and benefit from trade openness. The present analysis rests on two main motivations. The first objective is to examine determinants of the import trade flow of Pakistan from major trade partners through a gravity model approach. Most empirical studies are centered on the export flow between countries, while present analyses focus solely on import flow which is more scarce. Secondly, this analysis

aims to examine the impact of the FTA signed by Pakistan in recent years and estimate the import potential from these trading partners.

The rest of the paper is organized as follows: Section 2 discusses available literature on the gravity model. Section 3 explains model specifications and sources of data. Empirical analyses of the model are discussed in section 4, whereas section 5 presents the conclusion and policy implications.

2. Empirical Literature on Gravity Model

There is a plethora of trade literature employing the gravity model. Giving a theoretical justification for applying the gravity model, Mishra et al. (2015) found a positive relationship between the GDP of India and its trade volume with the outside world. Nevertheless, Sahu, Kumar, and Heng (2017) examined exports of India with the top 50 trade partners. The study concludes that GDP, distance, population, and real exchange rate are the main factors that play an essential role in the exports of India.

Applying the gravity model and using both cross-sectional and panel data, Hassan (2001) found opportunities for trade creation among South Asian Association for Regional Cooperation (SAARC) countries without any evidence of trade diversion with other countries. In the same vein, Martinzen-Zarzoso (2003) examined the intra-block effects of the EU, NAFTA, and the Centro-American Common Market. Empirical results confirmed that the income elasticity of the exporter was higher than that of the importer. Hence study suggested signing a new preferential trade agreement among sample countries. Similarly, Rahman, Shadat, and Das (2006) found significant intra-regional trade creation in SAARC Preferential Trading Arrangement (SAPTA). In contrast, studies like Singh (2018), among others, believe that SAARC has been unable to enhance intra-regional trade in the sample countries. Various studies (Govindan, 1996; Pigato et al., 1997) argue that regional integration can benefit participating countries, particularly India and Pakistan. Abbas and Waheed (2019) examined the macroeconomic behavior of trade flows and potential markets for Pakistan. The results indicate higher trade between countries with a common language but lower trade between bordering countries. Lastly, the SAFTA has been ineffective in creating trade opportunities for Pakistan, and member countries need to revisit the regional trade agreement.

Kazmi and Shabir (2007) analyzed the effects of the FTA between China and Pakistan. The study inferences that FTA offers ample opportunity to benefit from enhanced market access, improved technology, and investment. Moreover, increasing investment volume from China would increase production capacity, transfer of technology, and generate employment opportunities in both countries. According to Malik (2013), Pakistan needs to make a structural change and modernize the agricultural sector to increase its trade. Since China is making a huge

investment in different parts of the world, Pakistan needs to take adequate steps to attract such investment. Similarly, Irshad et al. (2017) are of the view that Pakistan must formulate policies in such a way that the negative impact on local industries due to enhanced imports from China and trade deficit can be minimized. At the same time, Mukhtar et al. (2017) have critically examined the China-Pakistan FTA and why Pakistan could not benefit from this agreement as per expectations. The author concludes that Pakistan could not benefit from the trade agreement for many reasons, including lack of competitiveness, narrow export base, and inclusion of those products in the offer list in which it lacks comparative advantage or has a low advantage over China.

Achakzai (2006) has estimated the trade potential of Pakistan in the Economic Cooperation Organization (ECO). The high coefficient value of -1.27 for distance indicates that transportation cost is high, which acts as a barrier to trade between member countries. Other constraints include production inefficiencies, restrictive trade practices, communication gaps, financial constraints, and many other factors the member countries need to address to increase intra-ECO trade. The study concludes that Pakistan has considerable scope to increase its exports to member countries. Din, Ghani, and Qadir (2009) have examined the prospects of Pakistan's trade with China. The study argues that there is abundant potential for expansion of bilateral trade, but it may remain in favor of China, at least in the short run. In the long run, trade is likely to influence production structure, balance the trade, and help in the sustainable development of both countries. According to Khan and Khan (2013), GDP and GDP per capita positively impact the trade relations of Pakistan with its partners. The author is of the view that steps must be taken to increase trade with these countries. Moreover, economic activities should be preferred, and politics should not dominate economic and trade decisions. Using the panel data set, Abbas and Waheed (2015) argued that partner countries' supply capacity and market size positively impact Pakistan's export flow. The government needs to revise trade agreements and diversify its basket of goods to benefit from enhanced trade opportunities.

Using the PPML estimation technique with panel data for 1993-2013, Hussain (2017) argues that GDP, per capita income, and distance are the major factors affecting the export flow of Pakistan. Besides, information flow, a proxy for globalization, positively impacts exports. The authors argue that government should provide necessary information to the business community to boost exports. However, the primary cause of the continuous decline in exports from the country is low-level skills, structural constraints, low investments, and higher production costs, which require immediate attention. Irshad and Xin (2018) analyzed bilateral trade between Pakistan and its trade partners, including China, with which it has signed FTA or RTA. The bilateral trade of Pakistan with FTA partner countries is positively

affected by GDP, religion, membership in WTO, trade openness, and shared borders, and negatively by geographical distance and inflation. Similarly, Abbas and Waheed (2019) argue that Pakistan enjoys high trade with countries that share a common language but low trade with bordering states. The study concludes that Pakistan must diversify its markets and develop new industries to benefit from trade opportunities. However, from the existing literature, one can argue that no study explains the import determinants of Pakistan with a primary focus on FTA taking into account time-variant and time-invariant measures. Further, no study has examined the import trade potential with top trade partners. Therefore, the present study tries to fill this literature gap by applying the PPML gravity model.

3. Methodology

3.1. Sources of Data

The dataset used is a balanced panel that includes 28 top trade partners of Pakistan from 2002 to 2018. The dependent variable is total imports between countries measured in current US dollars. Total import data was collected from the Direction of Trade Statistics, International Monetary Fund (IMF), whereas data for Gross Domestic Product (GDP) and GDP per capita was extracted from World Development Indicators (WDI), World Bank.

The information for other variables, including distance, language, and contiguous (common border), are extracted from the Centre d'Etudes Prospectives et d'Informations (CEPII). Excluding distance, a continuous variable, the remaining variables from CEPII are dummy variables.

Information for Regional Trade Agreement (RTA) and FTA was obtained from the World Trade Organization. The FTA takes the value of 1 for the year agreement was signed and zero before. Enough literature has examined the trade creation and diversion effects of FTAs and RTAs on trade volume between countries. For example, Gaurav and Bharti (2019) have examined different FTAs signed by India. All data in value terms are in current US dollars.

3.2. Formulation of Gravity Model

It is the universal gravitation law of Newton (1687) from which the gravity model of trade was derived. The law states that it is the gravitational force that attracts two points. It is positively related to the mass of objects and negatively to the square of the distance between them. In equation (1), Mij is a dependent variable [1], and the independent variables include the economic size of countries and the geographical distance between them. In simple form, the model explains the flow of trade between country i and j with the economic size of partner countries and the distance between two capitals. Trade is expected to be affected positively by economic size and negatively by distance. In addition, the equation includes constant G, which captures

country-independent effects like world liberalization.

$$M_{ij} = g\left(\frac{GDP_{it} * GDP_{jt}}{DIS_{ij}}\right) \quad (1)$$

Tinbergen (1962) and Poyhonen (1963) applied the gravity model to trade analysis. The model became known as the *workhorse of international trade* due to its successful application in analyzing the effect of various policy variables on trade cooperation between countries.

From existing literature, equation (1) is transformed into log-log form, so it confirms to usual regression analysis

$$\ln M_{IJ} = \alpha_0 + \alpha_1 \ln GDPR_{it} + \alpha_2 \ln GDPP_{it} + \alpha_3 \ln DIS_{ij} + \varepsilon_{ijt} \quad (2)$$

In equation (2), $\ln M_{IJ}$ is a dependent variable which is the total imports in the present study. The independent variables include the economic size of reporting and the partner country ($GDPR_{it}$ and $GDPR_{jt}$) and DIS_{ij} is the geographical distance between them. In simple form, the model explains the trade flow between country i and j with the economic size of partner countries (often GDP is taken as a proxy for economic size) and the distance between two capitals. Trade is expected to be affected positively by economic size and negatively by distance. In addition, the equation includes constant G, which captures country-independent effects like world liberalization.

Traditionally, cross-sectional data was used in the gravity model to estimate bilateral trade determinants. However, it yields biased results due to heterogeneity (Chang & Wall, 2005). Recent studies have used panel data to capture the relevant relationship between variables over time. Besides, it is possible to monitor unobservable trading-partner-pairs individual effects (Martinez-Zarzoso & Nowak-Lehmann, 2003). With panel data, country and time-invariant variables can be controlled, which is impossible in cross-section or time-series. It gives more information and variability, efficiency and degree of freedom, and less collinearity among the variables.

3.3. Econometric Specification of the Model

In the gravity model, binary dummy variables are incorporated to examine the effect of free trade agreements (FTAs). The present study explores the trade creation and diversion impact of FTAs signed by Pakistan. In the model, two dummy variables, "free trade agreement both" ($FTAb_{jt}$) where both countries are part of the agreement and "free trade agreement one" ($FTAone_{jt}$) where only one country is part of the agreement has added to separate the impact of FTA on trade creation and trade diversion. Besides, the South Asian Free Trade Agreement (SAFTA), represented by RTA_{jt} has been included in the model to examine the impact of the regional trade

agreement. Thus including these and other related variables, equation (2) seems to be

$$\ln M_{ijt} = \alpha_0 + \alpha_1 \ln GDPR_{it} + \alpha_2 \ln GDPP_{jt} + \alpha_3 \ln DIS_{jt} + \alpha_4 \ln PCGDPD_{jt} + \alpha_5 FTAb_{jt} + \alpha_6 FTAone_{jt} + \alpha_7 RTA_{jt} + \alpha_8 comlang\_off_{jt} + \alpha_9 contiguous_{ij} + \mu_{ijt} \quad (3)$$

where $\ln M_{ijt}$ are imports of country i to country j, $GDPR_{it}$ indicates the economic size of the importing country, $GDPP_{jt}$ reflects the economic size of the partner country. $PCGDPD_{jt}$ shows per capita gross domestic product difference, indicating the development level in partner countries. Most often, researchers have used per capita GDP to explore the link between the stage of economic advancement of a country and its level of trade. It is expected that as the two countries are more developed, it is likely that they may trade more with each other. The standard gravity model also predicts that countries with different per capita GDP levels trade less than countries with a similar per capita GDP. In addition, other variables, which include distance, common border, and language, also affect the trade cooperation between countries.

Countries often sign free trade agreements (FTA) with neighboring countries to increase trade and benefit from each other's economic development. This variable is assigned the value of 1 in the case the trade agreement is signed or 0 otherwise. As China and Pakistan signed the FTA in 2006, this variable is expected to have a positive sign. In the present study, two dummy variables were taken to get a clear idea of the trade creation-trade diversion impact of the FTA signed between two countries. Besides, SAFTA, indicated by RTA in Equation (3), has been included in the model to examine the impact of the regional trade agreement. Similarly, $comlang\_off_{jt}$ which refers to the common language between two countries has been included to examine cultural factors between partner countries. Besides, $contiguous_{ij}$ has been included to account for the common border between Pakistan and its neighboring countries.

Equation (3) is a log transformation of selected variables on which pooled Ordinary Least Square (OLS) has been applied [2]. However, this technique provides biased results and deviates from key assumptions due to unobserved heterogeneity. The OLS overestimates the actual standard errors with or without correcting for heteroscedasticity (Gujarati, 2007). The Poisson Pseudo-Maximum Likelihood method (PPML) as defined by Silva and Tenreyro (2006), is used to overcome this problem. Following (Westerlund & Wilhelmsson 2006; Lohani 2020; Montant, G. 2019), equation (4) is estimated with time effects.

$$M_{ijt} = \alpha_0 + \alpha_1 \ln GDPR_{it} + \alpha_2 \ln GDPP_{jt} + \alpha_3 \ln DIS_{jt} + \alpha_4 \ln PCGDPD_{jt} + \alpha_5 FTAb_{jt} + \alpha_6 FTAone_{jt} + \alpha_7 RTA_{jt} + \alpha_8 comlang\_off_{jt} + \alpha_9 contiguous_{ij} + T_t + \mu_{ijt} \quad (4)$$

In addition to the time effect, equation (5) incorporates exporter and importer-specific effects to capture unobserved country-specific variables such as factor endowment and infrastructure.

$$M_{ijt} = \alpha_0 + \alpha_1 \ln GDPR_{it} + \alpha_2 \ln GDPP_{jt} + \alpha_3 \ln DIS_{jt} + \alpha_4 \ln PCGDPD_{jt} + \alpha_5 FTAb_{jt} + \alpha_6 FTAone_{jt} + \alpha_7 RTA_{jt} + \alpha_8 comlang\_off_{jt} + \alpha_9 contiguous_{ij} + T_t + C_t + Y_t + \mu_{ijt} \quad (5)$$

However, before examining the impact of FTA, one must address the problem of endogeneity associated with such agreements. The rationale for FTA is that it can enhance trade volume, but causation can also be reversed, i.e., increased trade volume can motivate countries to sign FTA. Kepaptsoglou et al. (2010) suggest that ambiguous results obtained in existing literature could be due to endogeneity. The solution to this problem is the application of a specific methodology. In this context, Baier and Bergstrand (2007) have applied a pair-fixed effect methodology to address this problem in the panel data set, and the same has been used in the present study. The main shortcoming of the selected method is that time-invariant variables like distance, common language, and the common border have to be excluded. However, the solution to this problem is to run two specifications; a specification with time-invariant variables without FTA dummies and a specification with FTA dummies without time-invariant variables. Equation (6) controls time and bilateral fixed effects.

$$M_{ijt} = \alpha_0 + \alpha_1 \ln GDPR_{it} + \alpha_2 \ln GDPP_{jt} + \alpha_3 \ln PCGDPD_{jt} + \alpha_4 FTAb_{jt} + \alpha_5 FTAone_{jt} + \alpha_6 RTA_{jt} + T_t + C_t + Y_t + \mu_{ijt} \quad (6)$$

The second step estimates the import potential between Pakistan and its main trade partners from the coefficients obtained. The coefficients acquired from the model are employed to determine the import potential of Pakistan with its major trade partners. In the available literature, different methods have been used to determine trade potential between countries. In the present study, Following Sultan and Munir (2015) and Dadakas et al. (2020), import potential has been calculated with the help of the following formula:

$$IP_{pak,j,year} = \left(\frac{X^{pak}}{Xpak,year}\right) \quad (7)$$

In this approach, the import potential is estimated for two recent years (2017 & 2018) by dividing predicted values estimated (X^pak) with actual values (Xpak, year), the ratio of predicted over actual imports enables us to analyze and interpret Pakistan's import potential with its major trade partners. If Pakistan exhibits a potential import ratio greater than one against a particular country, then imports with that partner can

increase given the prevailing economic conditions as import potential is said to exist. Suppose the value against a particular country is less than one. In that case, this shows that the present maximum potential has been exhausted, and other characteristics of the economy need to be improved.

4. Empirical Analysis

Table 1 shows descriptive statistics, including the concerned variables' mean, standard deviation, and maximum/minimum values. Table 2 shows the correlation results of the variables used in the present study. The gravity model specifications are discussed in the next section.

Table 1 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Lnimports	476	20.03094	1.294466	15.83856	23.45479
LnGDPR	476	25.88738	.4422528	25.00418	26.47453
LnGDPP	476	27.09625	1.625073	22.12326	30.65361
LnPCGDPD	476	9.24498	1.840706	.8655815	11.11157
LnDIS	476	8.231727	.7458044	5.925998	9.340733

Source: Author's Calculation.

Table 2 Coefficient of Correlation

Variables	Lnimports	LnGDPR	LnGDPP	LnPCGDPD	LnDIS
Lnimports	1.0000				
LnGDPR	0.2836	1.0000			
LnGDPP	0.4737	0.2090	1.0000		
LnPCGDPD	0.2638	0.1625	0.4035	1.0000	
LnDIS	0.1014	-0.0000	0.6162	0.6659	1.0000

Source: Author's Calculation.

4.1. Import Determinants of Pakistan without FTA dummies

Given the various issues- endogeneity problem, and MRTs, the present study estimates three different models. Column (1) and (2) indicates pooled OLS and PPML, column (3) and (4) shows OLS, and PPML estimation with country effect, and column (5) and (6) covers both country and time effect.

Table 3. Gravity Model Results Without FTA Dummies

	Pooled Model		With Country Effect		With Country and Time Effect	
	OLS	PPML	OLS	PPML	OLS	PPML
Variables	(1)	(2)	(3)	(4)	(5)	(6)
LnGDPR	0.285**	0.389***	0.213**	0.131	0.329**	0.237**
	(0.11)	(0.12)	(0.10)	(0.08)	(0.15)	(0.12)
LnGDPP	0.505***	0.485***	0.397***	0.556***	0.399***	0.558***
	(0.03)	(0.05)	(0.07)	(0.06)	(0.07)	(0.12)
LnDIS	-0.881***	-1.203***	-1.369***	-2.392***	-1.372***	-2.397***
	(0.11)	(0.19)	(0.22)	(0.19)	(0.22)	(0.19)
LnPCGDPD	0.232***	0.398***	0.461***	0.499***	0.461***	0.499***
	(0.04)	(0.08)	(0.05)	(0.05)	(0.05)	(0.05)
comlang_off	-0.033		0.334**	0.691***	0.335**	0.695***
	(0.10)		(0.15)	(0.14)	(0.15)	(0.14)
contiguous		0.351	2.097***	1.378***	2.093***	1.382***
		(0.27)	(0.18)	(0.16)	(0.18)	(0.16)
Constant	4.085	-10.373***	10.650***	3.184	7.618*	0.364
	(3.07)	(3.69)	(3.06)	(2.08)	(4.25)	(3.01)
Obs	476	476	476	476	476	476
R-squared	0.364	0.323	0.621	0.842	0.626	0.848
Adj R-sq	0.357		0.606		0.599	

Note: Standard errors in parentheses
*p <.10, **<.05, ***<.01

First, estimation techniques were applied without FTA dummies, as presented in Table 3. Results presented, and interpretations hereafter depend on the reasoning of the importer country (Pakistan). Results presented in columns (1) and (2) show that all estimated coefficients align with the theoretical background according to which trade increases with the impact of favorable factors like GDP, common border, and common language and declines with unfavorable factors like trade restrictions and transport costs.

The results presented in column (6) indicate that GDP growth in Pakistan plays a significant role in enhancing imports from partner countries. Model (6) shows that a 1 percent increase in GDP in Pakistan leads to a 0.55 percent increase in imports from partner countries. The results support the hypothesis that the larger the economic size of partner countries, the more trade volume between them. In line with previous literature, distance significantly and negatively impacts imports. The significant and negative impact of distance highlights the need to improve infrastructure and connectivity between countries.

To account for factor endowment, the difference in per capita GDP (PCGDPD) was included in line with empirical work (Sultan & Munir, 2015; Montant, 2019). The estimated coefficient is significant and has a positive sign which indicates a higher

volume of imports between trading countries. Hence, it can be concluded that the H-O hypothesis dominates the Linder hypothesis, which means that countries with different factor endowments have a higher inter-industry flow than intra-industry trade (Krugman, 1981). This result could suggest the domination of inter-industry trade between Pakistan and its major trading partners.

The positive and significant coefficient of common language indicates that countries that share a common language trade more with each other than countries that speak different languages. The estimated coefficient shows that holding everything else constant, the common language between countries enhances bilateral trade. Similarly, the estimated coefficient of the common border has a significant and positive impact on import enhancement between partner countries. The results indicate that a common border also increases imports between countries compared to countries without a direct link.

4.2. Import Determinants with FTA dummies

The main objective is to estimate the impact of the trade agreement(s) on import flow between Pakistan and its major trade partners. The time-invariant variables should be excluded [3] to overcome the stumbling block of FTA endogeneity (Montant, 2019). However, these variables have been explained in Table 3. As mentioned previously, China has emerged as the largest importer of Pakistan, and the volume of bilateral trade has enhanced rapidly, particularly after the FTA of 2006. Thus, given the increasing importance of China in total imports of Pakistan, the present study aims to examine the trade creation and diversion effects of the FTA signed by Pakistan with China and other trade partners. In addition, to FTAs, RTA (SAFTA) is also examined to assess the trade opportunities of Pakistan in the immediate neighborhood.

Table 4 indicates "FTAboth" is positive and significant, exemplifying trade creation between two countries. The reason is that China and Pakistan firmly adhere to a trade agreement, which leads to an increase in trade, indicating enormous trade opportunities between the two countries. The percentage of trade creation (model 6) in the case of "FTAboth" is (e (1.44)-1) = 155 percent, which is a positive sign for participating countries. Similarly, the coefficient of "FTAone" is positive, indicating that trade agreements with other partners have also created import opportunities for Pakistan. Along with FTA, countries that are part of the same RTA are expected to trade more bilaterally. However, RTA has not been able to positively contribute to trade enhancement between participating countries and needs to be revisited.

Table 4 Import model with FTA dummies

	Pooled Model		With Country Effect		With Country and Time Effect	
	OLS	PPML	OLS	PPML	OLS	PPML
	(1)	(2)	(3)	(4)	(5)	(6)
LnGDPR	0.375***	0.374***	0.293***	0.176**	0.484**	0.343*
	(0.10)	(0.10)	(0.09)	(0.08)	(0.21)	(0.18)
LnGDPP	0.496***	0.548***	0.381***	0.480***	0.380***	0.483***
	(0.03)	(0.04)	(0.06)	(0.06)	(0.06)	(0.06)
LnDIS	-1.436***	-2.203***	-1.518***	-2.216***	-1.515***	-2.221***
	(0.10)	(0.15)	(0.14)	(0.11)	(0.14)	(0.11)
LnPCGDPD	0.110***	0.197***	0.361***	0.517***	0.329***	0.519***
	(0.04)	(0.06)	(0.04)	(0.06)	(0.04)	(0.06)
FTAb	-0.174	0.566***	1.761***	1.442***	1.760***	1.444***
	(0.22)	(0.14)	(0.20)	(0.21)	(0.20)	(0.21)
FTAone	0.978***	1.170***	1.476***	1.451***	1.472***	1.458***
	(0.12)	(0.16)	(0.13)	(0.14)	(0.13)	(0.14)
RTA	-1.921***	-3.088***	-1.321***	-1.426***	-1.327***	-1.423***
	(0.19)	(0.32)	(0.25)	(0.21)	(0.26)	(0.22)
Cons	8.051***	12.539***	11.415***	16.395***	6.607	12.114***
	(2.57)	(2.45)	(2.23)	(1.91)	(5.27)	(4.34)
Obs.	476	476	476	476	476	476
R-sq.	0.513	0.775	0.711	0.864	0.715	0.867
Adj. R-sq.	0.506		0.699		0.698	

Note: Standard errors in parentheses
*p <.10, **<.05, ***<.01

5. Import Potential of Pakistan

Table 5 shows that among neighboring countries, Pakistan enjoys import potential with Iran and India. Besides Bangladesh, China, Hong Kong, Malaysia, Turkey, Sri Lanka, etc., enjoy import potential with Pakistan. The above analysis is an indication that Pakistan has not efficiently utilized its trade agreements (bilateral and regional) to benefit from increasing trade opportunities in partner countries. The country has exhausted its import potential with top import partners and needs to diversify its import with other trade partners.

Table 5 Import Potential of Pakistan

Values more than 1		Values less than 1		Values above 1		Values below 1	
2017		2017		2018		2018	
Country	Import potential	Country	Import potential	Country	Import potential	Country	Import potential
Netherland	1.04	Afghanistan	0.86	China	1.00	Afghanistan	0.67
		UAE	0.74	Belgium	2.27	UAE	0.66
Germany	2.19	Australia	0.47	Bangladesh	1.12	Canada	0.55
Belgium	1.97	Canada	0.51	Germany	1.86	Australia	0.82
Hong Kong	2.13	China	0.88	Netherland	2.01	Spain	3.14
India	1.91			Hong Kong	1.16	UK	0.86
Iran	1.53	France	0.68	India	1.55	Indonesia	0.84
Spain	3.10	Indonesia	0.82	Iran	1.22	Italy	0.89
Kuwait	1.52	Japan	0.82	Kuwait	1.68	Japan	0.79
Sri Lanka	1.22	Bangladesh	0.76	Sri Lanka	1.12		
Malaysia	1.70	Oman	0.74	Malaysia	1.70	Oman	0.69
Russia	4.96	Thailand	0.52	Russia	3.14	France	0.99
Saudi Arabia	1.05	Italy	0.94	Singapore	1.21	Thailand	0.49
Singapore	1.19	USA	0.39	Turkey	2.67	Saudi Arabia	0.95
Turkey	4.20	UK	0.97			USA	0.37

Data source: Author's calculations.

6. Conclusions and Policy Implications

The present study identifies import determinants of Pakistan using the gravity model from 2002 to 2018. The model explains import flow between countries as being proportional to their economic size and inversely proportional to the geographical distance. The basic econometric specification consists of various theoretical determinants of import flows such as bilateral distance, GDP, the existence of a common language, and border. In addition, the augmented gravity model, which includes other variables besides income and distance, has also been used. The empirical results confirm the robustness of the gravity equation, for results were akin to the established theories on the subject. Moreover, along with income and distance,

FTA, common language, and common border play an essential role in imports of Pakistan from its main trade partners.

The second part of the empirical analysis assesses the impact of adherence to a particular trade agreement. The results indicate that FTA signed by Pakistan with China and other trade partners has created trade opportunities for participating countries, highlighting the importance of trade liberalization in the long run. In cases where only one country adheres to FTA, it reduces bilateral import flows. This has been the case with SAFTA, where the RTA dummy shows that SAFTA has been unsuccessful in enhancing cooperation among participating countries. Hence, countries must adhere to these trade agreements to promote bilateral and multilateral trade. The combination of adherence to different bilateral and multilateral agreements permits the effective promotion of trade cooperation between countries. In addition, the empirical analysis aims to examine the import potential of Pakistan with its major trade partners. The results present a promising picture for enhancing the imports of Pakistan from its main trade partners. The country enjoys import potential with China, Iran, Malaysia, Sri Lanka, and other neighboring countries and has already exhausted its import potential with other top trade partners. Thus from the above analysis, it can be summarized that Pakistan has not utilized its trade agreements efficiently, and policymakers need to pay attention to this direction.

Further, empirical results highlight that Pakistan has enormous potential to benefit from economic opportunities. Based on the factors identified as the main determinants of imports, the formation of appropriate policy can take the country on the path of sustainable development. In neighboring countries with a common culture, transportation costs can be reduced by opening more border points. Lastly, India and China are two leading emerging economies, and Pakistan has the opportunity to increase the development pace by benefiting from the economic rise of these two countries.

Limitation

The present empirical work can be extended in different ways. The panel data set can be expanded to include other import partners. Besides, the role of tariff and non-tariff restrictions can be examined in future studies.

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References

1. Abbas, S., Waheed, A. (2015), Pakistan's potential export flow: The gravity model approach. The Journal of Developing Areas, 49(4), 367-378.
2. Abbas, S., Waheed, A. (2017), Trade competitiveness of Pakistan: Evidence from the revealed comparative advantage approach. Competitiveness Review, 27(5), 462-475.
3. Abbas, S., Waheed, A. (2018), Import Determinants and Potential Markets: A Panel Data Gravity Modelling Analysis for Bahrain. Review of Middle East Economics and Finance, 14(1).
4. Abbas, S., Waheed, A. (2019), Pakistan's Global Trade Potential: A Gravity Model Approach. Global Business Review, 20(6), 1361-1371.
5. Abdullahi, N. M., et al. (2021), Determinants and Potential of Agri-Food Trade Using the Stochastic Frontier Gravity Model: Empirical Evidence from Nigeria, SAGE Open, 11(4), 21582440211065770.
6. Abdullahi, N. M., et al. (2021), Nigeria's cocoa exports: a gravity model approach. Ciência Rural, 51.
7. Achakzai, J. K. (2006), Intra-ECO Trade: A Potential Region for Pakistan's Future Trade. The Pakistan Development Review, 45(3), 425-437.
8. Alam, M., Uddin, G., Taufique, K. (2009), Import inflows of Bangladesh: the gravity model approach. International Journal of Economics and Finance (ISSN 1916-971X), 1(1), 131-139.
9. Anderson, J., Wincoop, E. V. (2003), Gravity with Gravitas: A Solution to the Border Puzzle. The American Economic Review, 93(1), 170-192.
10. Baier, S. L., Bergstrand, J. H. (2007), Do free trade agreements actually increase members' international trade? Journal of International Economics, 71(1), 72-95.
11. Baldwin, R., Taglioni, D. (2006), Gravity for Dummies and Dummies for Gravity Equation. Working paper 12516, NBER.
12. Carrere, C., Schiff, M. (2005), On the geography of trade. Revue économique, 56(6), 1249-1274.
13. Chang, I.M., Wall, H.J. (2005), Controlling for Heterogeneity in Gravity Models of Trade Integration. Federal Reserve Bank of St. Louis Review 87(1), 49-63.
14. Chi, T., Kilduff, P. P. (2010), An empirical investigation of the determinants and shifting patterns of US apparel imports using a gravity model framework. Journal of Fashion Marketing and Management: An International Journal, 14 (3), 501-520.
15. Din, U., Ghani, E., Qadir, U. (2009), Recent experience and future prospects of Pakistan's trade with China. The Lahore Journal of Economics, 14, 87.

16. Dinçer, G. (2014), Turkey's rising imports from BRICS: A Gravity model approach, Online at https://mpra.ub.uni-muenchen.de/61979/MPRA Paper No. 61979.
17. Emikonel, M. (2021), The impact of international organizations on Chinese trade as the determiner of trade: the gravity model approach. The Chinese Economy, 1-15.
18. Frankel, J., Rose, A. (2000), Estimating the Effect of Currency Unions on Trade and Output. NBER. 7857.
19. Gaurav, K., Bharti, N. (2019), Some Common Lessons from Uncommon FTAs. South Asia Economic Journal, 20(1), 138-157.
20. Guan, Z., et al. (2021), Trade Relations Between Mauritius and China: A Gravity Model Approach. SAGE Open, 11(4), 21582440211058184.
21. Hassan, M. (2001), Is SAARC a viable economic block? Evidence from gravity model. Journal of Asian Economics, 12(2), 263-290.
22. Head, K. (2003), Gravity for beginners. University of British Columbia, 2053.
23. Hussain, M. (2017), Globalization and Gravity Model of Trade of Pakistan-A PPML Estimator Analysis. Management and Administrative Sciences Review, 6(1), 15-27.
24. Irshad, M. S., Xin, Q., Hao, H., Arshad, H. (2017), SWOT Analysis of Pakistan-China Free Trade Agreement: Pros and Cons. International Journal of Asian Social Science, 7(1), 45-53.
25. Irshad, M. S., Xin, Q., Hui, Z., Arshad, H. (2018), An empirical analysis of Pakistan's bilateral trade and trade potential with China: A gravity model approach. Cogent Economics and Finance, 6(1), 1-18.
26. Kepaptsoglou, K., Karlaftis, M. G., Tsamboulas, D. (2010), The Gravity Model Specification for Modeling International Trade Flows and Free Trade Agreement Effects: A 10-Year Review of Empirical Studies. The Open Economics Journal, 3(1), 1-13.
27. Khan, S., Khan, D. (2013), An Empirical Analysis of Pakistan's Bilateral Trade: A Gravity Model Approach. Romanian Economic Journal, 16(48).
28. Lohani, K. K. (2020), Trade flow of India with BRICS countries: A gravity model approach. Global Business Review, 0972150920927684.
29. Mahmud, M., Hamid, N., Ahmed, H. (2015), Exports: Lessons from the past and the way forward. In Amjad, R. & Burki, S (Ed.), Pakistan moving the economy forward (pp. 22-47). Cambridge University Press. Delhi 110002, India.
30. Malik, S., Chaudhary, A. R. (2012), The structure and behavior of Pakistan's imports from selected Asian countries: An application of gravity model. Pakistan Journal of Commerce and Social Sciences (PJCSS), 6(1), 53-66.
31. Martinez-Zarzoso, I. (2003), Gravity model: An application to trade between regional blocs. Atlantic Economic Journal, 31(2), 174-187.
32. Martínez-Zarzoso, I., Nowak-Lehmann, F. (2003). Augmented gravity model: An empirical application to Mercosur-European Union trade flows. Journal of applied economics, 6(2), 291-316.
33. Mishra, A. K., Gadhia, J. N., Kubendran, N., Sahoo, M. (2015), Trade Flows between India and Other BRICS Countries: An Empirical Analysis Using Gravity Model. Global Business Review, 16(1), 107-122.
34. Montant, G. (2019), The Determinants of Intra-Oceanian Imports from 2001 to 2015 : A Panel Gravity Model Approach. The International Trade Journal, 0(0), 1–22.

35. Mukhtar, H., Hongdo, Q. (2017), A Critical Analysis of China-Pakistan Free Trade Agreement. Learning Experience for Pakistan with Respect to its Future FTA's. Global Journal of Politics and Law Research, 5(6), 63-74.
36. Mwangi, E. N. (2021), Determinants of Agricultural Imports in Sub-Saharan Africa: A Gravity Model. African Journal of Economic Review, 9(2), 271-287.
37. Pöyhönen, P. (1963), A tentative model for the volume of trade between countries. Weltwirtschaftliches Archiv, 93-100.
38. Rahman, M., Shadat, W. B., Das, N. C. (2006), Trade potential in SAFTA: An application of augmented gravity model. CPD occasional paper series, 61, 512.
39. Rose, A. K., Van Wincoop, E. (2001), National money as a barrier to international trade: The real case for currency union. American economic review, 91(2), 386-390.
40. Roy, M., Rayhan, M. I. (2012), Import flows of Bangladesh: gravity model approach under panel data methodology. Dhaka University Journal of Science, 60(2), 153-157.
41. Sahu, P. K., Heng, S. Y. (2017), India's Competitive Advantage and Export Performance: A Gravity Model Approach, Arthshastra. Indian Journal of Economics & Research, 6(6), 23.
42. Salvatore, D. (2005), Introduction to international economics, Hoboken, NJ: Wiley.
43. Shabir, S., Kazmi, R. (2007), Economic effects of the recently signed Pak-China free trade agreement. Lahore Journal of Economics, 12(Special Edition), 174-202.
44. Silva, J. S., Tenreyro, S. (2006), The log of gravity. The Review of Economics and Statistics, 88(4), 641-658.
45. Tinbergen, J. (1962), Shaping the world economy suggestions for an international economic policy, New York: The Twentieth Century Fund.
46. Wani, M., et al. (2016), The determinants of India's imports: a gravity model approach. Online at https://mpra.ub.uni-muenchen.de/74700/ MPRA Paper No. 74700,
47. Westerlund, J., Wilhelmsson, F. (2011), Estimating the gravity model without gravity using panel data. Applied Economics, 43(6), 641-649.

Notes:
[1] Which can be exports, imports, or total trade, depending on the objectives of the study.
[2] The estimation technique does not capture country and time effects.
[3] For they have perfect collinearity with fixed effects.