An Empirical analysis of the Influencing Factors of Foreign Trade in Pakistan: Based on the Gravity Model

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Abstract: The major goal of this research was to use the gravity model to assess the impact of numerous factors on Pakistan's world trade with other countries. The research was carried out over a fifteen-year period, with data being analyzed from 2005 to 2019. The elements that determine the volume of commerce from Pakistan to other nations have been identified as gross domestic product, per capita GDP, trade to GDP, inflation, and distance. Pakistan's trading ties with Afghanistan, Turkey, Iran, Kazakhstan, China, and India were taken into account for this analysis. According to the study's findings, per capita GDP has a significant impact on trade volume with Pakistan. Demonstrating that the GDP per capita of the trading countries and Pakistan were comparable. The effect of distance was also found to be significant and negative, indicating that increased distance reduces trade volume. The results of the second model revealed that GDP dimensions, inflation, and distance had a significant impact on Pakistan's export volume. The study also proposes some academic and policy implications.

Keywords: Gravity model; Pakistan; Trade.

JEL Classification: I21, I24, I3, I31, I32, D63, P46

1.   Introduction

The majority of countries' technological and infrastructure developments in the last decade alone have resulted in a consistent change in trade activities by reducing geographical boundaries and bringing

different cultures and societies closer together. Trade has a significant impact on foreign relations, foreign investments, and national policies, and it has been linked to the evolution of economies (Latif et al.,2018).[1] Trade has been recognized as one of the main aspect of converting the world into a global economy and has expanded into the developing countries at a faster pace than ever before(Hotak & Wani, 2019; Rocha, 2017).[2]The trade of Pakistan is under the control of the government and the market in the country is under the influence of government controlled institutions as well. There are a smaller number of commercial and administrative barriers for the imports. The custom duties also remained low for 2016. Conversely, the country has a poor infrastructure, destroyed because of war, a developing legal system and businesses that are under the development of production houses. The permission to join the world trade organization was approved towards the end of 2015(Rahimi & Artukoglu, 2019). [3]Moreover, the IMF has been working closely to establish and improve the economic and trade policies of the countries since 2010. An increase in the exports and a slowed growth in the demand for imports, developed due to decreasing local demand, the Central Statistics Organization estimated that due to incidence of these situations the trade deficit of the country is bound to decrease. The famously traded Pakistani products include dried fruit, cotton, gold, cereals and different non-alcoholic drinks. The trading of these and other products have increased since 2013(Burhani & Wani, 2019).[4] However, the value of the imported products remains to be higher by four times than the exports, and also the incidence of the international aid there could be a substantial trade deficit. The trading relationships of countries or governments are governed by a variety of factors such as infrastructure, border, distance, administrative issues, inflation, and so on. These factors govern policies and procedures, as well as the determination of tax laws and customs on traded products. Pakistan's economy is already volatile, so the government maintains a firm grip on the market and works tirelessly to improve trade relations with partner countries (Tahiri, 2017).[5]

The Pakistani government has designated the period 2014-2024 as a decade for the country's development and transformation in order to improve the country's current situation. The presence of intra-country conflicts and wars has had a negative impact on the country's infrastructure. Pakistan is currently involved in trade with its neighboring countries of Afghanistan, China, India, Turkey, Iran, and Kazakhstan. Pakistan is responsible for 40 percent of the exports, closely followed by India, China and then Turkey. Iran is one of the main suppliers of goods in Pakistan, trailed by Pakistan, China and Kazakhstan. The poor state of the business policies, questionable infrastructure and trade barriers arising due to administrative issue have made the trading activities difficult for the country. Anyhow, there are a number of factors that are incident on the international trading association among two countries, with the distance among them being one of the most important (Hasiner & Yu, 2019).[6]Moreover, the development of trading associations with the other central Asian countries and Iran could be the key for increase in the exports of the country. Also, under the development of the BRI initiative by China will develop a new railway system that will be linking Pakistan with China and will pass through Uzbekistan, Tajikistan, Kyrgyzstan and Kazakhstan. The trade deficit of the country has been decreasing steadily, the trade deficit amounted to only 5.72 billion in 2018 in contrast to the 5.95 billion in 2017, and the value of exports has been rising and was reportedly 485 million USD in 2018. The main focus of the current study thus is to identify and evaluate the various factors that have contributed in the development of trade in the country. The distance and economic conditions of the trading countries are the main factors under consideration. These factors are identified to be the key indicators and influencers of the trading associations among countries as per the gravity model. Keeping these features in view the primary aim of the study is to use the gravity model of international trade to study the various factors that affect the trade of the country.

The economic situation of Pakistan has been improving slightly since the last decade, the primary reason being that the country is over-coming the disastrous effects of war and internal conflicts. The country is rich in natural minerals, metal ores, livestock production, textile and carpet manufacturing etc. There has been an increase in the export value and a reduction in the imports value of the products of the country in the recent years. The country has demonstrated a strong position in overcoming various internal and external barriers and has a strong focus on development of trade and infrastructure by 2024. Therefore, the present study analyzes the various factors influencing the trading relationships among Pakistan and other countries. Since the collapse of the Taliban control in the government in 2001, the country has been focusing on improving its international trade and thus has been involved in a number of agreements focusing on the development of trade and infrastructure in the economy, investments and transport with a number of countries and regional bodies. Thus, the focus of the present study is to evaluate the factors that are influencing the trade development and relationships of the country. The present literature available on the bilateral trade associations of the countries focuses on various sectors or with specific countries. The present study is evaluating the bilateral trade association with the top importing and exporting economies, from Pakistan's point of view.

The present study has the been carried out in order to satisfy the following research objectives

- ➢ To identify the factors that influences the foreign trade of Pakistan with other countries.
- ➢ To identify the impact of GDP dimensions on total trade of Pakistan with other countries.
- ➢ To find out the impact of inflation on the trade of Pakistan with other countries.
- ➢ To find out the impact of inflation on the export of Pakistan with other countries.
- ➢ To find out the impact of inflation on the imports of Pakistan with other countries.

2.   China and Pakistan Trade Relationship

The China-Afghan trade relationship has been developing under the recent developments of the CPEC. The financial assistance and infrastructural development has been on a considerable increase since the initiation of the Belt and Road initiative. In the past there were a number of treaties consigning the economic association between the countries (Treaty of Economic and Mechanical Assistance). Recently, the trade among the two countries has been progressively increasing as China is a chief exporter of Pakistan. Under the developmental projects, the employment initiatives and opportunities in Pakistan have been developing as well. The trade relations between the two countries mainly consisted of tea, fruit, vegetables in the past but in the present era the trade consists of animal products, vegetables, fruits, minerals, aircraft etc. The table below summarizes the export of Pakistan to China for 2018.

Table 1: Table of products exported by Afghan to China

Pakistan exports to China	Value	Year
Edible fruits, nuts, peel of citrus fruit, melons	$12.10M	2018
Wool, animal hair, horsehair yarn and fabric	$9.94M	2018
Vegetable textile fibers not specified elsewhere, paper yarn, woven fabric	$5.14M	2018
Salt, sulfur, earth, stone, plaster, lime and cement	$915.35K	2018
Carpets and other textile floor coverings	$149.21K	2018
Raw hides and skins (other than fur skins) and leather	$82.39K	2018

Table 2: Table of products exported by Afghan to China (Continued)

Pakistan exports to China	Value	Year
Oil seed, oleagic fruits, grain, seed, fruits	$69.76K	2018
Coffee, tea, mate and spices	$5.02K	2018
Special woven or tufted fabric, lace, tapestry	$2.99K	2018
Aircraft, spacecraft	$1.47K	2018

Moreover, in 2003 China issued a grant of $15 million after the signature on the Financial and Mechanical Assistance Agreement. In 2011, China issued an aid of 23.7 million dollars to Pakistan and the main areas of cooperation and trade between the countries are agriculture, infrastructure building, hydroelectricity and natural reserves.

3.   Literature Review

The foundations of the foreign trade 'Gravity model' is an important econometric framework (Anderson, 2011)[11] that lays on the physical law of universal gravity, governed by Newton. Newton's law of gravitation says that any two celestial bodies have an attraction force between them that is proportional to their masses and inversely proportional to their distance. This hypothesis states that nations with a comparably big economy attract more international trade activity, whereas countries with a wider geographical distance attract less foreign commerce (Falk, 2016). [12] As a result, the conventional gravitational force has been recognized a primary Foreign Trade determinant by (Blonigen & Piger, 2011)[12]. As a result, the conventional gravitational force has been recognized a primary Foreign Trade determinant by (Blonigen & Piger, 2011)[12]. Furthermore, commerce activity falls when the geographical distance between the home and the host nation grows, and vice versa. However, advances in information and communication technology can assist to mitigate the consequences of this distance and bring countries closer together electronically (L. Tang L& Trevino, 2010). [13] As a result, information and communication technology (ICT) can operate as a moderator in the link between international commercial activity and geographical distance. According to a research, distance does not always mean geographical distance; cultural, administrative, and economic variables can all contribute to the creation and expansion of distance (Ghemawat, 2001). [14]

Carey, a social researcher, was the first to apply the notion of Newtonian Physics to human psychological behaviour and condition in the year 1860. As a result, the gravity model has received widespread acceptance in the social sciences (Talamo, 2013). [15] Following that, numerous researchers have used this basic gravitational theory to conduct empirical investigations of international commerce flows. This has been utilized by (Tinbergen, 1962)[16] to analyses the bilateral trade flow between the nations. The gravity model was later used to assess both direct and indirect capital flows. As a result, according to the gravity model for international commerce, trade volume between nations may be estimated using economic size, which is defined by GDP, GDP per capita, and other GDP indices. In addition, the population of the nations, their physical distance from one another, and other institutional elements such as culture, law and order, language, and trade agreements all impact commerce between them. It is considered that when a country's economic size grows, as measured by GDP, and transportation costs decrease as the distance between economic capitals decreases, commerce expands.

Tinbergen was the first scholar to use the Gravity equation for the analysis of foreign trade (Tinbergen, 1962).[17] Then, population was included in this formula by (Linnemann, 1966)[18] to define the augmented gravity model by providing an estimate of bilateral trade elasticity to income, population, country size and the distance in the form of a linear log. The other variables that can be included in the model include factors, such as currency, language, regional integration and other historical and cultural factors. Hence, the augmented gravity equation is given in a linear form which provides elasticity of bilateral trade to income (GDP: Y_i , Y_j), country size (Population: POP_i , POP_j) and distance (D_{ij})(Talamo, 2013).

Towards the end of the 20th century, the economists have been working on shaping the gravity model into a structured economic theory. An economist claimed that the initial research on the model was based on pure theoretical basis, instead of empirical analysis of the trade theories to predict the trade flow (Deardorff, 1984).[19] This paved the way for further advancements in the model and provided the basis international trade in the form of traditional model of Ricardian and attempted to derive the gravity equation considering the assumption of product differentiation. Another economist explored the theory- based assessment of bilateral trade using the gravity equations employing monopolistic competition models(Bergstrand, 1985).[20]Helpman and Krugman applied the framework of differentiated product and scale returns. The main distinction between these theories has provided various specifications to deduce the empirical results. The gravity model can be used to understand the evolution of bilateral trade to contemplate the FDI pattern on international basis(Helpman & Krugman, 1985). Some scholars have also provided different modifications to improve the gravity model (Cheng & Wall, 2005; Egger, 2000). Several other scholars have put efforts for the refining the conceptual definition of variables. (Mátyás, 1998)[21] and (Frankel & Wei, 1998) have related the gravity model to the export, imports and poverty, richness respectively. The empirical analysis of the research related to trade and FDI by (Cheng & Wall, 2005[22]; Mátyás, 1998)[21] have provided specification for accounting the panel data to refine the model. The regression mechanism using the cross-sectional technique contends that the intercept and the slopes are similar for the pairs of the countries. This model does not account to the heterogeneous nature characterizing the countries' trade relationships being affected by the political, cultural and institutional variables in correlation with the gravity variables of other countries that include the distance, population and the GDP. In this mode, other factors, like laws and language can be included(Talamo, 2013). [15]

Pakistan is a country situated at the central position of Central Asia, which has immense strategic position with the presence of commercial transit. The country gained autonomy in the year 1919 and the era for modernization started in the country for the economic growth and development. Resultantly, a number of trade agreements were signed with other nations. So, initially, economy for the agricultural products was developed(FARAHMAND & ESEN, 2020). After the 2[nd]World War, the government of Pakistan enforced a 5-yeareconomic development plan. In the year 1725, the government of Pakistan entered into a trade agreement with USSR (Union of Soviet Socialist Republics) for the agricultural products. After that, many trade agreements were signed with Egypt, England, Japan, Germany, Switzerland and Poland in the time period of 1919-1928. In 1929, for connection between the northern, western, eastern and southern sides of the country, highways were constructed for the expansion of the foreign trade. Chamber of Commerce and Industry was developed in the country in 1931 for uniting the traders and eradicating the trade barriers. The two main banks of Pakistan, Central Bank of Pakistan and Afghan National Bank provided assistance for the development process of foreign trade in 1939 and 1932 respectively (Sanjar&Sengur, 2019).[23]This process remained till the 2[nd]World War. In spite of the fact that Pakistan was not a participant of the war, the country's

economy was badly affected since it was situated close to the two major trade partners: USSR and England – India. The conflicts which arose in the period 1979 to 2001, played a major role in destroying the sectors of health, banking, education, agriculture, infrastructure and the economy as a whole. For this reason, the country was economically and politically damaged and as many as 5 million Afghans had to migrate to Iran and Pakistan. Nearly 20% of the Afghan villages were destroyed which badly hampered the country's agricultural sector and caused a blow to the production of local products and their imports. As a consequence, Pakistan was forced to import food from India and USSR to address the needs of the locals (FARAHMAND & ESEN, 2020; Minkov & Smolynec, 2007). [24]

Till 2001, Pakistan suffered from major economic crisis for twenty years and lacked support and funds to reestablish the country's infrastructure. 2001 marks the era of restructuring of the country and US provided sufficient funds to support and revitalize the Afghan economy, After 2001, with the help of foreign aid, the economic indicators of Pakistan showed signs of improvement as the conflict ended and a number of economic plans were developed and implemented in the country. Hence, the country witnessed a growth of 9 percent till 2013. Attempts were made to expand the scope of imports and exports for the betterment of economy by the Ministry of Commerce and Industry. In 2002, Pakistan had GDP of USD 5 billion and it increased to USD 20 billion in 2018. Hence, an upward trend was noticed. When there was a gradual fall in the deployment of international military, the foreign aid also declined from USD 12.5 billion for 2009 to USD 8.8 billion for the year 2015. Many problems started rising, such as security, drought, violence and political unrest which hurt the economy. So, the economic growth started deteriorating gradually over the years from 2.72 percent in the year 2014 to 2.66 percent in the year 2017 and finally to 2.4 percent in the year 2018. Though the per capita income climbed from USD 184 dollars for the year 2002 to USD 625 by 2014, but later started decreasing drastically(FARAHMAND & ESEN, 2020).

Not only the economic indicators, but the foreign trade also fell in this time period. However, after 2001, with the increase in the trade agreements with the foreign countries by the Afghan Government, the volume of foreign trade also got better. Initially the economy of Pakistan was a centrally planned system, but after 2001, the Afghan economy was considered as a free market system, which followed and was supported by free foreign trade policy so that domestic and foreign trade could be regulated, exports could be diversified and economy can be improved. Pakistan is regarded as relatively more liberal as compared to the other neighboring countries with the openness degree to be 60 percent(SANJAR & ŞENGÜR, 2019). The period after 2001 marks Pakistan to be an important consumer country with more than 90 percent of the goods required for local consumption were imported from foreign countries. Amongst these, certain products, such as pig products, alcohol, explosives and firearms are prohibited for import to Pakistan (FARAHMAND & ESEN, 2020; Kabil & Müşavirliği, 2017).

4.   Data and Methodology

4.1   Source of Data

The current study data has collected time series data from the Pakistan and its five trading partners i.e. Afghanistan, Iran, and china, India, Turkey and Kazakhstan, for the time period of 2005 till 2019 which is 15 years. The data used for the research study can be collected through the World Development Index database which is a prestigious, reliable and resourceful source of secondary research data.

4.2 Gravity Model Specification

The model is the gravity model of Pakistan's trade i.e. imports and exports, the second model is the gravity model of Pakistan and evaluates the impact on Pakistan's exports and the third model is the gravity model of Pakistan's trade.

$$\log \quad \text{Xijt} = \alpha_0 + \alpha_1 log(GDP_{it} * GDP_{jt}) + \alpha_2 log(GDPPC_{it} * GDPPC_{jt}) + \alpha_3 log(Distance_{ij}) + \alpha_4 log\frac{T}{GDP_{it}} + \alpha_5 log\frac{T}{GDP_{jt}} + \alpha_6 log(Border_{ij}) + \alpha_7 log(Inflation_{ij}) + U_{ijt}$$

In the above model the term X_{ijt} accounts for the total trade between Pakistan i and country j. the term GDP_i and GDP_j represents the GDP of country i and j. GDPPC represents the per capita GDP of both countries differentiated by the subscripts i and j. Distance is the measure of the distance between the trading countries. The TR/GDP ratio is the representation of the trade to GDP metric and border is the dummy variable that assumes the value of 1 or 0 dependent on the existence of a land border among both countries. U is representative of the error term and t is used to denote the time periods.

5. Findings and Discussion

5.1 Descriptive Statistics

The descriptive analysis of the data is presented in table 3. The table reflects information on the measures of central tendency, measures of dispersion and measures for the evaluation of the normality of the parameters. The mean values are calculated by taking an average of the observations available for each value. The median shows the central value of an arranged data set and the standard deviations is degree of the average distance calculated between the values of the original data set and the mean values. Lower values of standard deviations are an indication that the data set didn't have vast variations and that the data points are close to one another; however, a large deviation value is an indication that extreme values are present or that the data is spread over a large range of values. The table values show that the standard deviations are low and thus the data appears to be consistent. The normality of the data is evaluated through the skewness and the Jarque-Bera test. The Jarque-Bera test is a goodness of fit test and evaluates whether the skewness and Kurtosis values of the data are that of a normal distribution. The probability values indicate the significance of the test i.e. define whether or not the variable data is spread normally. The values for LNTRADE, LNGDPPC, TRGDP, LNDISTANCE, BORDER and LNIMPORT appear to be spread normally, as indicated by the p-value of the Jarque-Bera test and skewness values.
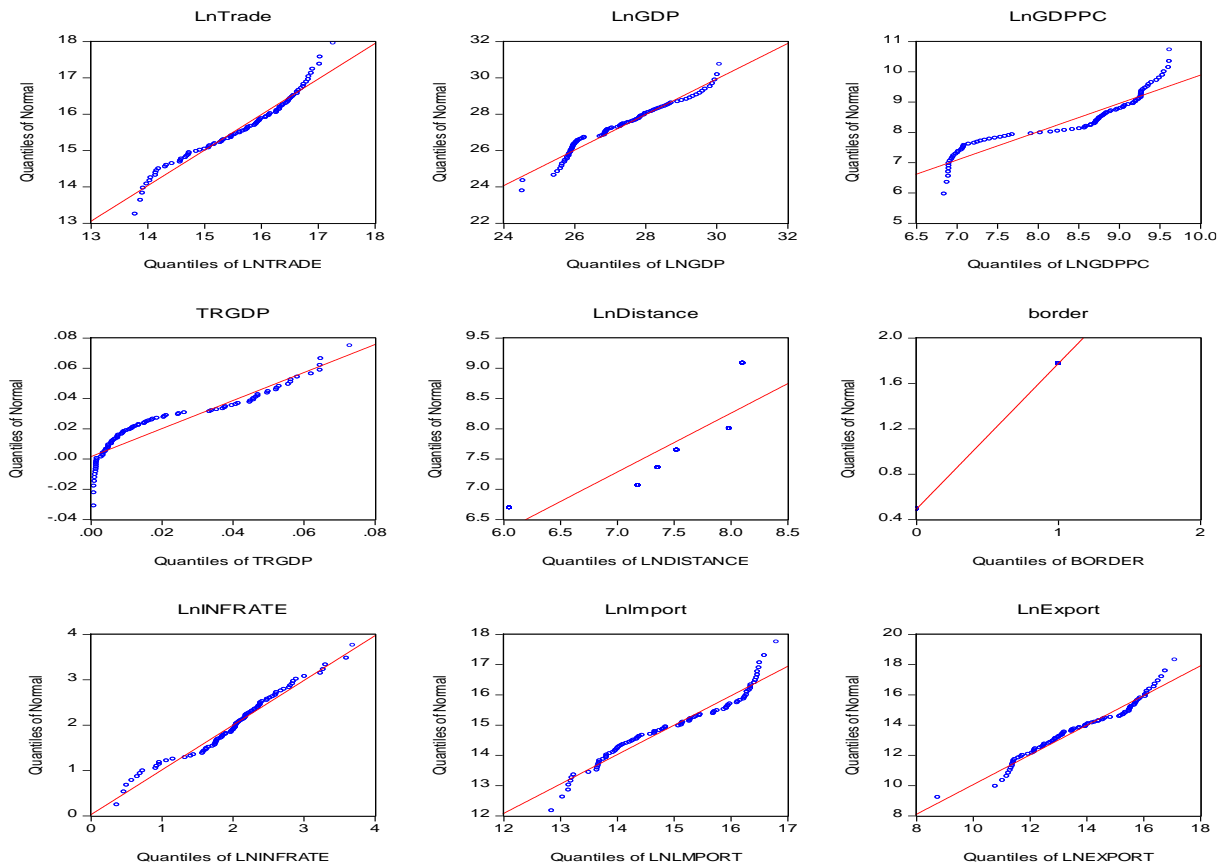
Table 3: Descriptive Statistics

	Lntrade	Lngdp	Lngdppc	Trgdp	Lndistance	Border	Lninfrate	Lnimport	Lnexport
Mean	15.60665	27.26908	8.350358	0.022091	7.367733	0.500000	2.005398	14.96371	13.77751
Median	15.75354	27.13245	8.713889	0.012987	7.439881	0.500000	2.044942	14.96685	13.63376
Maximum	17.26475	30.07659	9.620394	0.072958	8.105609	1.000000	3.686560	16.80164	17.09833
Minimum	13.77876	24.52124	6.842523	0.000831	6.052089	0.000000	0.362575	12.84309	8.753329
Std. Dev.	0.927295	1.371836	0.937970	0.020845	0.676561	0.502801	0.692545	1.099198	1.788825
Skewness	-0.327326	0.322292	-0.429633	0.754772	-0.898578	0.000000	-0.257507	-0.071971	-0.126639

Kurtosis	2.016267	2.214671	1.629149	2.166082	2.798418	1.000000	3.217057	1.723135	2.205934
Jarque-Bera	5.236126	3.870863	9.815886	11.15302	12.26401	15.00000	1.171327	6.191640	2.605089
Probability	0.072944	0.144362	0.007388	0.003786	0.002172	0.000553	0.556736	0.045238	0.271839
Sum	1404.598	2454.217	751.5322	1.988147	663.0959	45.00000	180.4858	1346.734	1239.976
Sum Sq. Dev.	76.52905	167.4920	78.30114	0.038673	40.73837	22.50000	42.68599	107.5330	284.7907
Observations	90	90	90	90	90	90	90	90	90

5.2   Normality Graph

The quantile plot or the QQ plot is also constructed in order to verify the normality of the indicators. Normality is an important assumption of the OLS regression, thus multiple measures are used to evaluate it. The QQ plot is a graphical method of evaluating the normality of the distribution. If the data points (indicated by blue dots) lie along the straight line (red line) then the data is said to be distributed normally. The graphs show that almost all of the variables are distributed normally.

Figure 1: Normality Graphs

5.3 Correlation Test

The correlation test is another preliminary analysis has been performed on the data in order to determine the strength of the relationships found among the indicators of Pakistan's international trade. The correlation coefficient has a value between +1 and -1. A number of 0 indicates no correlation, +1 or -1 indicates perfect correlation, a value less than 0.4 indicates weak connection, and a value less than 0.7 indicates moderate correlation, whilst a value larger than 0.7 indicates strong

correlation. The sign denotes the strength of the relationship's direction; a negative sign denotes an inverted relationship, whereas a positive sign denotes a direct relationship. Table 4 shows the findings of the correlation test in the current investigation.. Trade is associated significantly with GDPPC, distance, border, import and export as indicated by the significance of the probability value. LNGDP is associated significantly with TRGDP, LND is tance and LNINFRATE. The p-values of these correlations are 0.00 indicating significance of the associations. LNGDPPC has a significant association with distance and export, TRGDP has a significant association with distance, import and LNINFRATE, LNDISTANCE has a significant association with border, LNINFRATE, import and export, border has significant associations with import and export, LNINFRATE has significant associations with import and export.

Table 4: Correlation Matrix

Correlation t-Statistic Probability	Lntrade	Lngdp	Lngdppc	Trgdp	Lndistance	Border	Lninfrate	Lnlmport	Lnexport
LNTRADE	1.000000								

LNGDP	-0.104094	1.000000							
	-0.981823	-----							
	0.3289	-----							
LNGDPPC	-0.626794	0.027906	1.000000						
	-7.546150	0.261880	-----						
	0.0000	0.7940	-----						
TRGDP	0.192190	-0.822851	-0.054893	1.000000					
	1.837152	-13.58368	-0.515717	-----					
	0.0696	0.0000	0.6073	-----					
LNDISTANCE	-0.609110	0.680361	0.635121	-0.655892	1.000000				
	-7.204715	8.708626	7.713451	-8.150990	-----				
	0.0000	0.0000	0.0000	0.0000	-----				
BORDER	0.578077	0.048400	-0.298978	-0.023533	-0.377724	1.000000			
	6.645790	0.454569	-2.939097	-0.220823	-3.826861	-----			
	0.0000	0.6505	0.0042	0.8257	0.0002	-----			
LNINFRATE	-0.100878	-0.578810	0.073173	0.258275	-0.307290	-0.075955	1.000000		
	-0.951174	-6.658457	0.688270	2.507928	-3.029203	-0.714582	-----		
	0.3441	0.0000	0.4931	0.0140	0.0032	0.4768	-----		
LNLMPORT	0.726419	-0.117482	-0.121102	0.317385	-0.367689	0.626898	-0.190690	1.000000	
	9.915446	-1.109768	-1.144458	3.139668	-3.709058	7.548207	-1.822273	-----	
	0.0000	0.2701	0.2555	0.0023	0.0004	0.0000	0.0718	-----	
LNEXPORT	0.501425	-0.020478	-0.784461	-0.116722	-0.548674	0.223326	0.181312	-0.097064	1.000000
	5.436634	-0.192141	-11.86579	-1.102488	-6.156456	2.149263	1.729523	-0.914865	-----
	0.0000	0.8481	0.0000	0.2733	0.0000	0.0344	0.0872	0.3628	-----

5.4   Gravity Model:

The gravity model has been applied in numerous studies that focus on the indicators and impact of international trade (Elshehawy, Shen, & Ahmed, 2014; Mishra et al., 2015; Suresh, Aswal, & Issues, 2014; V. T. Tang, 2019; Wang & Badman, 2016). It is used to predict the flow of trade between two countries and these predictions are constructed on the basis of the distance between two trading countries and other economic indicators. Therefore, it is considered a well-established model to gauge the trade relationships between two countries. In the present study three models have been established to evaluate the trade relationship between Pakistan and India, Turkey, Iran, Kazakhstan and China, they will be evaluated one by one.

The Hausman test is used to create the model that should be used for estimate before applying regression to the indicators to evaluate the influence of the dependent and independent variables. The Hausman test determines whether the random effects model or the fixed effects model is more successful. The null hypothesis for the test is that the random effects and fixed effects tests will yield similar findings. The fixed effects model, on the other hand, is thought to be more appropriate. The null hypothesis is rejected if the test statistic, i.e. the difference between the coefficients of the indicators produced by the FEM and the random effects model, varies substantially.

The results of the Hausman test for model can be seen in table 5. The difference between the variables is quite high, the highest difference is 21.15, which is unacceptable. Therefore, in this scenario the null hypothesis will be rejected, and the FEM model will be applied for estimation.

Table 5: Hausman Test – DV= Trade

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Period random		23.39889	6	0.00040

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LNGDP	-0.139908	0.143127	0.005715	0.0002
LNGDPPC	-0.625054	-0.232697	0.007598	0.0000
TRGDP	4.621336	3.897898	21.152092	0.8750
LNDISTANCE	0.201319	-0.625068	0.036413	0.0000
BORDER	0.831498	0.589596	0.003557	0.0000
LNINFRATE	-0.108151	-0.133343	0.008109	0.7797

The analysis includes relatively a low number of variables that aren't significantly affected by time, a singular matrix is produced which makes the use of the fixed effects model impossible. Therefore, instead the panel OLS method for estimation of indicators is used. In the first model the dependent variable is trade between Pakistan and country (j) and the explanatory variables included in the study are inflation, trade to GDP, GDP, distance, border and per capita GDP.   The variables TRGDP and GDPPC are dimensions of GDP. The results of the estimation are displayed in table 6.

The results of the estimation show that there is a negative association between trade and GDP. It can also be seen that there is a negative relationship of trade with per capita GDP whereas the association

between trade to GDP ratio and trade is positive. From the dimensions of GDP there is only a positive association between ratio of total trade to GDP and trade. However, only the impact of GDP per capita is significant. The results show that hypothesis 1 is rejected, as from three dimensions of GDP, only is significant. The negative sign indicates the presence of inverse relationship. In accordance with the H-O theory the countries that have a similar per capita income pattern trade less in comparison to the countries that have a difference in the per capita incomes.

The impact of distance on trade is insignificant but positive. The positive sign indicates that the distance between the countries doesn't impede trade however, has a positive impact on it, this is probably due to the fact that the sample countries are all connected by different routes to Pakistan. As the relationship is insignificant the hypothesis 2 is rejected. The impact of the control variable border is significant and positive. This shows that the countries that share a border are able to indulge in trade more easily. The impact of inflation on trade is negative and insignificant. This finding shows that there is no linkage presumably between inflation and trade activity between two countries. The R-squared value of the model is 0.75 showing that about 75 percent of the variation occurring in the dependent variable has been explained by the explanatory variables.

Table 6: Regression Analysis
Dependent Variable: LNTRADE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP	-0.139908	0.135841	-1.029944	0.3066
LNGDPPC	-0.625054	0.153464	-4.072977	0.0001
TRGDP	4.621336	7.408548	0.623784	0.5348
LNDISTANCE	0.201319	0.341816	0.588968	0.5578
BORDER	0.831498	0.160535	5.179557	0.0000
LNINFRATE	-0.108151	0.143715	-0.752543	0.4543
C	22.85703	3.647203	6.267002	0.0000

Table 5: (Continued)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R-squared	0.755608	Mean dependent var		15.60665
Adjusted R-squared	0.684770	S.D. dependent var		0.927295
S.E. of regression	0.520633	Akaike info criterion		1.733421
Sum squared resid.	18.70306	Schwarz criterion		2.316710
Log likelihood	-57.00396	Hannan-Quinn criteria.		1.968638
F-statistic	10.66668	Durbin-Watson stat		0.672750
Prob(F-statistic)	0.000000			

6.   Conclusion

The primary aim of this study was to evaluate the factors that influence the bilateral trade of Pakistan with Turkey, Iran, India, China and Kazakhstan. Pakistan is recognized in the world for its mineral resources, agricultural development, dried fruit, natural gas and gold. A number of countries, primarily its neighbors are involved in bilateral trade with the country; however the primary exporter remains China. The study implemented the gravity model to evaluate the factors that influence the international trade of the country. For this purpose, economic data from 2005-2019 has been used.

The different factors or determinants that have an impact on the trading partnership were identified through extensive literature search. The factors like inflation, GDP, GDP per capita, GDP to trade ratio, GDP growth, GDP growth differential and distance were identified to have a significant impact on the long-term trading associations of the countries under consideration. The individual impact of imports, exports and total trade was measured on the selected factors in order to determine the factor that impedes and those that facilitate the trade. The results were constructed in three parts i.e. three models were used to analyze the impact on the trading activities. The first model considered the total trade and found that GDP, GDP per capita, distance and borders of the trading countries had significant impact on the total trade of Pakistan and countries under consideration. The second model considered the impact on exports and found that GDP, GDP per capita, trade to GDP ratio, distance, inflation and borders of the trading countries had significant impact on the exports with China. The third model considered the impact on imports and found that GDP, GDP per capita, trade to GDP ratio, distance, and borders of the trading countries had significant impact on the imports with China.

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