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DETERMINANTS OF PAKISTAN'S BILATERAL TRADE WITH MAJOR TRADING PARTNERS: AN APPLICATION OF HECKSCHER-OHLIN MODEL AND TINBERGEN GRAVITY MODEL

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ABSTRACT

This paper applies Heckscher-Ohlin and gravity model to examine the bilateral trade performance of Pakistan with other selected countries including China, Bangladesh, India, Iran, United Arab Emirates, Algeria, Saudi Arabia, Malaysia, Sri Lanka, Thailand, United Kingdom and United States. The size of economies, Distance, and scale reveal that these nations have great geographical, economic importance. The Study has used panel data on trade with other core variables i.e., land endowment, capital endowment, labor endowment, population scale, GDP distance and Remoteness over the period 2002 to 2019. The results divulge an enormous effect of Bilateral trade in case of Pakistan with other partner countries. ARDL results illustrate that there is significant upshot of remoteness with trade due to having substantial marketing network among these nations. Similarly, GDP distance and land endowment along with capital, labor endowment have also favorable effectiveness on trade and these variables demonstrate positive and significant effect on the volume of trade. While population scale has an adverse effect on the volume of trade. Study concludes that it is necessary to focus more on human capital as well as on physical capital for constructing a large framework globally to enhance the international trade volume. Though the policy of spending more on human capital, by offering incentives to Pakistani people to involve in trade activities as well as focusing more on the free trade agreement between the partner countries can be fruitful for enriching the trade pattern among these nations.

Key words: Trade volume, Heckscher-Ohlin theory, gravity estimation, factor endowments, remoteness,
JEL Code: F12, C23

I. INTRODUCTION

The current era's channel of trading is tranquil for the intensification of relations among nations. Today, numerous states adopt different diplomatic strategies to approach the global connections and to approach the markets, based on good geographical, cultural, size of economic background with other states. Though shipping of goods and services from one boundary to another boundary has important insinuations for nation's welfare. Trade is one of those imperious tools that help with the allocation of resources and also it promotes economic scale, competition, and specialization (Grossman and Helpman, 2021). Technology with factor endowments is a major driving force today for the quality development of any country. Likewise, it is so major element for the expansion of trade performance Jianmin and LI (2020). The high technology-based trade with strong geographical connections is contributing a significant share for economic growth. Though, the higher production-based countries are speedily moving and exchanging their commodities from one boundary to another as compared to lower-based production countries in the modern world Irshad (2021) and contributing a larger share in their Gross Domestic Product (GDP) level. The means of communication, transportation, modernized infrastructure with good geographic condition attracts the globe's political, economic, social, cultural, religious values with high strengthen so that it stimulates the output level of the country progressively Shahzad (2019). Pakistan is increasing its trade volume for a few years because of having good diplomatic strategies with other nations including underdeveloped, developing and developed nations for the stabilization of economic performance.

The gravity model is used generally for investigating trade volume and it is considered a common tool to analyze the trade flow across the nations. Many researchers have done their research based on the gravity model using different

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countries groups on trade. Similarly, different researchers found different outcomes based on different samples, periods, methods and countries. The additional attention of this paper for gravity estimation is that the necessary required data on trade is easily accessible. Current research is so different from many of other researches because of constructing remoteness, Labour endowment, capital endowment, population scale, GDP distance variables that had not been designed and mentioned collectively in any of research for representing bilateral trade through gravity model except study Ali et al. (2021) in which they designed these variables for elabourating bilateral trade structure of Pakistan. A few studies used as remoteness is the most imperative variable for trade volume as study Brodzicki et al. (2015) measures the distance with GDP of countries and size to measure the gravity estimation. Likewise, Beronilla et al. (2016) designed the same variable related to the distance for measuring the trade in his study like that of study Brodzicki et al. (2015) and they found the significant effects of size and distance for potential level of the economy. Celebi (2019) also used remoteness for elabourating the Low and lower-middle-income countries performance as well as to examine the upper-middle- and high-income countries performance of the trade. Similarly, Manosuthi (2020) used the weight of distance for measuring the trade pattern of Hong Kong trade flow. Halaszovich and Kinra (2020) measured the same location index, taking the average export distance and import distance between countries. The remoteness is also used to an enormous extent for gravity estimation in the Study of Rasoulinezhad (2018) and Das et al. (2015). Qi et al. (2020) also used a population scale for China as the study of Sun and Li (2018) and Loseva et al. (2016), with some other variables for measuring gravity estimation in their study. In some of the studies, the capital endowment is also used as a core variable for analyzing the trade volume as studies Aghlmand et al. (2018), Khan et al. (2020) and Cieslik (2020) show the significant effects of capital endowments on trade volume. While the study of Loseva et al. (2016) emphasized the population scale with economies of nations that are influencing variables for the trade volume. Thus, the current study has taken scale, size, remoteness of economies with factor endowments as core areas for the effectiveness of trade volume following the study Ali et al. (2021). Theoretically, our study is similar to the study of Davis (1995) and Suzuki and Doi (2019) in which they used the Heckscher Ohlin model to explore the factor endowments and technology effects on the volume of trade. Likewise, the study of Jha (2020) is also analogous with the Heckscher-Ohlin model that is related to factor endowments and technology differences in which he proofed that due to the progress of factor endowment in two countries, the escalations in the volume of trade occur progressively. Now we see the literature review of different studies.

II. LITERATURE REVIEW

Numerous studies have been done to intricate the estimation of trade volume in different decades based on different data set, samples, modelling and techniques. Different researchers found different outcomes due to different geographical, social, cultural, economic distances along with boundaries. Anderson (1979) suggested the gravity model and found significant outcomes based on the size of economies with the volume of trade. Results showed that the same economies of different nations have positive effects on the volume of trade while the different economies (i.e., small or larger) have less effect on the volume of trade. These findings were the same as in the literature of Fujita, Krugman and Venables (1999) the same consequences have been endorsed based on different selected countries. Another study on factors endowments Helpman and Krugman (1985) given the contradictory arguments between the volume of trade and factor endowments. Their findings reveal that volume of trade does not necessarily upsurge with the increase in factor endowments despite having similarities in the boundaries for economies of scale. The concordant opinion by Bacchetta et al. (2012) with the same above study on multilateral trade, reveals that any increase in the level of factor endowments causes to increase the volume of trade progressively. Results show that the similarity in factor endowment may cause to increase the trade volume despite having variation in productivity level. The difference in productivity level may increase the production level across the countries and it is connected with the specialization aspect based on factor endowments. A study by Tripathi et al. (2013) also used the gravity model for estimation of trade patterns in India with selected 22 countries. The findings of this study reveal that cultural proximity and political globalization are positively correlated with bilateral trade. In this paper, common border and economic size are used as a proxy of cultural proximity and political globalization. Drzewoszewska (2014) also examined a study on the panel gravity model for the estimation of multilateral trade. The empirical results show that there exists a significant association of national income with the trade pattern. Similarly, the exporter's remoteness also conformed to a substantial effect on trade while the importer's remoteness didn't find substantial effects because of higher cost for EU countries. Panda and Sethi (2015) found significant results for trade in the case of India with 226 trade partners using panel data over the period 2005-2012. Results indicated the positive effect of common language, border, common colonial and Trade. Likewise, these are also certainly connected with the GDP level of partner countries while the unfavourably connected with the distance level and per capita level of partner countries. Sheikh et al. (2018) analyzed a study on bilateral trade using panel data 2013-2014 of Pakistan with other member of CEO countries by estimating gravity model. The empirical results reveal that the bilateral trade is positively correlated with the GDP,

border and trade openness. However, bilateral trade is negatively correlated with the exchange rate, distance and per capital GDP.

Oladipupo and Adedoyin (2019) used augmented gravity model to estimate the trade pattern in case of the Nigerian economy with sixteen trade partners countries and found fruitful upshots of remoteness, economic mass, population with trade level while found adverse upshots in case of distance with trade level using 1980 to 2000-2016 data of selected countries. A study by Liu et al. (2019) also examined trade with factor endowments, for China and Kazakhstan. They explored significant outcomes based on the comparative advantage theory. The findings revealed that different commodities-based trading generated a prodigious potential and caused a strong bilateral economic relationship for these two nations. It is because Kazakhstan is one of the five foremost countries in central Asia that has strong diplomatic strategies for the development of regional trade in Asia. In favour of the above study, the findings of Jianmin and li (2020) proposed the same inscription for the volume of trade and factor endowments. According to results technology and relative endowments have a chief influence in the production process and countries may have different outcomes from other countries due to their specialization aspects. The study found nonlinear effects between factor endowment and volume of trade.

The research gap is also seemed in current research. In many of previous studies, factor endowments along with population scale, GDP distance have not been discussed especially for Pakistan and with other partner countries. Some of studies have used gravity model to estimate the trade volume in which they had not been used factor endowments properly with theoretical base along with other core variables GDP distance, population scale and remoteness that are so influential areas for enriching the trade volume between countries. The limitations of current study are also seemed in present study. As the data of 2002-2019 has been taken for presenting the bilateral performance of trade due to inaccessibility of some apposite data because of current disease covid-19. Exchange rate can also be included in further research studies with these core areas for the determination of bilateral trade.

III. DATA AND METHODOLOGY

Thirteen countries including Pakistan, China, Algeria, United Arab imarets, Bangladesh, India, Iran, Malaysia, Sri Lanka, Saudi Arabia, Thailand, Unite States, and United Kingdom have been focused for current study. The data of exports and imports have been taken from Pakistan Economic Survey, data of Gross Domestic Product Per Capita (GDPPC) and Gross Domestic Product (GDP) have been gathered from the international monetary fund, while the data of total population, arable land, capital, labor force, world GDP have been taken from world Bank. Based on these variables, study has designed variables trade, remoteness, population scale, land endowment, capital endowment and GDP distance following studies Wei (1996), Baxter and Kouparitsas (2006), Trotignon (2010) and Kikerkova et al. (2021).

Table 1 Measurement and Designing of variables

Variables	Designing	Description	Unit	Source
Trade volume	Exports plus Imports of related country	Log of trade volume	Current US $ billion	Pakistan Economic Survey
Capital Endowment	Maximum value of Pakistan's capital ratio & partner country's capital ratio divided by Minimum value of Pakistan's capital ratio & partner country's capital ratio	Log of capital endowment	Current US $ (billion)	World Bank
Labor endowment	Maximum value of Pakistan's labor ratio & partner country's labor's ratio divided by Minimum value of Pakistan's labor ratio & partner country's Labor ratio	Log of labor endowment	Current US $ (billion)	World Bank
Land endowment	Maximum value of Pakistan's Land ratio & partner country's land ratio divided by Minimum value of Pakistan's land's ratio & partner country's land ratio	Log of land endowment	Arable Land (Hectares)	World Bank
Population scale	Total population of Pakistan multiplied by population of partner country	Log of population scale	Billions	World Bank
Remoteness	Distance (proxy of transportation cost) multiplied by GDP of partner country divided by GDP of world	Log of Remoteness	Current US $ (billion)	International Monetary Fund,
GDP Distance	Maximum value of GDP per capita of Pakistan & partner country's GDP per capita minus Minimum value of Pakistan's GDP per capita & partner country's GDP per capita	Log of GDP Distance	Current US $ (billion)	International Monetary Fund

Our study is based with the H.O (Heckscher-Ohlin) theory. Accordingly, Heckscher-Ohlin theory of comparative advantage there are two homogenous factors of production, for two commodities and two countries case, as;

LBx; labor input with x commodity
CPy; capital input with y commodity
For product x, capital-labor ratio can be written as; Cx/Lx
Let Cx/Lx= X
For product x, capital-labor ratio can be written as; Cy/Ly
Let Cy/Ly= Y
It is assumed that these ratios are the same for both countries based on the constant return to scale assumption. Likewise doubling the number of inputs, the double will be the output level. We can write the cost of the inputs based on the long-run while eliminating economic profit; x unit cost;

$$C_{x=} rCP_x + \omega LB_x \quad (1)$$

y unit cost;

$$C_{y=} rCP_y + \omega LB_y \quad (2)$$

Assuming that $CP_x = XLB_x$ and $CP_y = YLB_y$

Cost statement can be shown as,

$$C_{x=} rXLB_x + \omega LB_x$$

$$C_{x=} (rX + \omega)LB_x \quad (3)$$

$$C_{y=} rYLB_y + \omega LB_y$$

$$C_{y=} (rY + \omega)LB_y \quad (4)$$

For relative cost of trade, we can rewrite both equations 3 & 4 as;

$$\frac{C_x}{C_y} = \frac{(rX + \omega)LB_x}{(rY + \omega)LB_y} \quad (5)$$

If two commodities corporates the same amount of labour as $LB_x = LB_y$ then equation (5) can be modified as;

$$\frac{C_x}{C_y} = \frac{(rX + \omega)}{(rY + \omega)} \quad (6)$$

Now by dividing 'r' on right side of equation,

$$\frac{C_x}{C_y} = \frac{rX/r + \omega/r}{rY/r + \omega/r}$$

$$\frac{C_x}{C_y} = \frac{(X + \omega/r)}{(Y + \omega/r)} \quad (7)$$

Heckscher-Ohlin theory of comparative advantage requires two inputs labor & capital, two goods x and y, two technological production process X & Y.

Where, ω_1 represents the wages for labor and r_1 shows the rent for capital in country 1. Likewise, ω_2 reveals the wages for labor and r_2 demonstrates the rent for capital in country 2.

Though, the cost ratio of country 1

C1= C_{x1}/C_{y1} will be equal to $C_1 = \frac{(X + \omega_1/r_1)}{(Y + \omega_1/r_1)}$ (8)

while the cost ratio of country 2

$C_2 = \frac{C_{x2}}{C_{y2}}$ will be equal to $C_2 = \frac{(X + \omega_2 / r_2)}{(Y + \omega_2 / r_2)}$ (9)

According to the comparative advantage's doctrine trade only occurs when $C_1 \neq C_2$ of other nation. Thus, if X=B then

$$C_1 = \frac{(X + \omega_1 / r_1)}{(Y + \omega_1 / r_1)} \quad \& \quad C_2 = \frac{(X + \omega_2 / r_2)}{(Y + \omega_2 / r_2)}$$

There will be no comparative advantage in case of the same commodities production due to the same factor intensities. If $\omega_1 / r_1 = \omega_2 / r_2$ thus it is necessary for trade

when $X \neq Y$ or $\omega_1 / r_1 \neq \omega_2 / r_2$ when there arises a difference between relative factor endowments, factor intensities in the production process. If $X \prec Y$, it means that $C_x \prec C_y$ because $(X + \omega_1 / r_1) < (Y + \omega_1 / r_1)$ though producing x, the cost will be lower as compared to y, if x technology is labor-intensive. However, country 1 has lower producing cost when $C_1 \prec C_2$ and further it constructs the condition where;

$$\frac{(X + \omega_1 / r_1)}{(Y + \omega_1 / r_1)} \prec \frac{(X + \omega_2 / r_2)}{(Y + \omega_2 / r_2)}$$

Now by multiplying denominators on each side

$$(X + \omega_1 / r_1)(Y + \omega_2 / r_2) \prec (Y + \omega_1 / r_1)(X + \omega_2 / r_2) \quad (10)$$

$$XY + X(\omega_2 / r_2) + Y(\omega_1 / r_1) + (\omega_1 / r_1)(\omega_2 / r_2) \prec XY + X(\omega_1 / r_1) + Y(\omega_2 / r_2) + (\omega_1 / r_1)(\omega_2 / r_2) \quad (11)$$

We omit the same values in above equation on each side $X(\omega_2 / r_2) + Y(\omega_1 / r_1) \prec X(\omega_1 / r_1) + Y(\omega_2 / r_2)$ (12)

$$Y(\omega_1 / r_1) - X(\omega_1 / r_1) \prec Y(\omega_2 / r_2) - X(\omega_2 / r_2) \quad (13)$$

$$(Y - X)\omega_1 / r_1 \prec (Y - X)\omega_2 / r_2 \quad (14)$$

Country 1 is assumed as labour abundant country because it is producing commodity (x) based on labour-intensive condition, thus it has the comparative advantage in (x) while other country has capital-intensive condition due to producing (y) commodity and has a comparative advantage in (y) good. Equation 14 fulfills the condition of Heckscher-Ohlin theory of comparative advantage where factor endowments as well as factor prices are considered major tools to influence the price of goods in both nations. Each good requires factor inputs in different proportions. As relative use of factors in Pakistan and partner countries are not same for all goods and services in production process. Similarly, goods and services necessitate factors input in different proportionate. Pakistan is primarily a labour abundant country so that it exports a massive share of labour-intensive commodities to its industrialized partners because of having a cheap labour domestically.

Basically, Pakistan has an ability to produce commodities relevant with agriculture sector so that it is superior from partner country, for example, Saudi Arabia that is not agriculture country while Saudi Arabia is better endowed to supply oil or petroleum products. However, the prices of petroleum products are lower in Saudi Arabia. Thus, theory supports the evidence where trade is beneficial for both partners when they trade such substances to each other based on different factor endowments and factor intensities.

Now we can construct a gravity model estimation. Firstly Tinbergen (1962) and Poyhonen (1963) used the gravity equation for analyzing the flow of trade. Thus, the gravity equation can write as;

$$Tr_{in} = (Y_i Y_n)^{\infty} (Dis_{in})^{\delta} \tag{15}$$

Where Tr shows the trade volume of country i, and n.
Y shows the income level/Gross Domestic Product (GDP) Battersby and Ewing (2005) of countries i and n. Likewise 'Dis' shows the volume of the distance of countries i and n. ϕ, and δ are the parameters used for the estimation of the gravity model.
The extended form of gravity model used for analysis can be rewritten as,

$$Tr_{in} = (Y_i Y_n)^{\delta 1} (Dis_{in})^{\delta 2} (PO_i PO_n)^{\delta 3} (RE_{ij})^{\delta 4} (LE_{ij})^{\delta 5} (CE_{ij})^{\delta 6} (LBE_{ij})^{\delta 7} \varepsilon^{uin} \tag{16}$$

Where Tr shows the volume of trade of countries i and n. Y shows the Gross Domestic Product (GDP) of countries i and n. 'Dis' shows the volume of distance of countries, PO shows the population scale of countries i and j, RE shows the remoteness of countries i and j. Likewise, LE reveals the land endowment of countries and CE reveals the capital endowment and LBE is labor endowment of countries i and j. The general form of model is

$$TR = f(CE, LBE, LE, RMT, PSC, GD) \tag{17}$$

Where:
TR=Volume of trade
CE=Capital Endowment
LBE=Labor Endowment
LE=Land Endowment
RMT=Remoteness
PSC=Population scale
GD = GDP Distance

In econometrics form, equation can be written as;

$$TR_{it} = \beta_0 + \beta_1 CE_{it} + \beta_2 LBE_{it} + \beta_3 LE_{it} + \beta_4 RMT_{it} + \beta_5 PSC_{it} + \beta_6 GD_{it} + \varepsilon_{it} \tag{18}$$

The unrestricted error correction model of bilateral trade is based upon the general equation (17).

$$\begin{aligned} TR_{it} = {} & \sigma_0 + \sigma_1 TR_{it-1} + \sigma_2 CE_{it-1} + \sigma_3 LBE_{it-1} + \sigma_4 LE_{it-1} + \sigma_5 RMT_{it-1} \\ & + \sigma_6 PSC_{it-1} + \sigma_7 GD_{it-1} + \sum_{i=1}^{\Re 1} \gamma_1 \Delta TR_{it-i} + \sum_{i=1}^{\Re 2} \gamma_2 \Delta CE_{it-i} + \sum_{i=1}^{\Re 3} \gamma_3 \Delta LBE_{it-i} \\ & + \sum_{i=1}^{\Re 4} \gamma_4 \Delta LE_{it-i} + \sum_{i=1}^{\Re 5} \gamma_5 \Delta RMT_{it-i} + \sum_{i=1}^{\Re 6} \gamma_6 \Delta PSC_{it-i} + \sum_{i=1}^{\Re 7} \gamma_7 \Delta GD_{it-i} + \varepsilon_{it} \end{aligned} \tag{19}$$

σ_i and γ_{ij} shows the short and long-run coefficients in equation (20) for exploring the relationship between dependent and independent variables. Δ reveals the sign of the first difference while ε_{it} is the error term. Based on this equation the short and long-run results are given in Tables 2 and 3.

$$\begin{aligned} TR = {} & \sigma_0 + \sum_{i=1}^{\Re 1} \gamma_1 TR_{it-i} + \sum_{i=1}^{\Re 2} \gamma_2 CE_{it-i} + \sum_{i=1}^{\Re 3} \gamma_3 LBE_{it-i} + \sum_{i=1}^{\Re 4} \gamma_4 LE_{it-i} \\ & \sum_{i=1}^{\Re 5} \gamma_5 RMT_{it-i} + \sum_{i=1}^{\Re 6} \gamma_6 PSC_{it-i} + \sum_{i=1}^{\Re 7} \gamma_7 GD_{it-i} + \varepsilon_{it} \end{aligned} \tag{20}$$

$$TR = \sigma_0 + \sum_{i=1}^{\Re 1} \gamma_1 \Delta TR_{it-i} + \sum_{i=1}^{\Re 2} \gamma_2 \Delta CE_{it-i} + \sum_{i=1}^{\Re 3} \gamma_3 \Delta LBE_{it-i} + \sum_{i=1}^{\Re 4} \gamma_4 \Delta LE_{it-i} +$$

$$\sum_{i=1}^{\Re 5}\gamma_5\Delta RMT_{it-i}+\sum_{i=1}^{\Re 6}\gamma_6\Delta PSC_{it-i}+\sum_{i=1}^{\Re 7}\gamma_7\Delta GD_{it-i}+\hat{\lambda}ECM_{it-i}+\varepsilon_{it} \quad (21)$$

The parameter $\hat{\lambda}$ shows the coefficient of Error Correction Term (ECT) in equation 22. While the parameters σ_i and γ_{ij} shows the short-run and long-run coefficients in the above equations.

IV. RESULTS AND DISCUSSIONS

IV.I. UNIT ROOT TESTS

To check the stationarity condition of the data study has employed Levin, Lin and Chu (2002) test based on the Akaike Info criterion. A stochastic process is said to be stationary if its mean and variance are constant over time or the moments of the probability distribution are invariant. The results are given in Table: 2

Table 2: Results of Unit Root Tests

	Levin, Lin, chu			Lm, Pesaran, Shin		Fisher-ADF			Fisher-PP			Conclusion
Variables	Individual intercept	Individual intercept & trend	None	Individual intercept	Individual intercept & trend	Individual intercept	Individual intercept & trend	None	Individual intercept	Individual intercept & trend	None	
TR	3.39*	-1.32*	4.67	0.88	0.40	0.96	0.27	1.95	-0.13	1.44	0.34	I(0)
CE	-1.53***	-0.77	-0.74	-0.64	1.10	-0.72	1.15	3.60	-0.64	2.01	2.01	I(0)
LBE	-1.18	0.16	2.06	0.05	0.21	0.13	0.06	2.19	0.47	1.04	2.11	I(1)
LE	-5.02*	-0.34*	0.74	-0.18	-0.66	-0.02	-0.60	-1.84**	-0.63	-0.35	-2.20**	I(0)
PSC	-5.09*	1.41	0.60	0.26	4.06	0.22	4.47	9.98	-3.45*	4.38	12.64	I(0)
RMT	-1.02	-0.47	2.62	0.85	1.59	0.83	1.72	0.83	1.90	1.76	1.90	I(1)
GD	-0.20	-0.42	-0.11	-2.85*	-0.38*	-2.92*	-0.38	1.36	-2.77*	1.04	1.27	I(0)

Based on unit root test, study has used the Autoregressive Distributed Lag (ARDL) well known as Pesaran *et al.* (2001) technique for the specification of gravity model as like the study Ganbaatar *et al.* (2021) and to check the integration between the variables.

IV.II. LONG RUN AND SHORT RUN RESULTS OF DETERMINANTS OF PAKISTAN'S BILATERAL TRADE

Table 3 provides the long-run estimates of bilateral trade. The empirical findings show that factor endowments along with population scale, remoteness and GDP distance have a significant impact on bilateral trade. Critical The availability of capital input is considered a lifeblood of economy that stimulates the production process and attracts the globe market progressively. The economic wheel is directly connected with the capital today due to the substantial level of quantity and quality of capital Umair et al. (2021). The coefficient value of Capital Endowment (CE) indicates a positive and significant association with the volume of trade. It is expected that because of having healthier human as well as physical capital of trade partners may have a potential effect on the trade volume. However, the exchange of goods and services can easily move from one boundary to another boundary due to the usage of capital so that it would enrich the trade share between the trade partners. As Heckscher-Ohlin-Ricardo Approach reveals that the concentration of production in capital-intensive commodities is prolific for capital abundant countries and the production of labour-intensive commodities is positive for labour abundant countries. Based on specialization, countries should trade with partners countries that can be very fruitful for both nations Rasoulinezhad and Jabalameli (2018). So, the value of Capital Endowment (CE) is assumed to be positive with the volume of trade. Results are also in line with the study of Helpman and Krugman (1985) and Kikerkova et al. (2021) while on the contrary with the

study of Flam and Helpman (1987), and Mitra and Trindade (2005). Likewise, these are common with the theory of Davis (1995).

Labour endowment (LBE) is the availability of labour input that has a vigorous role in the production of any product. Labor along with capital and land have been considered a critical factor of production (Jones, 2017). The abundance of such input can directly affect the comparative advantage of labor related product. The labour abundant regions are more likely form a comparative advantage in the labor-intensive commodities. Labor endowment (LBE) has showed a positive and significant link with the trade volume. The results show that an increase in the labor endowment would increase the trade volume by 2.48 units. It predicts that due to some effective use of labor with trading partners, may have substantial effect on trade volume. It is so important driving force that can positively influence trade volume and labor-abundant trade partners can successfully obtain trade benefits. Our results are in the line with the study Maslak et al. (2020) and Rasoulinezhad and Jabalameli, 2018.

Table 3: Long Run Results

Dependent Variable: TR				
Variables	Coefficient	Std. Error	t-Statistic	Prob. *
C	0.881	0.347	2.542	0.012
CE	1.921	0.404	4.750	0.000
LBE	2.487	0.943	2.637	0.009
LE	1.726	0.237	7.277	0.000
PSC	-2.829	0.466	-6.066	0.000
RMT	2.099	0.366	5.737	0.000
GD	4.100	1.053	3.891	0.000

Land is considered a decisive and primarily factor in the production process. The availability of natural resources that are quantitative and qualitative include the absolute size of area owned by region, play a vital role for the production as well as for the transaction of goods and services from one boundary to another boundary. Similarly, Land is counted as first place of all factors Maslak et al. (2020). The land endowment is estimated a positive connection with the volume of trade. It may be due to good geographical interconnection among the states. Because in the current era land endowment is also an imperative facet for the geographical significance of economies. Similarly, land abundant countries can produce at a large scale and can influence the income pattern of economies Deininger (2011), based on the exchange of specific goods and services in which they can gain due to specialization aspect. Though, based on such an argument nation can increase its volume of trade progressively.

The country size matters a lot in the determination of bilateral trade. The population of nation can increase or decrease the trade volume and has a dynamic role for the transaction of goods and services across the nations. The coefficient value of the population scale indicating a negative relationship between the population scale and the trade volume. It is assumed that due to increase in the population, the demand of goods and services can increase that would increase the price level so that less likely will be traded goods and services because of higher cost of production. Though highly cost items can adversely effect on the demand side of partner countries. The other reason may be the less involvement of people in trade activities due to providing inadequate incentives by state. Thus, it is estimated a negative impact of population scale with the volume of trade. Our results are in the line with the studies Coe et al. (2002) and Sheikh et al. (2019) in which they found a negative association of population with the volume of trade. While it is contrary to the study of Akpoilih and Farayibi (2015) in which they found a positive effect on the trade volume.

The role of remoteness has been taken a great deliberation from a few decades that plays a central role in the share of trade volume because of influencing international market framework. The world economic activity related with trade along with distance is considered a vital determinant of bilateral trade that provides quantifiable evidence on the extent of nations' economic well-being Battersby and Ewing (2005). Though, it is assumed that there exists a positive connection between Remoteness (RMT) and volume of trade. It is expected that due to strong geographical linkage as well as strong diplomatic strategies of the domestic state along with partner countries, the remoteness can influence

trade volume effectively across the nations. Our results are matchable with the study of Frankel and Wei (1998) in which they found a positive association between the remoteness and trade volume.

The GDP distance is also an important determinant of bilateral trade. Fundamentally, Per capita GDP difference of nations is influential measure of economic scale that has substantial impact on the volume of trade. Though we estimate the GDP distance to explore the connection of trade volume for Pakistan and trade partners. The coefficient value of GDP distance is positively and significantly correlated with the volume of trade. It is assumed that with the increasing GDP distance nation can produce the specialization base items domestically and can ship abroad progressively. Results match with the studies (Buch & Piazolo, 2001; Porojan, 2001; Baxter & Kouparitsas, 2006) in which they found the positive association of the same variables. While the contrary study of Husain & Yasmin (2015) for Bangladesh shows a negative connection of GDP distance with the volume of trade.

Table 4 Short run results

Dependent Variable: TR				
	Coefficient	Std. Error	t-Statistic	Prob. *
ECT	-0.232	0.133	-1.749	0.083
D(CE)	1.214	0.680	1.786	0.077
D(LBE)	-3.577	1.306	-2.739	0.007
D(LE)	-0.830	0.518	-1.601	0.112
D(PSC)	10.744	1.306	8.229	0.000
D(RMT)	-0.280	1.118	-0.251	0.802
D(GD)	-0.282	6.504	-0.043	0.966
C	-0.881	0.347	-2.542	0.012

Table 4 shows the ECM results that reveal that how short-run elasticities are connected with long elasticities in long run. The long-run elasticities may be convergent to its targeted path or maybe divergent to its targeted path. Mostly it is observed that the elasticities are positive in the long run or speed of adjustment justified the existence of the long-run relationship between variables. The Error Correction Model (ECM) value represents the speed of adjustment under long-run equilibrium and it illustrates, how quickly or slowly variables move towards their equilibrium path. The value of error correction -2.232 in Table 3 shows that the speed of adjustment is high and it will move rapidly to its equilibrium path with 23 percent points. The country-wise cross-section short-run results are specified in Table 5. The short-run coefficient value of Algeria is -0.24 shows that the deviation occurs in long from 24 per cent speed. Though, the speed of adjustment illustrates the convergence towards equilibrium path based on ECT value.

Table 5: Cross section short run Analysis

Variables	Algeria	Iran	Saudi Arabia	United Arab Emirates	Bangladesh	China
ECT	-0.24 0.0004*	-0.74 0.0007*	-0.03 0.0583**	-1.28 0.0003*	0.01 0.1693	-0.38 0.0003*
D(CE)	-0.50 0.4759	0.87 0.0437**	-0.100 0.3167	0.52 0.7214	-0.67 0.0511**	0.47 0.0000*
D(LBE)	0.574 0.044**	-9.371 0.272	0.897 0.084***	1.015 0.427	0.115 0.421	0.036 0.942
D(LE)	-2.96 0.8635	-1.28 0.8976	2.23 0.4090	-0.63 0.0039*	-3.02 0.7807	-0.49 0.2545
D(RMT)	-0.92 0.0039*	-0.29 0.0081*	-0.28 0.0002*	1.73 0.0440**	-0.09 0.3852	-0.001 0.0000*
D(PSC)	9.64 0.7384	1.72 0.9835	1.32 0.9229	-12.01 0.4459	7.64 0.2800	-3.94 0.0752***
D(GD)	8.77 0.3811	0.56 0.7790	4.14 0.1035	-6.76 0.5587	0.06 0.0033*	-0.29 0.0002*
Variables	India	Thailand	United Kingdom	United states	Sri Lanka	Malaysia

ECT	-0.31 0.0015*	0.18 0.0042*	0.06 0.0001*	-0.006 0.0001*	-0.12 0.0001*	-0.23 0.0003*
D (TR (-1))	0.92 0.0408*	-0.57 0.0004*	-0.16 0.1032	-0.06 0.5893	0.21 0.0240*	0.66 0.0006*
D(CE)	-2.57 0.0150*	-2.49 0.0541**	0.09 0.3191	0.33 0.0521**	0.31 0.0127*	0.52 0.0311**
D(LBE)	-2.750 0.543	0.184 0.965	-0.701 0.006*	1.689 0.001*	-5.297 0.070	-1.785 0.527
D(LE)	-9.49 0.7187	-2.52 0.8502	-1.22 0.5580	1.41 0.5768	-0.08 0.7614	-0.29 0.7416
D(RMT)	0.08 0.0000*	-0.06 0.2675	-0.003 0.0000*	2.18 0.0000*	-0.26 0.0867***	-0.06 0.2881
D(PSC)	9.50 0.9679	-7.18 0.9333	7.56 0.3946	0.71 0.9853	5.59 0.2857	-0.85 0.8680
D(GD)	0.18 0.0011*	6.55 0.4869	0.52 0.3334	1.47 0.8916	-0.72 0.0984***	-0.36 0.9202

The ECT value of Iran is -0.74 that is significant. It reveals that the deviation from short run to long run quickly and speedily occurs with 74 per cent. However, the speed of adjustment towards the equilibrium path is also convergent here that justifying the association among the variables in the long run.

In Saudi Arabia case, the ECT value is -0.03 that also shows the convergence situation towards its equilibrium path with the speed of 3 per cent. The same state is observed for the United Arab Emirates with the ECT value -1.28 that also shows that the deviation from short run to long run speedily occurs towards its equilibrium path. In addition, the ECT value of Bangladesh is 0.01 and is seemed insignificant. While the value for China is estimated at -0.38 that reveals the convergence situation. The speed of adjustment for this country occurs with 38 per cent quickly towards the long run. In the case of India, it is -0.31 that also reveals the convergence situation, the speed of adjustment indicates that the deviation from short run to long run can occur at 31 per cent quickly.

While the ECT value is 0.18 and insignificant for Thailand that indicates the divergence situation among the variables. Likewise, as in Thailand the ECT value of the United Kingdom is also positive and divulges divergent situations in the short run. For the United States, the ECT value is significant having a coefficient value of -0.006 which indicates that the deviation from short run to long run can occur among variables. In addition, the ECT coefficient value is -0.12 for Sri Lanka, which shows the significant association among the variables and speed of adjustment indicates that the disequilibrium can restore towards its equilibrium at the speed of 12 per cent in the long run. In the case of Malaysia, the ECT value is -0.23 that also shows the convergence situation in the short run and it demonstrates that the adjustment of disequilibrium occurs towards equilibrium at the speed of 23 per cent.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

The main purpose of the study is to examine the bilateral trade performance of Pakistan with its trade partners using the time period 2002 to 2019. Heckscher-Ohlin theory of comparative advantage and the gravity model have been examined to determine the trade volume. Land endowment, labour endowment, capital endowment along with other core areas including remoteness, and population scale and GDP distance are taken as imperative determinants for trade volume. The empirical results suggest that the remoteness, land endowment and capital endowment are positive and significant with the volume of trade. Likewise, the capital endowment and labor endowment have also favorable effect on the volume of trade. It may be due to having a better human as well as physical capital intensity conditions with partner countries. While the population scale is negatively correlated with the volume of trade. The key policy recommendations on bilateral trade for Pakistan and partner countries include the following:

- Results of factor endowments (labor endowment, land endowment, capital endowment) show a significant role to boost up the trade volume. It is suggested that the policies should concentrate on improving the factor endowments along with factor intensities so that it can expand the volume of trade. In land endowment, there is need to distillate more on arable land for enhancing the production capacity in agriculture sector that supports a gargantuan share in trade. Similarly, the availability of human resource has a dominant role along with good geography and territory of a nation. So, it is essential to take measures for labor-endowment that can upsurge the trade volume. Likewise, human as well as physical capital is another imperative area in

boosting the bilateral trade. Though policy makers may help for increasing the capital share that has an influential impact on the volume of trade between these nations.

- The size of population is important determinant of bilateral trade that generally effects on trade volume. It is needed to concentrate more on such trainings and education that can improve the well-being of people so that they can easily involve for trading activities. However, the trade volume would increase because of supporting a large number of people towards globe market.
- Other vital aspect is to concentrate on GDP distance by focusing more on GDP per capita of nations that can enhance the trade volume between the partner countries.
- The distance along with world economic activity related with the trade is capable for supporting an enormous share in volume of trade between these nations. So, it is needed to focus more on the facet of remoteness that would enhance the economic wellbeing as well as it can pursuit the beneficiations across these nations. These are some important areas that can intensify the volume of trade at regional as well as at globe level amongst these nations.

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