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Economic & Cultural Distance & Regional Integration: Evidence from Gravity Model Using Disaggregated Data for Pakistan

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This study applies generalised gravity models to analyse Pakistan's bilateral trade flows at commodity level using both panel as well as cross-sectional data estimation techniques. The empirical findings indicate that distance and size of the economy are the major determinants of commodity trade flows. For many commodities, real exchange rate, trade preferences, being landlocked, technological differences and market size are vital factors, which boost bilateral trade flows. Remarkably, there is an inverse relationship between bilateral trade flows and a common border. As far as regional trading blocs are concerned, the results show that ASEAN is a potentially significant destination for Pakistan's commodity trade. The findings illustrate that in the case of SAARC trading partners, the potential of trade has not materialised. For the purpose of robustness of our results, we have also used agricultural and non-agriculture related trade costs. Estimates indicate that trade costs between Pakistan and its trading partners are highly significant and negatively related to commodity trade flows, while other empirical findings confirm the robustness of the results.

Keywords: Gravity Model, Commodity, Regional Integration, ASEAN, ECO, OIC, SAA

1. INTRODUCTION

No country in the world can produce all the goods and services it needs as none has the resources to meet all its requirements on its own. Countries differ with respect to skills, technology, land, climate, available capital, labour, mineral products, and forests. Trade with other countries fulfils requirements for goods and services a country is unable to meet itself. In the literature, previous studies empirically evaluate the pattern and determinants of trade flow at the aggregate level by using a gravity model. For instance, McCallum (1995) asserts that a national border has a tremendous effect on trade between the US and Canada. Zarzoso and Lehmann (2003) predict the volume and direction of trade amongst MERCOSUR and European Union. In addition, Boughanmi (2008), and Insel & Tekce (2009) empirically determine the trade pattern of GCC (Gulf Cooperation Council) countries by applying the gravity model.

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In the case of Pakistan, several studies attempted to estimate the pattern and determinants of trade at the aggregate level (Akhter & Ghani (2010); Malik & Chaudhary 2011; and Zaheer et al. 2013). In aggregate level studies, the impact of trade determining factors is expected to be uniform across individual commodities. However, commodity trade flows are frequently affected by the importing and exporting country's policies, among many other factors.

Thus, this study explores the determinants of commodity trade flows in case of Pakistan against 42 major trading partners by using disaggregated data at 3-digit SITC (Standard International Trade Classification) level. For this purpose, we select the 11 most traded commodities based on their importance in consumption, production, and share in aggregate trade flows of Pakistan. The selected commodities are as follows: rice, fruits, leather manufacture, pharmaceuticals, iron & steel, cotton, sports equipment, toys, electrical equipment, motor vehicles, footwear, and cement.

There is very little empirical evidence explaining the pattern of commodity trade flows. For examples, Harrigan (1994) uses the disaggregated data at 3-digit ISIC (International Standard Industrial Classification) level and empirically estimates the intra-industry trade in agriculture-related products such as crop production, livestock, hunting, and fishing. Lee and Swagel (1997) use the 4-digit ISIC data to investigate the effects of trade barriers and industries on the trading patterns of the food manufacturing industry, which includes dairy and grain products, slaughtering, preserved fruit, and canned items.

Moreover, Jayasinghe and Sarker (2008) and Karemera et al. (2009) empirically estimate the effects of regional trade agreements on the trade of selected agriculture-related commodities by using disaggregated trade data. Karemera et al. (2011) found that the uncertainty in exchange rate significantly reduces commodity trade flows. In addition, Castillo et al. (2016) explore the determinants of the wine trade and analyse the changes that have occurred in global wine exports.

The current study has modified the generalised gravity model into a commodity-specific gravity model while using commodity trade flows. A panel, as well as cross-sectional data, is used to estimate the empirical model. The panel analysis captures overall trade flows from 2000 to 2015, while the cross-sectional analysis captures trade flows separately in three different time intervals i.e., 2001-2005, 2006-2010 and 2011-2015.

The study addresses these fundamental questions:

- The internal and external factors to determine the trade flows of specific commodities.
- Is gravity modelling applicable to determine the trade pattern for a particular commodity for Pakistan's bilateral trade flow?
- Do neighbouring countries and cultural similarities influence Pakistan's bilateral trade flows?
- Do regional trade agreements play any role in enhancing or resisting bilateral trade flows?

In recent decades, bilateral trade has increased significantly. Regional integration is a central feature of economic growth and plays a vital role in determining trade flows. Through bilateral trade, nations come closer and enter regional trading blocs. There are

many successful examples showing that regional integration boosts economies and living standards of people in the concerned regions, which includes well-known trade agreements like ASEAN, NAFTA, and EU. For instance, (Frankel et al. 1995; Gould 1998; Krueger 1999a, 1999b, Jayasinghe & Sarkar 2008; Karemera et al. 2009; and Narayan & Nguyen 2016) showed the impacts of regional integration such as ASEAN, APEC, ECO, OIC, SAARC and WTO on bilateral as well as multilateral trade flows. This study also examines the impacts of regional integration in trade creation or trade diversion on commodity level trade flows.

Modeling and forecasting bilateral trade flows has been an important task in international economics. There are several models used for evaluating bilateral trade patterns among different countries of the world. The Ricardian theory of trade is based on comparative advantage, while the Heckscher-Ohlin model of trade emphasises resource abundance. As per trade theories, countries can specialise in the production of those commodities that it can produce efficiently with minimal cost (Samuelson et al. 1997).

Over the last few decades, the gravity model has been the most commonly used model to explain trade flows. This study evaluates the determinants of commodity trade flows by using a gravity model. The findings of the study reveal that GDP, differences in market size, bilateral real exchange rate, Relative Factor Endowments (RFE), being landlocked, common colony, and ASEAN have positively influenced commodity trade flows, while distance, common border, and SAARC have negative effects on commodity trade flows.

The remaining structure of the study is as follows:

Section 2: Comprehensive literature review.
Section 3: Model derivation and data specification.
Section 4: Empirical results and discussion.
Section 5: Conclusion with policy recommendations.

2. LITERATURE REVIEW

Tinbergen (1962) was the first to consider the gravity model in its simple form, followed by Poyhonen (1963) who extended the work on gravity further while using it empirically. Since then, there are numerous studies on the implications of gravity models, conducted empirically as well as theoretically. Researchers investigate linkages between gravity models and related issues with international trade such as evaluating trade patterns, measuring the cost of border, highlighting the effects of cultural similarities, and estimating the effects of regionalism on trade pattern (Eichengreen & Irwin, 1998; Feenstra, 1998; Hamilton et al. 1992; Baldwin, 1994; and Paas, 2000).

The gravity model has proved an efficient instrument to investigate bilateral trade patterns among the regional trading blocs (Bergstrand, 1985 & 1989; Koo & Karemera, 1991; Oguledo & Macphee, 1994; Zhang & Kristensen, 1995; Frankel, 1997; Rajapakse & Arunatilake, 1997; Karemera et al. 1999; Mathur, 2000; Sharma & Chua, 2000; Hassan, 2000 & 2001; Jakab et al. 2001; Soloaga & Winters, 2001; Christie, 2002; Carrillo & Li, 2004, and Egger & Pfaffermayr, 2003). In recent studies, regional integration or regional free trade agreements have proved to be a key factor explaining bilateral trade flows.

At the commodity level as well as at a disaggregated level, gravity models have been applied by Zahniser et al. (2002); Peterson et al. (2013). For forestry products, the gravity model has been applied by Buongiorno (2015, 2016); and Olofsson et al. (2017).

Likewise, at commodity level trade flows, Koo et al. (1994) investigate the factor affecting meat trade flows by using cross-sectional and time series data framework from 1983 to 1989. For this purpose, they modified the traditional gravity model into a specific commodity gravity model to evaluate the single commodity's trade flows. The findings of the study show that economic unions and a common border significantly enhanced meat trade flows. On the other hand, the distance between trading partners has negatively influenced meat trade flow.

Karemera et al. (1999) evaluate the benefits and determinants of free trade agreements in the Pacific Rim countries. For this purpose, the study modifies the traditional gravity model into a specific gravity model and uses the modified version model for single commodity trade flows. The study uses the cross-sectional and time-series framework. In the empirical analysis, the study includes commodities which are most traded among Pacific Rim countries. The empirical results found that the trade pattern among the Pacific Rim countries is determined by the income of countries, exchange rate, regional trade agreements, unit value of imports, and exports. Furthermore, the finding shows that trade significantly increases between members of ASEAN while trade has come down with non-member countries.

Similarly, Karemera et al. (2009) investigate whether the effects of regional blocs on trade flows create trade or divert it. The study evaluates the impacts of regional trade agreements such as NAFTA, APEC, and EU on selected commodity trade flows. For empirical analysis, the study uses the generalised gravity model of Bergstrand (1985, 1989) and modifies his model into a single commodity gravity model. Additionally, the empirical model for product trade flow uses the LS technique for estimation. The study uses disaggregated level panel data from 1996 to 2002. The empirical evidence shows that income has significant and positive impacts on commodity trade flows while the effects of population are positive for importing countries and negative for exporting countries. Furthermore, the establishment of NAFTA, APEC, and EU encourages trade flows. In addition, it found that there is more trade creation in NAFTA and APEC as compared to EU. The estimated coefficients show that the Asian Pacific Rim region is a significant destination for vegetables and fruits from US states.

Karemera et al. (2011) analyse the effects of exchange rate uncertainty on vegetable commodity trade flows among the OECD countries. The study also examines the effects of regional trade agreements such as the APEC, the NAFTA, and the EU on selected commodity trade flows. The study uses the commodity-specific gravity model for selected vegetable trade from the period 1996 to 2002. The findings of the study show that volatility in exchange rate significantly reduces trade flows in most commodities. In addition, empirical evidence also reveals that both long term and short-term uncertainty in exchange rate has a positive impact on specific commodity trade flows.

Jafari et al. (2011) identify the factor affecting export flows among the G8 countries by applying the gravity model. The empirical model estimated through panel data analysis for the years 1990 to 2007. The study found that the export flows among the G8 countries are positively determined by GDP, population, currency depreciation of

exporter countries, and a common border. However, transportation costs and importer's currency appreciation have negatively affected the volume of trade flows among the G8 countries.

Antonio and Troy (2014) examine the commodities trade flows for Caribbean Community countries (CARICOM) through the application of the traditional gravity model for international trade. The study found that trade to GDP ratio, per capita GDP differential, and language, impact trade flow positively. On the other hand, exchange rate, geographical distance, and historical trade relationships have significant negative effects on trade flows. The results of the study proposed that management of the exchange rate is critical and that CARICOM countries may be served better by trading with countries with higher living standards.

Karemera et al. (2015) explore the impacts of regional trade agreements on global meat trade flows. The study concentrates on NAFTA, EU, MERCOSUR, and ASEAN and establishes the determinants of bilateral and multilateral trade flows for meat trade. The study uses the specific gravity model with panel data from 1986-2009. The results of the study suggest that distance, income, population, production capacity, and exchange rate are major determinants of meat trade flows, while meat trade flow significantly increased with income and population. In addition, findings of the study reveal that the establishment of NAFTA and EU have significantly increased meat trade flows in regional bloc members while there are trade diversion effects between member to non-member trade flows. Furthermore, hoof and mouth diseases reduced meat trade flows, and the effects of exchange rate depends on product type.

In case of Pakistan, many studies have investigated Pakistan's trade flows using the gravity model. Akhter & Ghani (2010) show that the regional trade agreement between SAARC members will divert trade for the member countries. However, if a trading bloc between Pakistan, Sri Lanka and India is formed, it should result in trade creation. Akram (2013) explores the determinants of intra-industry trade between Pakistan and the SAARC region. The results show that Pakistan's trade is dominated by the vertical Intra Industry Trade while it shows that Pakistan's trade is explained more by country specific variables than by industry specific variables.

Zaheer et al. (2013) explore determinants of commodity trade flows for Pakistan while using the gravity model. It shows that in case of crude materials, the trade is of an intra-industry nature, while the country analysis shows that Pakistan's intra-industry trade is higher with Singapore.

Abbas & Waheed (2015) investigate Pakistan trade flows through the gravity model. The findings of the study indicate that the results of the models are in line with the gravity model, however, over time, the distance variable become less important. Hussain (2017) while analysing the determinants of trade flows for Pakistan shows that the findings are consistent with the theoretical prediction of the gravity model. However, in the case of language, and RTA dummy, there are mixed results for trade flows of Pakistan, India and China. Malik & Chaudhary (2011), Kabir & Salim (2010), Iqbal (2016), Khan et al. (2013), and Achakzai (2006) have reported the same.

Similarly, Butt (2008) shows that distance and size of economy are good indicators in explaining trade flows of Pakistan. Likewise, geographical, cultural and historical factors have expected signs in explaining trade bilateral trade flows of Pakistan. Gul &

Yasin (2011), while exploring trade potential for Pakistan, state that Japan, Sri Lanka, Bangladesh, Malaysia, the Philippines, New Zealand, Norway, Sweden, Italy, and Denmark are potentially good trading partners. In the case of regional trading blocs, Pakistan has great trade potential to be explored with ASEAN, EU, the Middle East and the African countries.

Salim and Mehmood (2015) investigate the determinants of Pakistan's cultural goods export with 157 trading partners from 2003 to 2012. For empirical analysis, the study selected the six categories of cultural goods that are classified at 6-digit level HS Codes and applied the gravity model to determine the influence factors of cultural goods exports flow. The study shows that distance, as well as market size between trading countries, are the most important determinants of cultural goods trade flows. The empirical evidence of the study suggests that cultural goods trade is significant and positively influenced by Pakistan's GDP growth rate, while the GDP of partner countries, as well as distance, have a negative impact.

Khan and Mehmood (2016) identify the impact of bilateral and regional trade agreements on Pakistan's trade flows in terms of trade creation and trade diversion with the help of the gravity model. The study analyses whether preferential reduction of tariff in favour of trading partners would enhance, or worsen, welfare of member countries. The results of the study suggest that the effects of trade creation by bilateral free trade agreements (BFTAs), Regional Trade Agreements (RTA), and South Asian Free Trade Agreements (SAFTA), are significantly higher than those of trade diversion are.

Altaf et al. (2016) use the gravity model to investigate the numerous determinants of trade cost for agricultural vs. non-agricultural trade, as well as overall trade of Pakistan with major trading partners across Asia, North America and Europe. For this purpose, the study decomposes the trade data into two macro-sectors, agricultural and non-agricultural, from 2003 to 2012. The study examined the relationship between trade cost and its major determining factors with a panel data-estimation technique. The empirical evidence suggests that maritime transport, geographical distance, and trade facilitation are the main determinants of trade cost. Moreover, trade costs for the agricultural sector tend to bypass the trade costs for the non-agricultural sector. The findings of the study also show trade cost as a significant barrier to bilateral trade flow, which implies that higher trade costs are an obstacle to bilateral trade and hamper the realisation of gains from trade liberalisation.

Irshad et al. (2018a) explore Pakistan's trade potential with China by using the gravity model for the period 1992–2015. The study uses various econometric techniques such as EGLS, REM, 2-stage EGLS, GMM, Tobit and PPML methods for estimation purpose. The findings of the study indicate that Pakistan's bilateral trade with all FTA partner countries is positively affected by GDPs, religion, WTO, trade openness in both countries, and a common border, but negatively affected by geographical distance and inflation. In addition, Irshad et al. (2018b) use a gravity model to estimate China's trade potential with OPEC member countries. The study shows that China's trade flows with OPEC countries were positively affected by GDP and trade openness, while trade cost (distance) and depreciation in bilateral exchange rate had a negative influence on China's trade flows.

3. METHODOLOGY

The gravity model is used to measure bilateral trade flows between different geographical regions. The gravity model is based on Newton's law of gravitation which has an application in Physics. In international economics, Tinbergin (1962) developed the traditional gravity model. Since then, the gravity model is used in various fields to evaluate foreign direct investment, migration flows, and especially to determine the pattern of trade flows.

Over time, there have been many attempts to provide a strong theoretical background to the gravity model. For example, Linemman (1966) and Anderson (1979) tried to provide some conventional theories and formulate a reduced form for the gravity model. Bergstrand (1985, 1989) developed a micro-foundation of the gravity model and expanded it by incorporating the price variable in the equation by using a CES utility function. In addition, Anderson and Wincoop (2003) extended the gravity model by incorporating trade barriers such as transportation and trade costs in empirical analysis while using different assumptions and properties.

The basic presumption of the gravity model is that bilateral trade flows between countries are directly proportional to the economic size of a country, generally measured by the GDP of the country, and inversely related to the geographical distance between them, which is a proxy for transportation cost. Similarly, in existing literature, numerous studies have used different qualitative variables to augment the traditional gravity model (see McCallum 1995; Anderson and Wincoop, 2003; Hutchinson 2005, & Kien, 2009). Karemera et al. (1999, 2009, and 2015) and Anderson & Wincoop (2003) modified the traditional gravity model into a specific one for single commodity trade flows.

This study uses the extended form of the specific gravity model. We augmented the traditional model by including relevant variables such as bilateral real exchange rate, relative factor endowments, market size differences, and other factors, which can affect Pakistan's bilateral trade flows. Furthermore, the study tends to improve the empirical model by adding regional integration and trade preferential dummies.

The present study follows the commodity-specific gravity model of Jayasinghe & Sarkar (2008) and Karemera et al. (2009, 2015) as follows:

$$T_{ijt} = BY_{it}^{\beta_1} Y_{jt}^{\beta_2} d_{ij}^{\beta_3} DGDP_{ijt}^{\beta_4} \times \exp[\beta_5 RFE_{ijt} + \beta_6 RER_{ijt} + \beta_7 D_1 + \beta_8 D_2 + \beta_9 D_3 + \beta_{10} D_4 + \beta_{11} ASEAN + \beta_{12} ECO + \beta_{13} OIC + \beta_{14} SAARC + \in_{ijt} \quad \ldots \quad (1)$$

In addition, the estimated coefficients are interpreted in terms of elasticity so we transform the empirical model in log form. Thus, the simplest form of commodity specific gravity model becomes as follows:

$$lnT_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnY_{jt} + \beta_3 lnd_{ij} + \beta_4 lnDGDP_{ijt} + \beta_5 RFE_{ijt} + \beta_6 RER_{ijt} + \beta_7 D_1 + \beta_8 D_2 + \beta_9 D_3 + \beta_{10} D_4 + \beta_{11} ASEAN + \beta_{12} ECO + \beta_{13} OIC + \beta_{14} SAARC + \in_{ijt} \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

In model (2), i represents Pakistan while *j* is used for Pakistan's trading partners. Where T_{ijt} is the value of total bilateral trade (export plus import) of a particular commodity measured in US $1000, between country *i* and *j* in specific time *t*, followed by Jayasinghe and Sarkar (2008); Y_{it} and Y_{jt} are the real gross product of Pakistan as well

as trading partner j in year t; $DGDP_{ijt}$ is the difference in market size between country i and j in year t; RFE_{ijt} is the relative factor endowment between country i and j in year t; RER_{ijt} is the bilateral real exchange rate between country i and j in year t; d_{ij} is the geographical distance between country i and j; D_1 is the dummy variable for adjacent country, it takes the value 1 if country j share common border with Pakistan and, 0 for otherwise; D_2 is the dummy variable common official language (English) which takes the value 1 if country j uses English as an official language, and 0 for otherwise; D_3 is the dummy variable for common colony; it takes the value 1 if both country i and j were Ex or present colony of the same region, and 0 for otherwise; D_4 is the dummy variable for landlocked countries, Likewise, it takes the value 1 if country j has no access to water transport and 0 for otherwise; $ASEAN$ is a dummy variable for regional integration which takes the value 1 if country j is member of Association of Southeast Asian Nations and, 0 for otherwise; similarly, ECO is a dummy variable which takes the value 1 if country j is a member of Economic Cooperation Organisation and, 0 for otherwise; OIC is a dummy variable it takes the value 1 if country j is a member of Organisation of Islamic Cooperation and, 0 for otherwise; $SAARC$ is a dummy variable which is equal to unity if country j is a member of South Asian Association for Regional Cooperation and, 0 for otherwise.

GDP and distance are focus variables of the gravity model to determine trade flows. According to Frankel (1997), GDP presents the level of development, market size, the output capacity of exporting countries, and purchasing power for importing economies. It is expected that GDP would positively affect trade flows. In addition, Ekanayake et al. (2010) and Karemera et al. (2016) show that countries with a high GDP have more trade volume as compared to low income or less developed countries.

A traditional gravity model uses total GDP of a country to evaluate the overall trade flows by using aggregate level data (Linneman, 1966; Bergstrand, 1985, 1989), & Karemera et al. 1999). This study uses disaggregated data of specific commodities. In the case of commodity-level analysis, the use of total GDP can overestimate the productive capacity of the commodity. Therefore, to avoid this problem, following Karemera et al. (2009), we have used a percentage share of agriculture and industrial sector GDP of Pakistan for commodity trade flows. Moreover, the study uses the total GDP of partner countries that represent the purchasing power of foreign countries (Karemera et al. 2016).

We use geographical distance (from the capital to capital) between trading countries as a proxy for transportation and information related costs. A rise in distance between trading countries is expected to increase transportation costs, which in turn is expected to negatively affect the bilateral trade flows. The exchange rate is the most important macroeconomic variable determining the international trade pattern. The real exchange rate acts as a proxy for prices and can be described as the depreciation or appreciation of domestic currency relative to foreign currency. In aggregate level studies, the assumption is that the impact of exchange rate across differentiated commodities remains the same. However, there are chances of rising uncertainty because the effects of aggregation may crowd out the impact on single commodity trade flow. Hence, this study will help overcome this issue as our analysis uses on disaggregated trade data. Many studies suggest that a variation in exchange rate tends to enhance trade flows (Bacchetta and van Wincoop, 2000; and DeGrauwe & Skudelny, 2000). On the other hand, Danial

(1990) argues that the uncertainty in the exchange rate may affect trade flows inversely. However, the expected sign of the real exchange rate depends on the country's currency fluctuations.

We also include the relative factor endowments (RFE) variable as a measure of technological differences between Pakistan and its trading partners. The RFE can be expressed as the differences in log value of capital/labour ratio between country *i* and *j*. However, because of unavailability of capital/labour ratio at the commodity level, following Egger (2002) and Baltagi et al. (2003), we use the difference between per capita incomes instead of capital/labour ratio. In addition, this study also augments our empirical model by including the variable in the model that captures the effects of differences in markets size (DGDP) on commodity level trade flows. According to Helpman and Krugman (1985) and Zaheer et al. (2003), DGDP can be defined as the differences in capabilities to produce differentiated products between country *i* and *j*.

We assume that countries neighbouring landlocked economies incur a high transportation cost as compared to island nations. According to Frankel (1997), air and land transport is more expensive compared to water transport. Being landlocked means a country is bordered by land and has no access to water transport. The expected coefficient of the landlocked dummy is supposed to be negative.

Many other qualitative variables such as the cultural and historical similarities play a vital role in determining the trade pattern. Difficulty in communication is considered a major barrier in trade relations. Hutchinson (2005) and Kien (2009) posit that the larger the proportion of population speaking a common official language, the higher the trade volume among member countries. McCallum (1995), Anderton & Skudendelny (2001), as well as Anderson & Wincoop (2003), show that the existence of a common border tends to increase bilateral trade volume. In addition, Ekanayake et al. (2010) identify the common colony as an important determinant of trade flows. Hence, we include a common official language, common colony and common border as dummy variables in our empirical model.

Finally, this study aims to investigate the impact of regional trade agreements i.e., ASEAN, ECO, OIC, and SAARC on Pakistan's trade flows. The selected trade blocs and their members are shown in the appendix. In the modern world, the role of regional integration has become a central feature of economic development. Karemera et al. (2009, 2015), Akhter & Ghani (2010), and Ekanayake et al. (2010) empirically evaluate the impact of regional integration on bilateral as well as multilateral trade flows. As per their findings, countries that have a formal membership of the regional bloc, trade more. This study uses the balance panel as well as cross-sectional data of all variables.

Data of all observations are taken annually from 2000 to 2015. The study includes a sample of 42 cross-section countries that are presented in the appendix. The dependent variables used for analysis are the total bilateral trade of specific commodities. The broad description of commodities with corresponding codes is shown in the appendix. The data for exports and imports at 3-digit SITC level is taken from UN-Commodity Trade (WITS). Data on GDP, market size, GDP differences, and relative factor endowment are extracted from WDI. The data on the bilateral real exchange rate and distance in kilometre is collected from IMF and CEPII respectively.

4. EMPIRICAL RESULTS AND DISCUSSION

The present study uses both panel and cross-sectional data for empirical analysis. The panel data analysis is used to capture the overall trade flows from 2000 to 2015, while cross-sectional analysis captures the trade flows separately in three different time intervals, i.e. 2001-2005, 2006-2010, and 2011-2015. The regression analysis at different time intervals helps to identify the structure of trade flows over different political and economic regimes. We have estimated 11 separate regressions for each of the selected commodities and one additional regression estimated for the aggregate sum of all these commodities. For estimation, we have used Generalised Least Square (GLS) model for cross-sectional analysis, and Random Effect Model (REM) for panel analysis.

Cross-sectional data is generally supposed to suffer from a heterogeneity problem. To account for the heterogeneity problem, we rely on the GLS approach, used in literature as a suitable technique to address unknown heterogeneity problems (Akhter & Ghani 2010). For panel data, fixed effect and random effect models are used in general, however, due to the presence of different time-invariant variables, the fixed effect model is not a suitable approach, therefore, we used REM for panel data. Furthermore, for cross-sectional data analysis, we use Pakistan to foreign country GDP ratio. The estimated results under both panel as well as cross-sectional analysis are shown in the appendix.

(a) Effects of Income and Distance

From both types of estimations, i.e. panel as well as cross-sectional analysis, it is apparent that the standard variables of the gravity model are statistically significant and have expected signs in most of the selected commodities as per the philosophy of gravity models. The estimated coefficients of Pakistan's, and the foreign countries, GDP are statistically significant and have expected positive signs in most cases, which depict a direct relationship between GDP growth in trading countries and commodity trade flows. This implies that when economies grow, they produce more goods, and export more by creating large exportable surpluses. This suggests that commodity trade flows in most cases are determined by GDP. However, in the case of pharmaceutical, cement, and footwear products, it carries significant and negative signs indicating that GDP affects the aforementioned products negatively.

According to Bahmani-Oskooee (1986), Bahmani-Oskooee, Iqbal & Nosheen (2015), and Bahmani-Oskooee, Iqbal and Khan (2017), as the size of the economy grows, it may affect both exports and imports positively as well as negatively. An increase in the size of the economy causes domestic output to grow, and will have a positive impact on exports. Likewise, if the increase in the economic size of a country results in increasing the productive capacity of a country, it will help the country to develop import substitutes, and as a result, imports will decrease. In addition, the increase in domestic income also helps increase imports by increasing the purchasing power of a country.

The negative impact of GDP on cement trade is due to Pakistan being an efficient producer of cement related products, and cement being a major export commodity for the country. During the last few years, the domestic consumption of cement related products has increased due to construction of new government projects, such as power and infrastructure, housing schemes in public and private sector, and now CPEC (China

Pakistan Economic Corridor), the leading project currently in process. Due to increasing demand for these products in domestic markets, our export of this commodity has decreased. Similarly, with increasing GDP, more multinational pharmaceutical companies have registered in Pakistan, resulting in import substitutes; therefore trade of pharmaceutical products has decreased as most of the domestic demand has been met from domestic production.

GDP growth has had a negative impact on the footwear industry. Although Pakistan has the potential to increase exports of quality footwear, its world market share is 0.001 percent equaling $110 million, as compared to India at $10 billion and Vietnam at $6.23 billion. The total domestic market of footwear products is Rs. 250 billion out of which Rs.100 billion is met from Chinese imports while the remaining is covered from within the country (WITS, WTO; The Pakistan Business Council, 2017). According to the Pakistan Bureau of Statistics, over the last few years, export of footwear products have decreased. For example, during July-April (2016-17), footwear export experienced a decrease of 32.54 percent. Thus, the decrease in exports can be attributed to increased domestic consumption, resulting in reduced trade of footwear products (See *Pakistan Economic Survey, 2016-17*).

Estimates of GDP ratio carry statistically positive and significant signs, which suggest that an increase in a trading country's GDP growth rate leads to an increase in commodity trade flows. However, it shows that the GDP ratio (domestic income over foreign income) tends to affect rice trade flows negatively in the first and second-time intervals. This is interpreted as a 1 percent increase in GDP ratio, leading to decreases in the rice trade flow by 0.70 percent and 0.56 percent respectively. However, the result shows that bilateral commodity trade is more sensitive to changes in the foreign country's GDP than domestic income.

Empirical findings reveal that cotton and leather manufacturing trade flows increased significantly with the GDP ratio during the third interval as compared to the first and second interval. Trade in sports equipment, and iron & steel increased more with GDP ratio during the second interval. The findings suggest that the income of trading countries is the most important determinant of commodity trade flows. These results are consistent with previous studies such as Frankel (1997), Prabir (2006), and Jayasinghe & Sarker (2008). For Pakistan, our results are in line with the findings of Akhter & Ghani (2010), Akram (2013), Zaheer et al. (2013), Abbas & Waheed (2015), Khan & Mahmood (2016), and Hussain (2017).

Rice and fruits are Pakistan's major exportable commodities. As per the *Pakistan Economic Survey (2015-16)*, during the last few years, the production of these commodities has decreased by approximately –2.7 percent and –5.3 percent respectively. One of the reasons behind the decreasing trend in production of rice is climate change creating unfavourable weather conditions in the rice growing areas in Pakistan. Moreover, low crop prices and higher production costs of agricultural commodities encourage farmers to substitute maize and fodder for rice as a cash crop.

Geographical distance has a considerable effect on commodity trade flows. The theory of spatial equilibrium recommends that there is an inverse relationship between distance and bilateral trade flows. From both analyses, the estimates of distance have expected negative and statistically significant impacts on commodity trade flow like rice,

fruit, electrical equipment, iron & steel, cement product, footwear, and total trade models. It implies that geographical distance is a hindrance to Pakistan's bilateral trade flows. However, the magnitude and degree of significance varies across the time interval as well as the commodity. In most cases, the elasticity of estimates of distance is greater than unity. It suggests that a 1 percent increase in distance leads to more than 1 percent diminution in commodity trade flows.

When a country is far from Pakistan then transportation-related costs increase for bilateral trade so it tends to decrease commodity trade flows. Hence, the estimated coefficients of distance confirmed the hypothesis that transportation and other transport related costs reduce bilateral trade flows. These findings are in line with the findings of Bikker (1987), Boisso & Ferrantino (1994), Harris & Matyas (1998), Hassan (2001), Rehman (2003), and Jayasinghe & Sarkar (2008). For Pakistan, our results are in line with the findings of Butt (2008). Gul & Yasin (2011), Karemera et al. (2009, 2015), Malik & Chaudhary (2011), Akram (2013), Abbas & Waheed (2015), Salim & Mehmood (2015), and Hussain (2017).

(b) Effects of Difference in Market Size (DGDP), Bilateral real Exchange Rate (RER) and Relative Factor Endowment (RFE)

The study has used Difference of GDP (DGDP) and Relative Factor Endowment (RFE) as proxies for economic size or, alternatively, for the difference in the capability to produce differentiated products and the relative difference in factor endowments (a proxy for technological difference) between Pakistan and its trading partners respectively. Helpman and Krugman (1985) show that the trade volume of intra-industry trade depends on the economic size and RFE of trading partners.

Economies with less difference in per capita income are supposed to be similar in demand pattern, while countries with a larger difference in per capita incomes are supposed to have more disparity in demand structure. Similarity in demand pattern implies that countries would have a higher level of intra-industry trade, whereas more disparity in demand pattern would be reflected in a lower level of intra-industry trade (IIT), as postulated by the Heckscher-Ohlin-Samuelson (HOS) theorem. Likewise, when the disparity in the RFE increases between trading partners, IIT is supposed to decrease. On the other hand, if the disparity in the RFE decreases between trading partners, it would result in an increase in IIT.

The size of a trading partner exerts a positive effect, while RFE differences exert a negative effect. The empirical evidence on economic size indicates that bilateral trade of selected commodities increased more in the case of the third interval than the first and second.

Furthermore, RFE has a statistically significant influence on many commodity trade flows. However, the estimated value of coefficients and the expected relationship between RFE and commodity trade flows varies across the product as well as intervals. During the first interval, the RFE has a significant and expected positive influence on rice, fruits, leather manufacturing, and footwear trade flows. In the second and third intervals, the RFE has a significant influence on cotton and leather manufacturing trade flows. The traditional trade theory postulates that bilateral trade increases due to the difference in technology between trading countries. The findings show that Pakistan has a

tendency to trade more with countries that are dissimilar in terms of technology and factor endowments. Therefore, the estimates of RFE, which are positively related to trade flows, are consistent with theory.

However, cotton trade flows are significant but unexpectedly negatively affected by RFE. The results are consistent with findings of Egger (2002), Ekanayake (2010), Kabir & Salim (2010), and Akram (2013). Pakistan is a major cotton producing country. The share of cotton production in Pakistan's GDP is 1 percent and cotton is a central exportable commodity. As per the *Pakistan Economic Survey*, during the last few years, the production of cotton has declined. Some of the reasons for the declining trend in cotton products are unfavourable weather conditions, frequent and prolonged rains, and pest attacks. Furthermore, due to the high prices of fertilisers & pesticides, and low price of cotton crop, farmers are disinclined to cultivate cotton.

Exchange rate plays a dynamic role in determining trade flows. This study uses the bilateral real exchange rate as a proxy for the price level. The effects of exchange rate on commodity trade vary across commodities. The estimates of exchange rate are statistically significant in the case of trade flows of rice, cotton, electrical equipment, leather manufacturing, cement products, motor vehicles, and sports equipment. However, the estimated coefficients of the exchange rate, which have positive signs, indicate that depreciation of domestic currency relative to foreign currency leads to an increase in commodity trade flows. The empirical findings suggest that commodity trade increases less than proportionately with 1 percent depreciation of domestic currency. These findings are consistent with the results of Gul & Yasin (2011).

According to theory, the response of exports and imports to an increase in depreciation depends upon elasticity. If a product or commodity is less (more) elastic, then trade flows may respond less (more) than proportionately. According to the Marshall-Lerner conditions, for devaluation/ depreciation to be successful, the elasticity of exports and imports should be greater than one. Therefore, in our results, though depreciation causes trade flows to increase to some extent, it does not fulfil the Marshall-Lerner condition. One possible explanation for this is that elasticity itself is dependent upon characteristics of the commodity, i.e. its substitutability with other commodities, or alternatively, availability of substitutes or being a necessity or luxury. Hence, if products are not necessities then their elasticity with respect to the exchange rate could be greater than one. However, if commodities are necessities, then their elasticity with respect to the exchange rate may be less than one.

In our commodities group, electrical equipment, motor vehicles, cement, and pharmaceuticals have special characteristics; for example, electrical equipment and motor vehicles have a major share in machinery imports and vehicle parts. These are a type of necessity for further value addition in the domestic country, so we expect less proportionate change with respect to the exchange rate. In case of cement products, we have a minor share of imports as well as exports that too mainly to countries like Afghanistan and India, as most of the cement products are consumed domestically. Hence, we expect a less proportionate response with respect to the exchange rate. As far as pharmaceutical products are concerned, most of the multinational companies are located domestically. While we still have a major share of imports, since pharmaceuticals products are necessities, we expect a less than 1 percent response with respect to the exchange rate.

(c) Effects of Landlocked, Common Border, Common Language, and Common Colony

We hypothesised that a country not having access to water transport bears a high transportation cost for the sake of trade. The estimated coefficients of the landlocked dummy are statistically significant and have an unexpected positive relationship with most of the selected commodities trade flows. However, the level of significance and magnitude are different across commodities as well as intervals. The estimates show that if a country is landlocked, commodity trade flow of Pakistan increases by more than 1 percent as compared to other economies, which are not landlocked.

In our sample of Pakistan's trading partners, only Afghanistan is a landlocked country. The reason behind the positive effects of being landlocked is that we have a common border with Afghanistan as well.

The impact of the common border on commodity trade flows is quite surprising. The results of the border dummy are statistically significant but have unexpected negative impacts on rice, fruits, electrical equipment, cement products, and motor vehicles trade flows. The estimated coefficients of the border dummy from the first interval are significant and have a negative relationship with motor vehicles and sports equipment. The second and third intervals have significant negative influences on leather manufacturing, electrical equipment, motor vehicles, and sports equipment trade flows. The border dummy reveals that with the countries with whom Pakistan shares a common border, commodity trade decreases more disproportionately as compared to geographically separated countries. Our results on the common border dummy are similar to the findings of Gul & Yasin (2011), Abbas & Waheed (2015), and Iqbal (2016) for Pakistan.

Diplomatic relations and historical events are the main barriers to bilateral trade with all neighbouring countries, except China. Therefore, Pakistan does not have much trade with India, Afghanistan, and Iran. The relationship between Pakistan and India has been unstable and problematic since the time of Independence in 1947. The conflict between the two nations tends to cripple trade relations. Despite having a common border, same culture, and language, there is only a 3.2 percent share of the total trade with India, which is quite low. The bilateral trade between Pakistan and Afghanistan is only 2.8 percent. Some reasons for the decline in bilateral trade between them are security conditions and corruption. The major share of the bilateral trade between them is informal, which is not measured under the legal framework. Iran, Pakistan's other neighbour, is burdened with international economic sanctions which hamper trade, keeping it down to 2.9 percent. Finally, from the aspect of the common border, bilateral trade diminishes due to a dominance of political factors.

It is difficult to express the effects of cultural similarities on trade flows quantitatively. Therefore, the study uses common language and colony dummies as proxies for historical and cultural similarities. The findings from the panel analysis indicate that electrical equipment and iron & steel trade flows are significantly and negatively affected by a common language which implies that if Pakistan and the trading partner have a common language then commodity trade decreases by more than 1 percent as compared to countries which do not have the same language.

From a cross-sectional technique, the results are different due to a change in technique, as well as time. During the estimation of the first interval, the estimates of a language dummy have statistically significant impacts on rice, electrical equipment, cement products, and sports equipment, while from the second and third intervals, the estimates show that they have a significant influence on rice, iron & steel, cement products, and footwear trade flows. However, the effects of a common language have mixed signs, i.e. positive and negative. Thus, electrical equipment, iron & steel, footwear, and sports equipment trade flows are negatively affected while rice and cement products are positively affected by common language. The results suggest that commodity trade decreases (increases) with common language countries. Khan et al. (2013) also found the same results for cultural similarities.

The estimated coefficients of the common colony, from both techniques, are statistically significant, and have an expected positive sign in case of most of the selected commodity trade flows. For instance, trade flows of rice, cotton, leather manufacturing, electrical equipment, iron & steel, cement products, motor vehicles, footwear, sports equipment, and total trade have significantly increased. It implies that for those countries where Pakistan had a colonial link, the commodity trade flows increased significantly, thanks to those ties. These results are consistent with the findings of Ekanayake et al. (2010), while for Pakistan, our results are in line with the findings of Salim and Mehmood (2015).

(d) Effects of Regional Trade Agreements

The study analysed the effects of regional blocs such as ASEAN, ECO, OIC, and SAARC on selected commodity trade flows. The extent of trade creation and trade diversion is also analysed. The estimated results, from both panel as well as cross-sectional analysis, suggest that there has been significant trade creation in fruit, motor vehicles, electrical equipment, iron & steel, pharmaceutical products, and total trade among ASEAN members during the study period. In the case of sports equipment, the dummy variable of ASEAN has a significant and negative sign during the first and second intervals. The negative sign of the estimated coefficient suggests that ASEAN members would divert trade in sports equipment. The findings suggest that there has been a significant increase in trade flows of fruit and pharmaceutical products among ASEAN members during the first interval, more than in the second and third interval, while trade in electrical equipment, experienced a greater increase in the second interval. Similarly, total trade, and trade in motor vehicles, increased with ASEAN members during the third interval, more than in the first and second. These findings are in line with the results of Gul & Yasin (2011).

The estimated coefficient of a dummy variable ECO is statistically significant and has the expected positive sign in case of motor vehicles during the entire study period. The result suggests that a possible inclusion in ECO may lead to significant trade creation in motor vehicles, while the trade of motor vehicles comparatively increased more in the second interval, than in the first and third intervals. The findings on the ECO dummy are in line with the findings of Achakzai (2006).

The estimated coefficients of the OIC bloc are statistically significant, and have an expected and positive relationship with rice and fruit trade flows. The magnitude and sign

of estimated coefficients of OIC suggests that there are strong trade creation effects in cases of rice and fruit trade flows during the first interval as compared to the second and third intervals. The empirical findings from all intervals show that OIC led to trade diversion in the case of pharmaceutical products and sports equipment as shown by negative and significant signs.

Similarly, the estimated coefficients of SAARC are statistically significant and have unexpected negative signs in most of the selected commodity trade flows during the entire study period. For rice, iron & steel, cement products, footwear, sports equipment, and electrical equipment trade flows, the coefficient of SAARC is negative, statistically significant and decreasing over time. The results show that the SAARC members are becoming less open to trade in case of rice, iron & steel, cement products, footwear, sports equipment, and electrical equipment trade flows with Pakistan. However, during 2000-2015 and 2011-2015, the findings suggest that SAARC led to trade creation for cotton and leather manufacturing trade flows. Interestingly, during the entire study period, the magnitudes of selected commodities are greater, which asserts that commodity trade decreases (increases) more than proportionately with SAARC members. These findings on the SAARC dummy are consistent with the study of Gul & Yasin (2011).

The empirical evidence suggests that the SAARC region has a negative impact on Pakistan's commodity trade flows because most of the members of SAARC are agro-based countries. They export mostly their agricultural sector related commodities to the Middle East and the EU, while in return, these countries import the industrial sector related commodities from developed countries. Therefore, Pakistan's commodity trade flows are negatively affected by the SAARC region.

Robustness of Results

In the empirical results above, we have used distance as a proxy variable for trade costs. However, in recent years, Altaf, Mahmood, and Noureen (2017) have developed a trade cost variable for both agriculture and non-agricultural products although data are available from 2003-2012 only. We use that data to check for the robustness of our results. Following Altaf et al. (2017), we tend to use agricultural-sector as well as non-agricultural sector trade cost in a gravity model for commodity trade flows. The results of the empirical model using trade cost are reported in Table A7 in the Appendix.

In developed countries, trade cost is recognised as an important determining factor of national trade performance and competitiveness. With much effort, developed countries have made effective policies for the reduction of trade cost. On the other side, developing countries like Pakistan have made minimal effort at the policy level to address this issue. Pakistan still exports a large amount of agricultural related commodities, while trade cost for the agricultural sector is substantially higher than that of the non-agricultural sector. Trade cost between trading countries is the main hindrance for bilateral trade flows.

Estimates indicate that trade cost between Pakistan and its trading partners is highly significant and negatively related to commodity trade flows. It reveals that the increase in trade cost reduces Pakistan's bilateral trade flows against its trading partners. This shows the government's lack of policy towards trade facilitation.

The estimated coefficient of Pakistan's GDP, as well as trading countries, have expected signs and are significant at 5 percent or higher. With respect to estimated coefficients of GDP, the findings reveal that a rise in income of an exporting or importing country leads to increased bilateral trade flows of rice, cotton, and motor vehicles. However, the magnitude of the coefficients is greater with the partner country's income suggesting that the quantities of a commodity traded are more sensitive to change in the trading partner's level of economic development.

Our results show that RFE and exchange rate are significant factors in enhancing commodity trade flows. The empirical findings reveal that bilateral trade of selected commodities is strongly influenced by RFE and RER, while differences in market size negatively affect the bilateral trade flows of rice, cotton, and total trade. In addition, bilateral trade flows of rice, cotton, and total trade sharply decrease with those trading partners that have the same colonial ties. This may possibly be attributed to the fact that with increasing globalisation, many countries have come closer to each other in terms of trading relations partly because of trade agreements and partly because of reduction in trade barriers. Cultural and education related contacts that have emerged so far between countries indicate that the colony effect has subsided over time.

Under the current circumstances, common border with trading countries is a strong factor to encourage bilateral trade flows of rice, cotton, iron and steel, cement products, motor vehicles, and total trade. However, electrical equipment and sports equipment trade flow is adversely affected by those countries that share a common border.

For regional trading blocs, the coefficients of ASEAN and SAARC dummy are statistically positive and significant for rice, cotton, fruit, and total trade. Estimates show that formations of ASEAN and SAARC may enhance commodity trade flows and may significantly contribute to trade creation for the commodities. Empirical results show that ASEAN led to significant trade diversion in case of electrical equipment, leather manufacturing, and motor vehicle trade flows as shown by negative and highly significant signs.

Similarly, the estimated coefficients of most of the selected commodity on OIC are negative and statistically significant. The negative estimates show that OIC members are becoming less open to trade with Pakistan for footwear, sports equipment, electrical equipment, pharmaceutical products, and motor vehicle trade flows. However, the findings suggest that OIC led to trade creation in case of cement products trade flows. It is interesting to note that the regional integration under SAARC leads to more trade creation among SAARC members than the integration under ASEAN and OIC for most of the selected commodity.

5. CONCLUSION AND POLICY IMPLICATIONS

The study has used the specific gravity model to arrive at the determinants of commodity trade flows in case of Pakistan against her major trading partners. For empirical analysis, the study used both panel as well as cross-sectional analysis from 2000 to 2015. The panel analysis captures the overall trade flows from 2000 to 2015 while cross-sectional analysis measures the trade flows separately in three different time intervals i.e., 2001-2005, 2006-2010 and 2011-2015. However, both analyses give almost similar results in terms of signs of coefficients. Nevertheless, in the case of the magnitude of coefficients, some variation can be found in the results.

Based on empirical results, we found that income from trading countries has significant and positive impacts on most of the selected commodity trade flows. The estimates of geographical distance reflect the theory of spatial equilibrium and indicate that the distance between trading countries is an important factor in determining trade flows of selected commodities. The impacts of relative factor endowment (RFE), differences in market size, bilateral real exchange rate (RER), common colony, and being landlocked stimulated more commodity trade. The interesting finding of the study is the negative impact of the common border on trade flows in case of most commodities. Thanks to unstable diplomatic relations between Pakistan and its neighbouring countries, trade flows have reduced with these countries.

The study examined the impacts of major regional blocs on commodity trade flows. We found that there are significant positive trade creation effects in the cases of fruit, motor vehicles, total trade, iron & steel, pharmaceutical products, and electrical equipment among ASEAN members, while the ECO bloc has a positive impact only on the motor vehicles trade flow.

Similarly, results show that the OIC bloc had significant trade creation in rice, fruits, and sports equipment. In general, the study found the trade creation effects of ASEAN are greater than OIC and ECO. Unfortunately, in the case of trade with SAARC members, hardly any improvement in trade flows can be observed in almost all commodities. For the purpose of robustness of our results, we have also used agricultural and non-agriculture related trade cost. The estimates indicate that trade cost between Pakistan and its trading partners is highly significant and negatively related to commodity trade flows*;* whereas other empirical results show that the results are robust.

Firstly, empirical results have important policy implications. Exchange rate fluctuations tend to create uncertainty on trade flows of agricultural related products such as rice and fruits. Pakistan faces competition from India, China, and other countries in the international market. The more uncertain exchange rate fluctuations are, the more reluctant the exporters and importers in maintaining trade levels with Pakistan in these products. They tend to divert their trade to other competitors in the markets. Hence, stability in the exchange rate is necessary to stabilise commodity trade flows, in particular agricultural products.

Secondly, we see reduced trade with neighbouring countries, India and Afghanistan, that share a common border with Pakistan. This is possibly the result of political disputes affecting friendly relations adversely. Similarly, although Pakistan has cordial relations with Iran, trade is still affected negatively due to international economic restrictions. Therefore, sustained and increased trade levels are dependent on normal and cordial political relations with our neighbours.

Thirdly, results indicate that commodity trade has not shown a satisfactory performance as with SAARC members as well as with neighbouring countries. Pakistan's bilateral trade can be enhanced with its neighbouring countries, without hurting national interest, through bilateral dialogue and free trade agreements. Being a member of SAARC, its impact on commodity trade flow is not as fruitful as compared to trade with ASEAN. The study found that ASEAN is a significant destination for Pakistan's trade flow. Hence, Pakistan should focus on another trading bloc like ASEAN.

Fourthly, results show that trade-related cost is a significant obstacle in the way of Pakistan's bilateral trade flows, and can be minimised through proper policy actions. Higher trade cost leads to lower competitiveness, thus limiting the potential benefits of trade. If proper policies are put in place, sufficient reduction in trade cost can be achieved. To reduce trade cost, Pakistan should actively participate in WTO's agreements on trade facilitation and reduce the red-tape at border crossings to cut down on trade costs.

We see that trade costs for agricultural commodities are substantially higher, compared to industrial products, thus shipment of perishable agricultural commodities must be expedited to help minimise trade cost. Similarly, trade cost could be reduced through improvement in cargo handling, port connectivity, and transportation. In addition, the negative effects of distance can be decreased through development of both soft and hard infrastructures by using modern technological methods such as internet, electronic media, and publicity campaigns.

It is evident that cultural similarities can benefit Pakistan's commodity level trade flows, so Pakistan should utilise our diaspora in the target countries for bilateral trade, where we have cultural similarities with Pakistan. Through this initiative, Pakistan could enhance competitiveness by reducing transaction costs.

APPENDIX

Table A1

Countries Included for Specific Commodities Trade Flows with Pakistan

S. No.	Country Name	S. No.	Country Name	S. No.	Country Name	S. No.	Country Name
01	Afghanistan	12	Denmark	23	Morocco	34	Sri Lanka
02	UAE	13	Finland	24	Netherlands	35	Sweden
03	Bangladesh	14	Hong Kong	25	Philippine	36	Thailand
04	Belgium	15	India	26	Portugal	37	Turkey
05	Canada	16	Indonesia	27	Qatar	38	Ukraine
06	China	17	Italy	28	Romania	39	United Kingdom
07	Egypt	18	Japan	29	Russia	40	United States
08	France	19	Kuwait	30	Saudi Arabia	41	Yamen
09	Germany	20	Malaysia	31	Singapore	42	Iran
10	Greece	21	Oman	32	South Africa		
11	Brazil	22	Kenya	33	Spain		

Table A2

List of Countries which belong to Common Border, Common Language, Common Colony, and Landlocked

Common Colony	Common Language	Common Border	Landlocked
UAE	Canada	Afghanistan	Afghanistan
Bangladesh	India	Iran	–
Hong Kong	Kenya	India	–
India	Philippine	China	–
Kuwait	United Kingdom	–	–
Malaysia	United States	–	–
Kenya	–	–	–
Qatar	–	–	–
Singapore	–	–	–
Sri Lanka	–	–	–
Yamen	–	–	–

Table A3

Regional Free Trade Blocs and Member Countries

01. ASEAN Members		
Indonesia	Malaysia	Philippine
Thailand	Singapore	–
02. ECO Members		
Afghanistan	Iran	Turkey
Pakistan	–	–
03. OIC Members		
Afghanistan	Bangladesh	Egypt
Indonesia	Iran	Kuwait
Malaysia	Morocco	Oman
Pakistan	Qatar	Saudi Arabia
Turkey	United Arab Emirates	Yamen
04. SAARC Members		
Afghanistan	Bangladesh	India
Sri Lanka	Pakistan	–

Table A4

Description of Variables and Sources of Data

Variables Name	Exact Definition	Source	Unit	Expected Sign
Specific Commodity Trade T_{ijt}	Total bilateral trade (imports plus exports) of the particular commodity from Pakistan to "j" trading partner in a specific year "t".	WITS At SITC-3 digit Revision-1	Thousands of U.S. dollar	–
GDP Y_{it}	GDP of Pakistan in a specific year "t".	World development indicators	at market prices, constant at 2010 US $	Positive
GDP Y_{jt}	GDP of "j" trading partner in a specific year "t".	World development indicators	at market prices, constant at 2010 US $	Positive
Relative factor endowment RFE_{ijt}	Technological differences between Pakistan and "j" trading partner in a specific year "t".	World development indicators	at market prices, constant at 2010 US $	–
Differences in market size $DGDP_{ijt}$	Differences in capabilities to produce differentiated product between Pakistan and "j" trading partner in a specific year "t".	World development indicators	at market prices, constant at 2010 US $	–
Real exchange rate RER_{ijt}	The bilateral real exchange rate between Pakistan and "j" trading partner in a specific year, defined as $\therefore RER = \frac{NER_i}{NER_j} * \frac{CPI_j}{CPI_i}$	IMF International Financial Statistics	LCU/ Current U.S. dollar constant at 2010	Ambiguous
Distance d_{ij}	It is the geographical distance from the capital to capital between Pakistan and "j" trading partner.	CEPII	Kilometer	Negative
Contingency D_1	It is a border dummy, =1 if "j" trading partner share common border with Pakistan.	The CIA world factbook	–	Positive
Common official language D_2	It is common official language (English) dummy, =1 if "j" trading partner share common official language with Pakistan.	The CIA world factbook	–	Positive
Common Colony D_3	It is common colony dummy, =1 if Pakistan and "j" trading partner were a colony of the same region.	The CIA world factbook	–	Positive
Landlocked D_4	Dummy for landlocked, =1 if "j" trading partner has no access to water transport.	The CIA world factbook	–	Negative
ASEAN	Dummy for a regional trade agreement, =1 for members of ASEAN and, =0 otherwise.	The CIA world factbook	–	Positive
ECO	Dummy for a regional trade agreement, =1 for members of ECO and, =0 otherwise.	The CIA world factbook	–	Positive
OIC	Dummy for a regional trade agreement, =1 for members of OIC and, =0 otherwise.	The CIA world factbook	–	Positive
SAARC	Dummy for a regional trade agreement, =1 for members of SAARC and, =0 otherwise.	The CIA world factbook	–	Positive

Table A4.1

Description of Commodities

Commodities	SITC code Revision 1
01. Rice	042
02. Cotton	263
03. Domestic electrical equipment.	725
04. Medicinal & pharmaceutical products.	541
05. Motors vehicles	732
06. Footwear	851
07. Fruits, fresh, dried fruits, oil nuts.	051
08. Lime, cement & building material.	661
09. Iron & steel bars, rods, angles.	663
10. Perambulator, toys, game & sports equipment.	894
11. Manufacturing of leather or artifacts.	612

Table A5

Estimated Results of Gravity Model under Panel Analysis 2000-2015

	Rice	Fruit	Cotton	Electrical Equipment	Leather Manuf.	Pharm. Products	Iron & Steel	Cement & Products	Road Motor Vehicles	Spots Item	Footwear	Total Trade
GDP_{Pak}	0.123***	0.0687**	-0.0575	0.00151	0.155***	-0.0579***	0.135*	-0.0991***	0.0172	0.0571***	-0.0381*	1.693***
	(3.13)	(1.96)	(-1.40)	(0.06)	(6.86)	(-3.15)	(3.60)	(-2.73)	(0.73)	(3.68)	(-1.66)	(-10.89)
$GDP_{trading\ partner}$	1.389***	1.784***	0.768***	1.439***	0.174	1.109***	2.845*	1.953***	1.493***	0.945***	1.122***	0.537***
	(6.08)	(8.14)	(3.18)	(5.60)	(0.83)	(5.71)	(7.32)	(5.82)	(6.17)	(6.04)	(4.69)	(-4.03)
Distance	-2.370***	-3.564***	1.347	-2.050*	0.302	-0.438	-2.550	-2.775***	-0.882	0.0129	-1.543*	-0.920**
	(-2.87)	(-3.32)	(1.49)	(-1.83)	(0.51)	(-0.55)	(-1.77)	(-2.95)	(-1.02)	(0.02)	(-1.70)	(-2.13)
Differences in market size	0.0423	0.195	-0.225	0.300**	0.207*	0.264**	-0.538**	0.0618	0.208	-0.0800	0.303**	0.205**
	(0.30)	(1.46)	(-1.51)	(2.11)	(1.66)	(2.44)	(-2.45)	(0.31)	(1.51)	(-0.89)	(2.25)	(-3.29)
Relative factor endowment	-0.305	-0.206	-0.112	-0.635***	1.022***	0.000247	-0.191	-0.649**	-0.210	0.605***	0.203	0.0649
	(-1.24)	(-0.74)	(-0.42)	(-2.11)	(5.35)	(0.00)	(-0.45)	(-2.13)	(-0.82)	(3.78)	(0.77)	(-0.5)
Real exchange rate	0.0106***	-0.0106***	0.00241	0.000366	0.00162	-0.00240	-0.0000651	0.00620	-0.00274	0.00434**	0.000858	0.00327**
	(3.18)	(-3.38)	(0.68)	(0.11)	(0.54)	(-0.94)	(-0.01)	(1.28)	(-0.84)	(2.03)	(0.27)	(-2.19)
Landlocked	8.626***	6.392*	3.603	10.14***	0.131	6.108**	10.04**	12.09***	5.952**	2.868*	9.598***	2.856**
	(3.25)	(1.86)	(1.24)	(2.82)	(0.07)	(2.40)	(2.16)	(3.94)	(2.14)	(1.69)	(3.29)	(-2.04)
Common border	-5.662***	-3.533*	1.963	-3.437*	0.728	-0.350	-1.027	-3.045*	-2.790*	-1.312	-2.216	-0.721
	(-3.62)	(-1.79)	(1.15)	(-1.66)	(0.63)	(-0.24)	(-0.38)	(-1.66)	(-1.71)	(-1.31)	(-1.30)	(-0.88)
Common language	0.884	0.767	-0.0385	-1.906*	-0.0804	0.204	-2.726*	0.857	-0.580	-0.422	-1.393	0.163
	(1.06)	(0.70)	(-0.04)	(-1.67)	(-0.14)	(0.25)	(-1.86)	(0.92)	(-0.66)	(-0.80)	(-1.52)	(-0.38)
Common colony	3.048***	1.369	0.248	3.325***	0.0947	1.190	2.392*	3.757***	1.966**	0.264	2.249**	0.859**
	(3.71)	(1.28)	(0.28)	(2.98)	(0.16)	(1.51)	(1.66)	(3.99)	(2.27)	(0.50)	(2.48)	(-1.97)
ASEAN	-0.981	3.194***	0.911	0.724	-0.0733	1.273	1.188	-1.415	3.415***	-0.228	-0.805	0.81*
	(-1.13)	(2.80)	(0.95)	(0.61)	(-0.12)	(1.53)	(0.78)	(-1.44)	(3.75)	(-0.41)	(-0.84)	(-1.8)
ECO	1.272	-0.181	-0.197	-0.340	-0.961	-1.482	1.762	0.0640	1.566	0.107	-2.618	-0.146
	(0.84)	(-0.09)	(-0.12)	(-0.16)	(-0.91)	(-1.02)	(0.67)	(0.04)	(0.99)	(0.11)	(-1.58)	(-0.19)
OIC	1.664**	1.274	1.018	0.595	-0.0860	-0.335	-0.663	1.085	-0.00620	-0.294	0.356	0.517
	(2.09)	(1.22)	(1.17)	(0.55)	(-0.15)	(-0.44)	(-0.48)	(1.22)	(-0.01)	(-0.58)	(0.41)	(-1.26)
SAARC	-3.571**	-0.920	2.739	-3.498*	1.223	0.929	-2.941	-3.588**	-0.289	0.798	-2.896*	-0.336
	(-2.42)	(-0.48)	(1.70)	(-1.76)	(1.16)	(0.66)	(-1.14)	(-2.14)	(-0.19)	(0.85)	(-1.79)	(-0.44)
_cons	-13.27*	-19.24**	-18.01*	-23.48***	-14.27**	-24.43***	-39.68***	-23.53**	-31.78***	-18.66***	-18.77**	-45.80***
(Constant)	(-1.71)	(-1.96)	(-2.13)	(-2.24)	(-2.39)	(-3.27)	(-2.87)	(-2.47)	(-3.81)	(-3.64)	(-2.17)	(-9.84)
Observations	672	672	672	672	672	672	672	672	672	672	672	672

Note: Value of z statistics are in parentheses and p*<0.01(Significant at 10%), p**<0.05(Significant at 5%), p***<0.10(Significant at 1%).

Table A6.0

Cross-Sectional Analysis with GLS (2001-2005)

	Rice	Cotton	Fruits	Electrical Equipment	Leather Manuf.	Pharm. Products	Iron & Steel	Cement & Products	Footwear	Road motor Vehicles	Sport Items	Total Trade
GDP ratio	0.708**	-0.71**	-0.191	-0.267	-0.0575	-0.0252	-1.099**	-0.257	0.758**	-0.399	-0.84***	0.0085
	(2.35)	(-2.41)	(-0.53)	(-0.65)	(-0.25)	(-0.10)	(-1.95)	(-0.82)	(2.14)	(-1.24)	(-5.56)	(0.06)
Distance	-0.127	0.295	-2.40***	-1.638*	-0.228	-0.904	-1.476	-1.442*	-0.888	-0.889	-0.312	-0.860**
	(-0.17)	(0.40)	(-2.65)	(-1.65)	(-0.40)	(-1.36)	(-1.04)	(-1.83)	(-0.99)	(-1.09)	(-0.82)	(-2.24)
Differences in market size	0.344*	0.311*	0.500**	0.868***	0.505***	0.695***	0.932***	0.531***	0.671***	0.687***	0.374***	0.563***
	(1.95)	(1.82)	(2.38)	(3.63)	(3.78)	(4.49)	(2.83)	(2.90)	(3.23)	(3.64)	(4.22)	(6.32)
Relative factor endowment	0.690**	-0.58**	0.578*	0.246	0.614***	0.231	0.131	0.0139	0.976***	-0.217	-0.0323	0.0172
	(2.39)	(-2.09)	(1.68)	(0.63)	(2.81)	(0.91)	(0.24)	(0.05)	(2.87)	(-0.70)	(-0.22)	(0.12)
Real exchange rate	-0.006	0.011*	-0.005	0.0142*	0.00705	0.00310	-0.0005	0.00925	0.00195	0.0113*	0.00680**	0.00425
	(-0.91)	(1.85)	(-0.63)	(1.71)	(1.52)	(0.58)	(-0.05)	(1.45)	(0.27)	(1.72)	(2.21)	(1.37)
Landlocked	-7.091	11.55**	2.495	7.029	4.035	0.913	18.36*	10.53*	-6.708	7.189	13.42***	1.095
	(-1.30)	(2.18)	(0.38)	(0.95)	(0.98)	(0.19)	(1.80)	(1.86)	(-1.05)	(1.23)	(4.89)	(0.40)
Common border	0.383	-1.105	-0.931	-1.959	-0.795	-0.354	0.340	-0.615	0.629	-3.374**	-3.03***	-0.810
	(0.25)	(-0.73)	(-0.50)	(-0.92)	(-0.67)	(-0.26)	(0.12)	(-0.38)	(0.34)	(-2.02)	(-3.85)	(-1.03)
Common language	1.730**	-0.344	1.380	-2.101**	-0.295	0.194	-1.842	1.628**	-0.633	-0.683	-0.620*	-0.0405
	(2.34)	(-0.48)	(1.57)	(-2.10)	(-0.53)	(0.30)	(-1.34)	(2.12)	(-0.73)	(-0.86)	(-1.67)	(-0.11)
Common colony	0.605	0.788	0.0380	2.518**	1.282**	0.357	2.321	1.842**	0.535	1.472*	1.359***	0.698*
	(0.72)	(0.96)	(0.04)	(2.20)	(2.01)	(0.48)	(1.48)	(2.11)	(0.54)	(1.63)	(3.21)	(1.64)
ASEAN	0.331	0.361	4.641***	2.412**	-0.552	2.250***	1.512	-0.286	1.124	3.349***	-1.57***	1.037**
	(0.39)	(0.43)	(4.55)	(2.07)	(-0.85)	(2.99)	(0.95)	(-0.32)	(1.11)	(3.65)	(-3.63)	(2.39)
ECO	-0.0776	0.735	-0.356	0.802	-0.914	-1.228	1.315	0.163	-2.405	2.542*	-0.139	0.148
	(-0.06)	(0.58)	(-0.23)	(0.45)	(-0.92)	(-1.07)	(0.54)	(0.12)	(-1.56)	(1.81)	(-0.21)	(0.22)
OIC	2.149**	0.640	1.343*	0.656	-0.299	-1.233**	-0.810	0.689	0.143	-0.731	-0.404	0.345
	(3.11)	(0.95)	(1.63)	(0.70)	(-0.57)	(-2.03)	(-0.63)	(0.96)	(0.18)	(-0.99)	(-1.16)	(0.99)
SAARC	-0.724	-0.109	1.333	-1.939	-1.706	1.181	-2.311	-3.426**	-1.347	-0.628	-1.963***	-1.042
	(-0.51)	(-0.08)	(0.79)	(-1.01)	(-1.60)	(0.95)	(-0.88)	(-2.34)	(-0.81)	(-0.42)	(-2.77)	(-1.46)
_cons	-3.911	-1.725	9.722	-5.988	-7.816	-4.071	-8.197	1.023	-7.817	-3.561	1.453	2.202
	(-0.56)	(-0.26)	(1.18)	(-0.64)	(-1.49)	(-0.67)	(-0.63)	(0.14)	(-0.96)	(-0.48)	(0.42)	(0.63)
Observation	42	42	42	42	42	42	42	42	42	42	42	42

Note: Value of z statistics are in parentheses and p***<0.01(Significant at 1%), p**<0.05(Significant at 5%), p*<0.10(Significant at 10%).

Table A6.1

Cross-Sectional Analysis with GLS (2006-2010)

	Rice	Cotton	Fruits	Electrical Equipment	Leather Manuf.	Pharm. Products	Iron & Steel	Cement & Products	Footwear	Road Motor Vehicles	Sport Items	Total Trade
GDP ratio	0.569*	-1.16***	-0.236	0.0646	-0.463**	0.0195	-1.423**	0.649*	0.431*	-0.513*	-1.13***	0.0141
	(1.81)	(-2.97)	(-0.54)	(0.15)	(-2.12)	(0.06)	(-2.24)	(1.83)	(1.32)	(-1.66)	(-7.63)	(0.09)
Distance	-1.068	0.433	-2.70**	-1.798*	-0.449	0.105	-3.727**	-2.578***	-1.557	-1.197	-0.278	-1.22***
	(-1.35)	(0.44)	(-2.47)	(-1.68)	(-0.82)	(0.13)	(-2.34)	(-2.90)	(-1.90)	(-1.48)	(-0.75)	(-3.06)
Differences in market size	0.193	0.581**	0.382	0.688***	0.433***	0.611***	1.573***	0.676***	0.896***	0.797***	0.217**	0.618***
	(1.01)	(2.44)	(1.45)	(2.65)	(3.26)	(3.23)	(4.07)	(3.14)	(4.51)	(4.07)	(2.40)	(6.40)
Relative factor endowment	0.429	-0.644*	0.352	0.547	0.702***	0.268	-0.360	0.129	0.410	-0.227	-0.0965	-0.145
	(1.38)	(-1.67)	(0.82)	(1.30)	(3.25)	(0.87)	(-0.57)	(0.37)	(1.27)	(-0.71)	(-0.66)	(-0.93)
Real exchange rate	-0.00253	0.0115	0.0101	0.0292***	0.0107*	0.000310	0.0139	0.0166*	0.00596	0.0185**	0.0111***	0.00294
	(-0.30)	(1.10)	(0.87)	(2.57)	(1.84)	(0.04)	(0.82)	(1.77)	(0.68)	(2.16)	(2.82)	(0.70)
Landlocked	-6.779	19.83***	3.233	4.405	6.540*	2.286	23.49**	-4.808	-0.660	8.294	19.05***	0.482
	(-1.20)	(2.83)	(0.41)	(0.58)	(1.67)	(0.41)	(2.06)	(-0.76)	(-0.11)	(1.44)	(7.16)	(0.17)
Common Border	-0.587	-0.966	-1.920	-3.742	-2.100*	1.576	-3.957	0.696	-1.383	-4.165**	-2.81***	-0.673
	(-0.33)	(-0.44)	(-0.78)	(-1.56)	(-1.71)	(0.90)	(-1.11)	(0.35)	(-0.75)	(-2.30)	(-3.36)	(-0.75)
Common language	2.036***	0.111	1.386	-1.410	-0.444	0.772	-3.074**	1.501*	-1.82***	-0.435	-0.0843	0.171
	(2.70)	(0.12)	(1.33)	(-1.38)	(-0.85)	(1.04)	(-2.02)	(1.77)	(-2.33)	(-0.56)	(-0.24)	(0.45)
Common colony	0.502	1.985*	-0.461	1.599	0.434	0.123	2.834	1.334	0.519	1.430	0.966**	0.507
	(0.58)	(1.83)	(-0.38)	(1.35)	(0.72)	(0.14)	(1.61)	(1.36)	(0.57)	(1.60)	(2.35)	(1.15)
ASEAN	0.0240	0.344	3.543***	2.648**	-0.312	1.557*	2.697	-0.00605	0.125	3.801***	-1.42***	0.964**
	(0.03)	(0.31)	(2.89)	(2.20)	(-0.51)	(1.77)	(1.50)	(-0.01)	(0.14)	(4.18)	(-3.40)	(2.15)
ECO	1.093	0.407	0.555	0.196	0.135	-1.714	2.542	-1.643	-2.459*	3.165**	0.174	0.0500
	(0.77)	(0.23)	(0.28)	(0.10)	(0.14)	(-1.22)	(0.88)	(-1.03)	(-1.66)	(2.17)	(0.26)	(0.07)
OIC	1.203*	0.962	0.773	0.701	-0.608	-0.104	-1.760	1.148	-0.317	-0.641	-0.952***	0.148
	(1.66)	(1.07)	(0.77)	(0.71)	(-1.21)	(-0.15)	(-1.20)	(1.41)	(-0.42)	(-0.87)	(-2.79)	(0.40)
SAARC	-1.719	1.054	0.550	-0.501	0.534	1.246	-3.963	-2.723*	-2.572*	-0.622	-0.953	-1.085
	(-1.17)	(0.58)	(0.27)	(-0.25)	(0.52)	(0.86)	(-1.34)	(-1.65)	(-1.69)	(-0.42)	(-1.38)	(-1.47)
_cons	10.17	-10.34	16.89*	-0.505	-4.430	-10.37	-3.737	6.745	-5.309	-3.348	5.627	4.974
	(1.37)	(-1.12)	(1.65)	(-0.05)	(-0.86)	(-1.41)	(-0.25)	(0.81)	(-0.69)	(-0.44)	(1.61)	(1.33)
Observation	42	42	42	42	42	42	42	42	42	42	42	42

Note: Value of z statistics are in parentheses and p***<0.01(Significant at 1%), p**<0.05(Significant at 5%), p*<0.10(Significant at 10%).

Table A6.2

Cross-Sectional Analysis with GLS (2011-2015)

	Rice	Cotton	Fruits	Electrical Equipment	Leather Manuf.	Pharm. Products	Iron & Steel	Cement & Products	Footwear	Road Motor Vehicles	Sport Items	Total Trade
GDP ratio	0.467	-1.29***	-0.419	0.220	-0.498**	-0.0363	-1.17***	0.210	-0.0566	-0.381	-1.069***	0.108
	(1.48)	(-3.69)	(-1.00)	(0.53)	(-2.49)	(-0.11)	(-3.09)	(0.48)	(-0.17)	(-1.16)	(-6.05)	(0.62)
Distance	-1.72**	0.552	-3.2***	-2.572***	-0.536	0.663	-4.43***	-1.404	-1.425*	-1.506*	-0.279	-1.38***
	(-2.25)	(0.65)	(-3.19)	(-2.57)	(-1.11)	(0.81)	(-4.82)	(-1.32)	(-1.73)	(-1.89)	(-0.65)	(-3.23)
Differences in market size	0.587***	0.633***	0.463*	0.713***	0.453***	0.602***	1.669***	0.651**	0.796***	1.006***	0.248**	0.740***
	(3.06)	(2.99)	(1.82)	(2.85)	(3.74)	(2.95)	(7.27)	(2.44)	(3.86)	(5.04)	(2.32)	(6.93)
Relative factor endowment	0.153	-0.776**	0.209	0.601	0.831***	0.245	0.0920	-0.410	0.323	-0.210	0.0685	-0.117
	(0.50)	(-2.31)	(0.52)	(1.51)	(4.32)	(0.76)	(0.25)	(-0.97)	(0.99)	(-0.66)	(0.40)	(-0.69)
Real exchange rate	0.0125*	0.00691	0.0110	0.0326***	0.0116**	0.00153	0.0111	0.0112	0.0130	0.0254***	0.0144***	0.00388
	(1.65)	(0.82)	(1.09)	(3.29)	(2.40)	(0.19)	(1.22)	(1.06)	(1.59)	(3.20)	(3.40)	(0.92)
Landlocked	-3.560	24.28***	7.168	1.326	5.007	4.434	20.27***	0.131	6.347	9.067	16.34***	0.375
	(-0.64)	(3.94)	(0.96)	(0.18)	(1.42)	(0.74)	(3.03)	(0.02)	(1.06)	(1.56)	(5.23)	(0.12)
Common Border	-2.791	-1.093	-3.871	-5.664**	-2.129	1.261	-3.203	-0.414	-2.514	-6.602***	-3.321***	-1.275
	(-1.50)	(-0.53)	(-1.57)	(-2.34)	(-1.81)	(0.64)	(-1.44)	(-0.16)	(-1.26)	(-3.41)	(-3.20)	(-1.23)
Common language	0.821	-0.489	1.766	-0.922	-0.169	0.398	-2.45***	0.807	-1.597**	-0.332	0.0911	-0.174
	(1.08)	(-0.58)	(1.75)	(-0.93)	(-0.35)	(0.49)	(-2.70)	(0.77)	(-1.96)	(-0.42)	(0.21)	(-0.41)
Common colony	0.988	2.202**	-0.168	1.448	-0.0263	0.231	2.178**	1.817	0.908	1.433	0.998**	0.507
	(1.15)	(2.32)	(-0.15)	(1.29)	(-0.05)	(0.25)	(2.11)	(1.52)	(0.98)	(1.60)	(2.07)	(1.06)
ASEAN	0.162	0.309	2.856**	1.797	0.0716	1.520*	2.126**	-0.775	-0.368	4.212***	-0.637	1.224**
	(0.19)	(0.33)	(2.51)	(1.61)	(0.13)	(1.67)	(2.08)	(-0.65)	(-0.40)	(4.73)	(-1.33)	(2.57)
ECO	1.118	-1.074	0.887	1.822	-0.0536	-1.045	1.481	1.838	-1.779	2.706*	1.036	-0.305
	(0.77)	(-0.67)	(0.46)	(0.96)	(-0.06)	(-0.68)	(0.85)	(0.91)	(-1.14)	(1.79)	(1.28)	(-0.38)
OIC	0.840	0.315	0.807	0.594	-0.412	-0.565	-1.125	-0.290	-0.233	-0.652	-1.204***	-0.376
	(1.18)	(0.40)	(0.85)	(0.64)	(-0.91)	(-0.74)	(-1.31)	(-0.29)	(-0.30)	(-0.88)	(-3.01)	(-0.95)
SAARC	-2.599*	1.294	0.243	-0.00994	1.971**	2.003	-5.65***	0.229	-1.888	-0.0450	0.207	-0.687
	(-1.84)	(0.83)	(0.13)	(-0.01)	(2.21)	(1.33)	(-3.34)	(0.12)	(-1.24)	(-0.03)	(0.26)	(-0.87)
_cons	6.420	-11.74	20.39**	4.929	-4.852	-14.39*	-2.460	-0.685	-3.221	-6.880	4.141	3.128
	(0.86)	(-1.42)	(2.05)	(0.50)	(-1.02)	(-1.80)	(-0.27)	(-0.07)	(-0.40)	(-0.88)	(0.99)	(0.75)
Observation	42	42	42	42	42	42	42	42	42	42	42	42

Note: Value of z statistics are in parentheses and p***<0.01(Significant at 1%), p**<0.05(Significant at 5%), p*<0.10(Significant at 10%).

Table A7

Estimated Results of Gravity Model using Trade Cost Variable under Panel Analysis 2003-2012

	Rice	Fruit	Cotton	Electrical Equipment	Leather Manuf.	Pharm. Products	Iron & Steel	Cement & Products	Road Motor Vehicles	Spots Item	Footwear	Total Trade
GDP_{Pak}	0.273**	0.022	-0.0266	-0.0615	0.0139	-0.0983**	-0.0194	0.00045	0.135*	0.0648	-0.029	0.0694
	(-2.6)	(-0.21)	(-0.19)	(-1.65)	(-0.26)	(-3.27)	(-0.34)	(-0.01)	(-2.26)	(-1.5)	(-1.01)	-0.16
$GDP_{trading\ partner}$	4.653**	2.335	5.412*	-0.739	1.373	-2.795**	3.148	2.654	0.629	1.043	0.576	2.821***
	(-2.61)	(-1.29)	(-2.32)	(-0.57)	(-0.73)	(-2.69)	(-1.58)	(-1.12)	(-0.3)	(-0.7)	(-0.58)	(-4.71)
Trade cost	-	-	-							-		
	0.0653***	0.0508***	0.0794***	-0.0339**	0.0436**	0.00438	0.00625	-0.0189	0.00818	0.0976***	-0.0028	-0.0514***
	(-6.08)	(-4.65)	(-5.64)	(-3.06)	(-2.71)	(-0.49)	(-0.36)	(-0.92)	(-0.46)	(-7.59)	(-0.33)	(-9.23)
Differences in market size	-5.680**	-1.945	-5.899**	-0.896	-2.425	1.86	-2.951	-1.399	-3.463	-0.496	-1.81	-1.907**
	(-3.28)	(-1.11)	(-2.60)	(-0.69)	(-1.29)	(-1.77)	(-1.47)	(-0.58)	(-1.65)	(-0.33)	(-1.81)	(-3.23)
Relative factor endowment	4.523***	1.121	3.261***	-1.802***	0.138	0.659	1.532	2.012*	1.145	-0.866	1.080**	1.186***
	(-6.56)	(-1.6)	(-3.6)	(-3.48)	(-0.18)	(-1.58)	(-1.91)	(-2.1)	(-1.37)	(-1.44)	(-2.71)	(-5.03)
Real exchange rate	0.00559	0.0138**	-0.0061	0.0178***	0.0123**	0.00723**	-0.0041	0.00172	0.0158***	0.00309	0.0133***	-0.002
	(-1.34)	(-3.25)	(-1.11)	(-6.48)	(-3.09)	(-3.26)	(-0.96)	(-0.34)	(-3.56)	(-0.97)	(-6.29)	(-1.51)
Common border	8.882***	2.061	10.16***	-4.629***	-1.445	1.387	6.781***	8.208***	3.097*	-5.053***	0.543	2.544***
	(-5.83)	(-1.33)	(-5.08)	(-5.02)	(-1.08)	(-1.86)	(-4.75)	(-4.82)	(-2.08)	(-4.72)	(-0.77)	(-6.1)
Common language	0.318	0.24	1.858***	-0.166	1.108**	0.11	-1.233**	1.153*	0.651	-3.055***	-0.251	-0.973***
	(-0.74)	(-0.55)	(-3.3)	(-0.61)	(-2.81)	(-0.5)	(-2.94)	(-2.3)	(-1.49)	(-9.69)	(-1.20)	(-7.92)
Common colony	-9.954***	-2.189	-10.02***	-0.253	0.406	1.072	-0.268	-0.544	-3.778	1.114	-0.891	-2.086***
	(-6.07)	(-1.31)	(-4.65)	(-0.21)	-0.23	-1.08	(-0.14)	(-0.24)	(-1.91)	(-0.78)	(-0.94)	(-3.74)
ASEAN	6.022***	2.141	4.885**	-4.551***	-5.705***	0.927	0.936	-1.163	-4.573*	2.248	-0.994	1.893***
	(-4.2)	(-1.47)	(-2.59)	(-3.93)	(-3.40)	(-0.99)	(-0.52)	(-0.54)	(-2.45)	-1.67	(-1.12)	(-3.59)
OIC	1.978	-1.303	2.518	-4.205***	-2.075	-3.328***	-1.395	5.782***	-3.489*	-8.097***	-4.081***	-0.214
	(-1.78)	(-1.15)	(-1.72)	(-4.86)	(-1.65)	(-4.77)	(-1.04)	-3.62	(-2.50)	(-8.06)	(-6.13)	(-0.54)
SAARC	12.86***	7.852**	10.15**	-7.807***	-5.155	-1.139	-0.762	3.495	-3.41	-0.579	-0.236	5.463***
	(-4.96)	(-2.97)	(-2.98)	(-3.90)	(-1.77)	(-0.71)	(-0.25)	-0.95	(-1.06)	(-0.25)	(-0.15)	(-6.01)
_cons	28.24**	24.57*	2.026	67.35***	28.76**	36.06***	-4.26	36.18**	86.52***	13.75	42.12***	-11.688
(Constant)	(-2.44)	-1.62	-0.17	-7.19	-2.11	-4.77	(-0.29)	(-2.09)	-5.73	-1.26	-5.84	(-1.17)
Observations	100	100	100	100	100	100	100	100	100	100	100	100

Note: Value of z statistics are in parentheses and p*<0.01(Significant at 10%), p**<0.05(Significant at 5%), p***<0.10(Significant at 1%).

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