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Gravity Analysis of Road-Trade Nexus: A Case Study of China-Pakistan Economic Corridor (CPEC)

Hassan Mujtaba

Dissertation Submitted to Department of Economics & Finance

Dr. Nasir Iqbal

Pakistan Institute of Development Economics, Islamabad

Date

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS, ISLAMABAD

CERTIFICATE

This is to certify that this thesis entitled **"Gravity Analysis of Road–Trade Nexus: A Case Study of China Pakistan Economic Corridor (CPEC)"** submitted by **Mr. Hassan Mujtaba** is accepted in its present form by the Department of Economics and Finance, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

External Examiner:

Dr. Abdul Rashid
Associate Professor,
IIUI, Islamabad.

Internal Examiner:

Ms. Uzma Zia
Research Economists,
PIDE, Islamabad.

Supervisor:

Dr. Nasir Iqbal
Associate Professor,
PIDE, Islamabad.

Head of Department of Economics and Finance:

Dr. Ahsan Ul Haq
Assistant Professor,
PIDE, Islamabad

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ABSTRACT

Economic Corridors are a relatively new concept that was introduced by Asian Development Bank (ADB) while developing infrastructure, road and energy projects in the Greater Mekong Sub-region (GMS). An economic corridor is not merely a road/transport corridor, but additionally connects the supply with the demand in a particular area/region. China-Pakistan Economic Corridor (CPEC) is the China's flagship project of One-Belt-One-Road (OBOR) comprising of long term investments in physical infrastructure, rail, road, energy, pipelines, electricity etc. A significant contribution of economic corridors is that they result in the creation of blocs and enhance regional economic integration. CPEC is also expected to create different blocs. The bloc between Pakistan & China is inevitable and at the same time, the author has constituted a hypothetical bloc comprising Pakistan, China, Iran, India, and Afghanistan. The main research problem of this dissertation is to analyze the impact of these two different blocs named CPEC (China-Pakistan) and CPEC_1 (Pakistan, China, India, Iran, and Afghanistan) on trade flows. For this purpose, the author has augmented a traditional gravity model and incorporated various other trade/economic variables. A panel data set ranging from 1981-2015 has been used and the results have been estimated through Ordinary Least Squares (OLS) and Fixed Effects (FE) regression. The results indicate that the creation of CPEC would result in an enhancing of trade flows by 120%. However, the creation of CPEC_1 would reduce trade flows by 55%. Terrorism, chaos, political instability, the political/Islamic insurgency in the western provinces of Pakistan are the main reasons for the latter figure and are the major impediments in the smooth execution of CPEC. It is only by dealing insurgents and miscreants through an iron fist that CPEC could

really turn into a ‘game changer’ and be simultaneously beneficial for Pakistan’s neighbors as well.

Keywords: China-Pakistan Economic Corridor (CPEC), Gravity Model, Trade flows, Ordinary Least Square (OLS), Fixed Effects (FE), Panel Data

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Hassan Mujtaba

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CHAPTER 1: INTRODUCTION

BACKGROUND

In the globalized world of 21st century, economic corridors have taken a central role in the regional & transnational trade. They act as catalysts in promoting economic growth, regional economic integration, multiplying trade flows, improving infrastructure and raising the standards of living of participating countries. Economic corridors encompass a network of roads, railways, airways, ports, energy infrastructure, and pipelines, etc. that not only connects different regions but also links supply with the demand in those areas. It is also pertinent to note that an economic corridor can be local (connecting two or more cities/provinces), regional (connecting two or more countries) and even international (for example, submarine telecommunication cables).

In the literature on International Economics, the term "economic corridor" is not defined quite clearly. Various research scholars, multilateral agencies, and government organizations have defined the concept in their own way. For instance, Asian Development Bank (ADB) uses a set of three characteristics that typify an economic corridor:

(I) It covers a geographical area with a well-connected network of roads, railways, bridges, airways, ports, etc. In other words, a region or a country having an efficient transport corridor.

(II) An economic corridor is primarily a bilateral rather than a multilateral arrangement. And especially, the strategic nodes at the border crossings of two countries are of utmost significance.

(III) Thirdly, the physical aspects of a corridor are highlighted or emphasized in such a way that the development needs of a country/region could be met.

Similarly, Srivastava (2011) discusses at length the process through which a transport corridor is transformed into an economic corridor. He identifies five different stages of this transformation viz. (I) Transport corridor, (II) Transport plus trade facilitation corridor, (III) Logistics corridor, (IV) Urban Development Corridor, (V) Economic Corridor (see figure 1 in appendix).

The concept of the economic corridor was first popularized by the Asian Development Bank (ADB) in the Greater Mekong Subregion (GMS). At the Eighth GMS Ministerial Conference in Manila in 1998, the GMS countries adopted the framework of economic corridors which was to be executed over a period of ten years i.e. from 2002-2012. As part of the flagship projects in the GMS Strategic Framework, the completion of three economic corridors was sanctioned viz. (I) North-South Economic Corridor (NSEC), (II) East-West Economic Corridor (EWEC), (III) Southern Economic Corridor (SEC). The major objective was to transform these corridors as a hub for trade, commerce, transport facilitation, investment promotion, enterprise development and tourism. Figure 2 on the following page shows a detailed map of all the countries and regions included in the GMS economic corridor framework (see figure 2 in appendix)

THE CASE OF CPEC

At the turn of the century, the concept and the idea of economic corridors have gained widespread popularity throughout the world. Different countries and regions are adopting this approach in order to boost connectivity and economic activity. In this context, China is looking forward to expanding its global outreach by developing a systematic and phase-wise project of economic corridors called ‘One-Belt-One-Road’ (OBOR). The implementation of OBOR, which

is a long run project, would result in the creation of different blocs in the region and across the globe.

China-Pakistan Economic Corridor (CPEC) is the flagship project of One-Belt-One-Road (OBOR) and that include investments in ports, road and rail infrastructure, energy projects, agriculture, science & technology, and finance. In April of 2015, Chinese President Xi Jinping visited Pakistan and signed a Memorandum of Association (MoU) and 51 agreements on Chinese investments totaling $46billion over the next ten to fifteen years. However, since then, the Chinese government has consistently upped the amount of investment and as of late, the figure has reached to $62 billion. Of this amount, $35 billion is reserved for energy projects while the remaining $27 billion is to be spent on infrastructure projects. According to Jawad (2013), the project of CPEC is expected to be completed in three phases: short-term by 2017, medium-term by 2025 and long-term by 2030.

China-Pakistan Economic Corridor (CPEC) is much celebrated in the Pakistani media, political circles, policy arenas and strategic community as the ‘game changer’. The project can have a long-lasting impact on Pakistan’s economy, trade, regional economic integration, employment generation and productivity provided that the Pakistani state is able to ensure its smooth implementation by minimizing and ideally completely eliminating security/terror concerns.

OBJECTIVES

In this context, this study has the following as its objectives:

(I) The impact of CPEC and CPEC_1 (a hypothetical bloc comprising India, Iran and Afghanistan as additional members of CPEC) on trade flows.

(II) The impact of free trade agreements (FTA’s) on trade flows.

(III) The impact of trade costs (both tariff and non-tariff barriers) on trade flows.

(IV) The impact of foreign direct investment (FDI) on trade flows.

(V) The impact of road quality (RQ) on trade flows.

SIGNIFICANCE

The study contributes to literature on various counts viz. (I) it analyzes the impact of CPEC'S physical infrastructure on trade flows by augmenting the standard gravity model, (II) it includes a hypothetical bloc of countries as a possible extension of CPEC and then investigates it potential impact on trade flows in the region.

DATA AND ESTIMATION METHODOLOGY

The study aims to utilize 'Gravity Model' of the international trade as its theoretical framework. The author intends to use panel data of Pakistan & its major (regional) trading partners (including China, India, Afghanistan & Iran) ranging for the period 1981-2015. Ordinary Least Square (OLS) and panel data estimation techniques of fixed effects (FE) and random effects (RE) shall be employed for model estimation. For the purpose of data analysis and model estimation, the researcher has used the popular statistical, forecasting & modeling software Stata 13.

LIMITATIONS

The only limitation in this regard is that energy & infrastructure projects of CPEC are a work in progress and the exact effects of this project on trade flows cannot be known in advance. However, by utilizing sophisticated models of International Economics and powerful econometric estimation techniques, a good approximation of trade flows emanating from CPEC is viable.

The rest of the dissertation is structured as follows: stylized facts are covered in Section 2; Section 3 highlights a brief review of literature on infrastructure, trade flows and the gravity model; modelling framework, data & methodology is presented in Section 4 while Section 5 presents

results & discussions. Finally, Section 6 presents conclusions and policy recommendations for this research dissertation.

CHAPTER 2: STYLIZED FACTS

CHINA-PAKISTAN ECONOMIC CORRIDOR (CPEC)

The project of CPEC is expected to be completed in three phases: short-term by 2017, medium-term by 2025 and long-term by 2030 (Jawad, 2013). The road infrastructure of China-Pakistan Economic Corridor (CPEC) spans 3,218 kilometers that starts from Gwadar in Baluchistan (Pakistan) and extends up till Kashgar in Xianjing province of China through Khunjrab Pass. This road network is complex incorporating various arteries and includes eastern, western and central routes[1] (Bengali, 2015). The $27 billion infrastructure investment is to be used to construct, repair and/or upgrade roads, highways, and motorways across Pakistan.

The Chinese One-Belt-One-Road (OBOR) initiative is an ambitious project that plans to include sixty-five countries, six economic corridors and about two-thirds of the world population (Awan, 2017). OBOR's proposed investment is approximately $900 billion to be spent over a period of time. The OBOR initiative can better be understood in the context of Chinese "Silk Road" connections: (I) revival of the ancient Silk route that starts from Xi'an in China and runs through Central Asia to Eastern Europe and finally ending up in Western Europe, (II) the China-Pakistan Economic Corridor (CPEC), and (III) Maritime Silk Route that starts from the Fuzhou port in China, runs through the entire Indian Ocean and then connects to the Middle East and Horn of Africa. CPEC is particularly significant in this scheme as it provides a natural bridge between the ancient Silk route and the proposed Maritime Silk Route. See Figure 3.

[1] There are three routes of the CPEC.

Eastern Route: Gwadar-Turbat-Panjgur-Khuzdar-Ratodero-Kashmore-Rajanpur-Dera Ghazi Khan-Multan-Faisalabad-Pindi Bhatian-Rawalpindi-Hasanabdal and onwards.

Central Route: Gwadar-Turbat-Panjgur-Khuzdar-Ratodero-Kashmore-Rajanpur- Dera Ghazi Khan-Dera Ismail Khan-Bannu-Kohat-Peshawar-Hasanabdal and onwards.

Western Route: Gwadar-Turbat-Panjgur-Khuzdar-Kalat-Quetta-Zhob-Dera Ismail Khan-Bannu-Kohat-Peshawar-Hasanabdal and onwards.

OBOR's Proposed Route

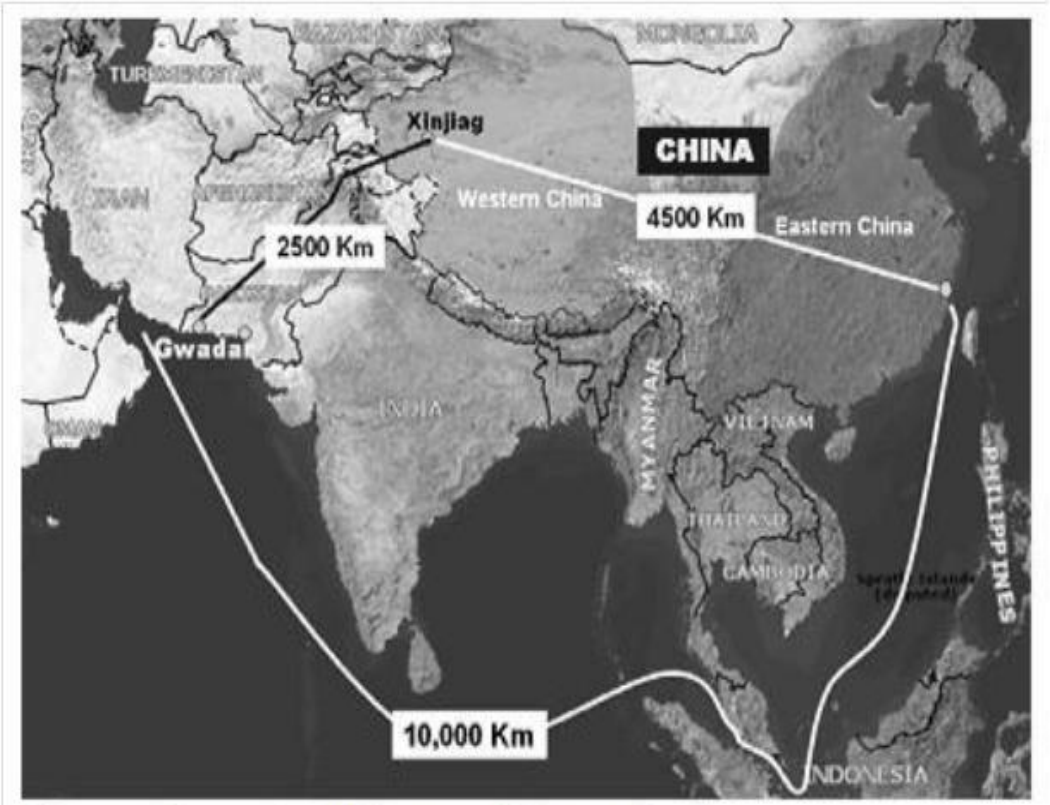
Figure 3

Source: Google Maps

The project is of paramount importance for both China and Pakistan. CPEC provides a lifeline to energy starved Pakistan through various coal, oil, solar and wind-based power plants[2] besides benefiting its economy through the improvement of infrastructure, creation of various industrial estates and special economic zones. For China, the development of Gwadar port means a decline in the importance of the Strait of Hormuz and Strait of Malacca for its trade and energy needs. China is the second largest consumer of oil in the world after United States and currently it imports most of its oil from the Middle East which has to pass through the Straits of Hormuz and Malacca covering a distance of about 10,000 kilometers. The oil tankers take

[2] According to Shoukat *et al.* (2016) more than 21,000 Megawatts of energy is expected to be produced via CPEC projects.

approximately 20 days to cover this distance. With the construction of CPEC's physical infrastructure, oil tankers will only take 48 hours to move from eastern China to Gwadar covering a distance of 2,500 kilometers (ICSANA, 2014). Thus, the benefits to China are obvious in terms of cost savings and speedy delivery of oil as CPEC will cut the supply route by 12,000 kilometers (South China Morning Post, 2014). See Figure 4.



Shortest Route from Western China to Gwadar

Figure 4

Source: (Khan, 2013)

China-Pakistan Economic Corridor (CPEC) is indispensable in meeting Pakistan's infrastructure development needs. Ever since its independence in 1947, the availability of physical infrastructure has been low in Pakistan. Moreover, the level of investment (private, public and foreign) is below its true potential, thereby further aggravating the scant conditions of public infrastructure in the country. According to Shoukat et al. (2016), Pakistan needs to spend an average of 0.71% of gross domestic product (GDP) on telecommunications, 5.5% of GDP on electricity generation and 1.23% of GDP on transportation every year till 2020 to meet its infrastructure needs. Furthermore, the penurious conditions of physical infrastructure in Pakistan have had a serious toll on the country's trade and growth costing the economy around Rs300 billion ($5 billion) per year (Saleem, 2011).

REGIONAL INFRASTRUCTURE

South Asia is one of the large and diverse regions in the Asian continent with a population of approximately 1.8 billion (which is roughly one-quarter of the entire world's population) and a combined nominal GDP of $3.12 trillion. Countries in the South Asian region are geographically knit together and share common historic, cultural, political, economic, ethnic and religious connections.

Like most other third world and developing countries, South Asian states suffer from low economic growth, stagnant GDP per capita, slow urbanization and large gaps in the infrastructure development. Besides, South Asia has the largest number of people living below the poverty line, while its birth/demographic rates are high in comparison to other regions in the world.

A large number of South Asia's population remains deprived of basic service facilities such as electricity grid, gas connection, metaled roads, sanitation, and telecommunications. The poor infrastructure coverage in South Asia is also a major constraint on the region's economic growth, development, and connectivity. In this regard, South Asia significantly lags behind other developing regions such as Latin America, Caribbean, East Asia and Pacific etc., although all of the aforementioned regions share similar rates of economic growth and industrial development. Besides, the situation of South Asian infrastructure is only marginally better than Sub-Saharan Africa, which is the least developed and integrated regions in the world. See Table 1.

TABLE 1: SOUTH ASIA'S INFRASTCUTRE COMPARISON

Region	Avg GDP Growth (2000-12)	Urbanization Rate (2012)	Telecom Access (per 100 people)	Electricity Access (% of pop)	Access to improved sanitation (% of pop)	Access to improved water (% of pop)
East Asia & Pacific (EAP)	8.9%	50	98	92	67	91
Europe & Central Asia (ECA)	4.4%	60	157	100	94	95
Latin America & the Caribbean (LAC)	3.1%	79	125	94	81	94
Middle East & North Africa (MENA)	4.2%	60	105	94	89	89
South Asian Region (SAR)	6.7%	31	72	71	39	90
Sub-Saharan Africa (SSA)	4.7%	37	54	35	30	63
World	**2.5%**	**53**	**103**	**78**	**64**	**89**

Source: **World Development Indicators, except when noted otherwise.**

So far we have discussed the inter-regional differences in various infrastructure measures across the world. However, it is interesting to note that there are also significant differences in the level of infrastructure development *within* the South Asian region. Table 2. below captures a glimpse of the situation.

As can be seen clearly in Column 1 of Table 2, Maldives has the highest figure of Telecom Access (per 100 people) followed by Sri Lanka. All the other South Asian countries rank far below on this infrastructure count. In terms of electricity access (percentage of population) Maldives and Sri Lanka dominate the ranking with 95% and 77% respectively and Nepal closely follows at 76%. Similarly, both these countries outperform the rest of South Asia in terms of other infrastructure measures such as improved access to sanitation, access to improved water and percentages of paved roads. However, in terms of total road network, it is Bhutan that is ahead of all other countries with a total road network of 9.7 km per 1000 people.

TABLE 2: INTRAREGIONAL VARIATION IN INFRASTUCTURE SERVICES IN SOUTH ASIA

Country	Telecom Access (per 100 people)	Electricity Access(% of pop)	Access to improved sanitation (% of population)	Access to improved Water (% of pop)	Total Road Network(km per 1000 people)	% of Paved Roads
Afghanistan	54	30	29	61	1.6	29
Bangladesh	58	47	55	83	0.1	10
Bhutan	69	65	45	97	9.7	40
India	75	75	35	92	3.5	50
Maldives	173	95	98	99	0.3	100
Nepal	47	76	35	88	0.8	54
Pakistan	65	67	47	91	1.5	72
Sri Lanka	**104**	**77**	**91**	**93**	**5.5**	**81**

***Source*: World Development Indicators, except when noted otherwise.**

Finally, we can conclude that Maldives and Sri Lanka have the best access to infrastructure rates while Afghanistan, Bangladesh and Nepal have the worst access rates in the entire South Asian region. The only exception in this regards is the access to improved water which is remarkably high throughout South Asia.

REGIONAL TRADE

The mantra of free trade was much chanted at in the latter half of the twentieth century as part of the neoliberal ideology that advocated globalization, free movement of goods/services, human resources, capital and promoted liberal democracy. As a result, in the realm of International Economics, various countries deliberated upon and signed a plethora of free trade agreements (FTAs) and regional trading agreements (RTAs). This trend was further accelerated by the slow pace of development of Word Trade Organization's (WTO) standards and protocols.

Following in the footsteps of other regions and countries, seven South Asian states namely India, Pakistan Nepal, Bhutan, Maldives, Sri Lanka and Bangladesh came together to form a regional bloc named South Asian Association of Regional Cooperation (SAARC) in the year 1985. Afghanistan later became a full member of the cooperation in 2007. The main objective of SAARC is to foster economic, political, cultural and regional ties among the member states. South Asian region comprises around 23% of world's population and contributes around 6% to world's gross domestic product (GDP). Around 2% of the commodities traded in the world originate from South Asia and the region contributes to around 3% of the global foreign direct investment (FDI) flows (Khandare & Babar, 2012). According to the latest statistics available at the *SAARCSTAT*, the total trade of SAARC member countries in 2012 was $956630 million. Of this amount $354617 million were the exports while $602013 million were the imports of merchandize from the rest of the

world. As compared to the previous year, the exports of the region shrank by 3% while the imports grew by almost 4%.

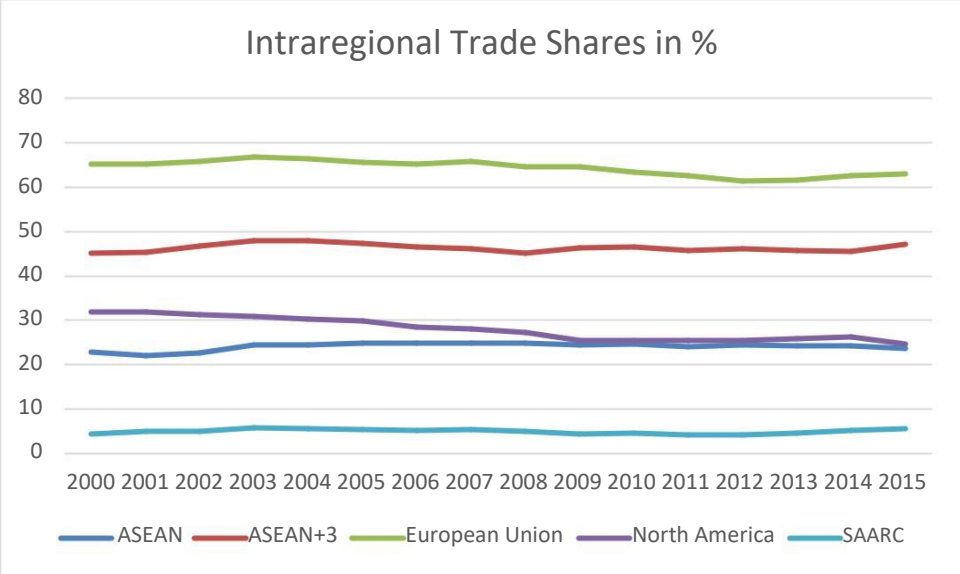
TABLE 3: SOUTH ASIA'S TRADE FLOWS

	Exports of Merchandise					Imports of Merchandise				
	Million US $					Million US $				
Country	**2008**	**2009**	**2010**	**2011**	**2012**	**2008**	**2009**	**2010**	**2011**	**2012**
SAARC	241304	206751	277639	365279	354617	409715	329968	441606	579639	602013
Afghanistan	540	403	388	376	350	3020	3336	5154	6390	6200
Bangladesh	15370	15083	19194	24439	25113	23860	21833	27821	36214	34132
Bhutan	521	496	641	675	590	543	529	854	1052	1020
Maldives	331	169	198	346	314	1388	967	1091	1465	1554
India	194828	164909	226350	302905	293214	321032	257202	350234	464463	489364
Nepal	939	823	856	919	960	3590	4384	5133	5774	6500
Pakistan	20323	17523	21410	25383	24596	42329	31668	37807	44012	44157
Sri Lanka	8452	7345	8602	10236	9480	13953	10049	13512	20269	19086

Source : http://www.saarcstat.org/

To gauge the success of any regional trade agreement (RTA), economists and policymakers look out for the intra-regional trade of the grouping. Higher intra-regional trade is generally considered a characteristic of an RTA meeting its goals and objectives. In the case of SAARC, intraregional trade has remained low throughout the life of the cooperation, varying between 4% and 6%. This is considerably low in comparison to other trade agreements in Asia and the rest of the world (Chandran, 2013). The intraregional trade of European Union ranges in between 60% to 70%, ASEAN+3 is close to 50%, North America varies in between 25% to 30% while that of East Asia is 35%. This makes South Asia one of the least integrated regions in the world. The figure below shows the dismal state of intraregional trade among SAARC member countries:

FIGURE 5



Source : https://aric.adb.org/beta

We have already seen the major exports and imports of Pakistan. Let's take a cursory look at the items of trade of other SAARC member countries. In the year 2012, India exported $142b worth of goods and services while its imports were $235b. Petroleum Crude, gold and silver and electronic goods are its top imports while petroleum products, gems and jewelry and pharma products its top exports. In the year 2015, Bangladeshi imports were $38.3n and its exports were $35.7b that is with a negative trade balance of $2.6b. The top exports of Bangladesh include Knit T-shirts, Knit Sweaters, Non-Knit Men's Suits, Non-Knit Women Suits and Non-Knit Men's Shirts. Its imports include petroleum, heavy pure woven cotton, raw cotton and wheat.

Nepal is a small country in the north of Indian subcontinent in the mountainous region of Himalayas. It has a gross domestic product of $21.2b with exports of $909m and imports of $6.61b. Its major exports include flavored water, fruit juices, knotted carpets, nutmeg and non-retail synthetic staple fibers yarn. Its imports include petroleum, silver, rice and semi-finished iron. Sri Lanka is a small island nation in the Indian Ocean near the tip of subcontinent. In 2015, the country had a GDP of $82.3b with exports of $11.8b and imports of $21b. The major exported items included tea, women undergarments, knit women suits and non-knit women suits. Its major imports include refined petroleum, crude petroleum, cars and planes, helicopter and/or spacecraft. The GDP of Bhutan in 2015 was $2.06b with imports of $465m and exports of $214m resulting in a trade deficit of $251m. The country exports ferroalloys, electricity, raw plastic sheeting, hydrogen and carbides while its major imports include refined petroleum, cars, machinery and planes, helicopters and/or spacecraft.

Maldives is a tiny island in the Indian Ocean. The country has a GDP of $3.44b with imports of $2.08b and exports of $227m. Its major exports include processed fish, fish fillets, non-fillet frozen fish and non-fillet fresh fish. Its imports include refined petroleum, planes, helicopter and/or spacecraft, telephones and sawn wood. In 2015 the GDP of Afghanistan was $19.3b with imports of $7.63b and exports of $865m. The top exports of the country include grapes, cotton, coal and nuts while its major imports include petroleum gas, raw sugar, wheat, peat and inedible oil.

On the eve of SAARC's conception, the leaders of South Asia set very ambitious targets for the body such as to create a Free Trade Area, Customs Union, a Common Market and a Common Economic & Monetary Union. Today, even after the passage of thirty years, the

cooperation remains a failure in achieving any of the above mentioned objectives. One of the main reasons of the bleak performance of SAARC is the bilateral relationship between India & Pakistan (two of SAARC's largest economies). Although both countries share a 2,912km long border but the trade between them is abysmally low and most of it takes place via Dubai. In 2013 for instance both countries traded goods & services worth $2.4b. According to World Bank estimates, it is 20% cheaper for India to trade with Brazil than the neighboring Pakistan! Incidentally, the leaders of both sides have always sacrificed greater economic and trade gains at the altars of the vested political interests.

CHAPTER 3: LITERAURE REVIEW

INTRODUCTION

The gravity model[1] of international trade draws its inspiration from the law of gravity of Physics which states that the mutual attraction between two planets or any other bodies is dependent upon their respective sizes and the distance between them. The classical gravity model was first postulated by Tinbergen (1962), Pöyhönen (1963) and Linnemann (1966) in which the trade flows were shown to be directly proportional to the economic size (that is, gross domestic products) and inversely proportional to the distance between two or more countries. Aitken (1973) for the first time augmented the classical gravity model to include dummies for regional trading arrangements (RTAs) and found them to be statistically significant and positive in explaining the direction of trade flows.

In the early years of the scholarly work on gravity model, trade economists were fascinated by the model as it usually resulted in an R^2 (that is, coefficient of determination) in between the range of 65% and 95% (Bergstrand, 1998). Owing to its sheer explanatory power, the gravity model gained popularity among those studying international economics, however a large majority of them were dissatisfied by its lack of theoretical or micro foundations.Anderson (1979) for the first time derived theoretical foundations for the gravity model. Several other researchers including Helpman and Krugman (1985), Bergstrand (1985, 1989), Eaton and Kortum (1997), Deardorff (1998) and Anderson van Wincoop (2003) followed suit and provided robust micro foundations for the gravity equation under different assumptions for example products differentiated by origin,

[1] Scholars of International Trade usually employ two different methodologies for modeling trade flows. These include (I) Simulation models that replicate policy conditions under different scenarios, (II) Econometric models that use past data to make predictions about the future. Simulation models such as Geographical Simulation Model, Computable Generalized Equilibrium (CGE) model etc. have been criticized on numerous accounts. For instance, it has been observed that simulation models lack sound econometric foundations and that they require selection of considerable number of parameters. And since these parameters are selected and not estimated, therefore the results are unreliable statistically. On the contrary, the gravity model belongs to a family of econometric models. Over the years, gravity model has proven to be robust, stable (with very high explanatory power) and with very solid micro foundations (Kepaptsoglou et al, 2010). Therefore, it is the model of choice for this research study.

monopolistically competitive markets with product differentiation, Heckscher-Ohlin model with its alternate scenarios etc. Baldwin (1994) commenting upon the theoretical foundations of gravity equation says:

"The gravity model used to have a poor reputation among reputable economists. Starting with Wang and Winters (1991), it has come back into fashion. One problem that lowered its respectability was its oft-asserted lack of theoretical foundations. In contrast to popular belief, it does have such foundations."

Although the gravity equation has robust micro foundations and enjoys wide acceptance among trade economists, the model does not exist without its flaws especially on accounts of lacking a sound theory. Mele & Baistrocchi (2012) presented a mathematical critique of the model within the context of international trade. They argued that ever since Tinbergen's use of gravity model to estimate the trade flows, researchers have failed to justify the use of a gravitational constant in the equation, especially considering its logarithmic form which yields the intercept of a straight line. Moreover, by estimating the constant ($\alpha = y - \beta x$) in a normal fashion, the researchers commit an implicit 'error acceptance'.

THORETICAL UNDERPINNINGS OF ECONOMIC CORRIDOR AND GRAVITY ANALYSIS

Infrastructure can be defined as the basic physical system of any country or an organization that includes roads, railways, ports, energy pipelines, communications, sewage, water & electric systems etc. Investments in infrastructure are highly costly and they are usually funded through public, private or public-private collaborative means. Infrastructure allows businesses, industries and countries to gain access to key economic factors of production such as land, labor, human resources and facilitates in the mobility of capital and entrepreneurial talent. On the other hand,

poor infrastructure raises the transportation, logistics and overhead costs thereby diminishing productivity and hampering a firm's ability to compete in the global market.

A brief review of trade literature reveals that trade costs including both tariff and non-tariff barriers have reduced considerably all over the world in the last decade or so, averaging less than 5% in developed economies and between 15% to 20% in the less developed countries (LDCs) (Anderson & van Wincoop, 2004). Therefore, as the world has become more integrated owing to globalization and free trade, tariff barriers have substantially fallen and are no longer major impediments in international trade. In the present context, trade costs related to soft and hard barriers have become more relevant where the former are dealt with various business facilitation measures and the latter are dealt through improving physical infrastructure.

There are numerous methods to study or scientifically analyze the impact of infrastructure on trade flows/economic growth/regional economic integration that have been used in the literature of economics. One of them is the gravity model of international trade. A number of scholars have extracted trade flows from infrastructure using the gravity estimates [(Nordås & Piermartini 2004; De 2006; Fujimura & Edmonds 2006; Ahmad, et al., 2011; Akpan 2013; Koczan & Plekhanov 2013; Ahmad, et al., 2015; Donaubauer, et al., 2015)]. Generally, a significant and positive impact of infrastructure on trade flows is reported as indicated by the sign of the coefficients. In the paragraphs that follow, the researcher has provided a brief review of literature that focuses on the relationship between soft/hard infrastructure and trade flows/economic growth.

Choudhri et al. (2017) analyzed the effects of barriers on Pakistan's east-west trade- especially its trade with China and India- and also highlighted the benefits accruing from a reduction in these barriers. The authors identify two broad set of barriers viz. policy induced

barriers in case of Pakistan-India trade (for example, high tariff and non-tariff barriers and strained political relations), land transportation barriers in case of Pakistan-China bilateral trade.

The authors used a gravity model and employed panel data of 183 countries for a time span of 2004-2013. Ordinary Least Square (OLS), EK Tobit and Poisson Pseudo Maximum Likelihood (PPML) regression techniques were used to estimate the model. The authors augmented the gravity model to include dummy variable, assessing the impact of these barriers on trade with each of these countries. The authors simulated a general equilibrium model considering two scenarios: (I) 10% reduction, (II) 25% reduction in trade barriers with both India and China. The authors found significant potential for trade expansion resulting from (I) Reduction in political, cultural and socio-economic barriers with India, (II) China-Pakistan Economic Corridor (CPEC).

Shoukat et al. (2016) analyzed the impact of the CPEC's physical infrastructure on regional economic integration (REI). They used 'trade openness' as a proxy for REI. The variable of physical infrastructure was constructed using 'Principle Component Method' (PCM) which included multiple indicators. Time series data of Pakistan's economy from 1972 to 2014 was used for the study. The authors found that there is a significant and positive connection between the growth of physical infrastructure and the regional economic integration (REI) for Pakistani economy.

Ahmad et al. (2015) studied the impact of infrastructure on trade in Malaysia using a gravity model. The authors employed panel data techniques viz. random effects (RE) and fixed effects (FE) besides ordinary least squares (OLS) to estimate the model. Of all the models, fixed effects (FE) was found to be most consistent and efficient. Their results suggest that improvement

in infrastructure has significant positive impact on the export volume of Malaysia and the result is consistent with those of other studies in the literature.

Akpan (2013) analyzed the impact of improvement in Dakar-Lagos Highway corridor on the intra-regional trade flows in the Economic Community of West African States Sub region (ECOWAS). The author employed a gravity model and he augmented it to include a variable for road quality (as a proxy for infrastructure). Tobit regression was used for the purpose of estimating the model. The author found that if the quality of roads (and infrastructure) is improved by 1% then the intra-regional exports will rise by US$1.01 million, on average. Besides, the author concluded that if roads in ECOWAS region are upgraded to match the level of road quality in South Africa, then the trade flows will improve by 5.27%, that is, by approximately US$397.80 million relative to the 2012 level.

Fujimura & Edmonds (2006) analyzed and estimated the economic impact of cross-border road infrastructure on trade and foreign direct investment (FDI) flows in the Greater Mekong Sub region (GMS). An augmented version of the gravity model was applied for the purpose of data modeling. The authors found that development in cross-border regional infrastructure had a positive and significant impact on the trade flows in the GMS. Another interesting finding of the study is that domestic-road infrastructure has a negative effect on GMS trade flows. It is only after inculcating cross-border infrastructure in the model with the domestic-road infrastructure, that the authors get an overall positive impact. Thus, this shows the significance of cross-border infrastructure development on trade, FDI flows and regional economic integration in the Greater Mekong Sub-region (GMS).

De (2006) in his paper studied the impact of non-price factors such as infrastructure and transaction costs on the trade flows in the Asian region. He augmented the gravity model to include

variables for income, geography, customs, political factors, transaction costs and free trade agreements (FTAs). He employed a panel data comprising of fifteen Asian economies from the time-period 2000 to 2004. By using Fixed Effects (FE) estimation technique, the researcher found that reduction in transaction costs (of doing business) and improvements in the physical infrastructure (such as roads, railways, ports, highways etc.) has significant positive impact on the trade flows and regional economic integration in Asia.

Ismail and Mahyideen (2015) analyzed whether the type of infrastructure plays a role on determining trade flows and economic growth in a country(s). Specifically, they examined the impact of hard and soft infrastructure on trade flows and the effect of quantity & quality of infrastructure on gross domestic product (GDP) growth. Hard infrastructure includes roads, railways, ports, airways etc. while soft infrastructure entails matters related to border and transport efficiency. The latter may include government regulation, documents required for import/export, time taken for cargo clearance etc. The authors used an augmented gravity model for which a panel was employed from 1971 to 2013. Random Effects technique was used for model estimation. Their results indicate that improvements in hard infrastructure have a positive impact on trade. Similarly, the Information & Communications Technology (ICT) infrastructure also significantly and positively impact the level of imports/exports. Finally, the researchers concluded that both quantity and quality of infrastructure determines economic (GDP) growth. Although, quantity of infrastructure has a direct positive impact on the overall economy, having quality infrastructure results in economic growth that is sustainable and efficient in the long run.

Nordås & Piermartini (2004) analyzed the impact of behind the border infrastructure on trade flows between and among countries. The authors augmented a traditional gravity model to include variables such as bilateral tariff rates, infrastructure, multilateral resistance term besides

including dummies for common border, common language, island & landlocked. The gravity equation was estimated using both Ordinary Least Squares (OLS) and fixed effects (FE) estimation technique. The authors concluded the following: (i) the quality of infrastructure is a significant determinant of trade flows, (ii) tariff barriers have a significant and negative impact on trade, (iii) Of all the components of physical infrastructure, ports & shipping was found to be most significant and explaining trade flows.

Imran and Niazi (2011) studied the impact of infrastructure stock on the level of GDP growth (which served as proxy for economic growth). Secondly, they analyzed the determinants of total factor productivity (TFP), especially its connection to the public infrastructure stock. The authors collected the data from various issues of *Pakistan Economic Survey* and *World Bank Development Indicators* data base. They ran (i) a simple regression, (ii) a growth regression to meet the objectives of the study. The researchers concluded that infrastructure has a significant impact on the economic growth and total factor productivity in Pakistan. However, one surprising result of the study is that investments in road infrastructure do not yield a significant result. But on the other hand improvements in telecommunications, information & communications technology (ICT), power sector, irrigation for agriculture etc. have highly significant and positive effects on the growth of the country. The authors suggest that the Pakistani government should allocate a larger amount for energy generation by diverting resources away from the construction/up gradation of road networks in its annual Public Sector Development Program (PSDP).

Ahmad et al. (2011) analyzed the impact of Information & Communications Technology (ICT) infrastructure on Malaysian trade. The authors augmented a gravity model to include three ICT infrastructure indicators as follows: (i) mobile and fixed line telephone subscribers per 100

people, (ii) personal computers per 100 people and (iii) internet users per 100 people. They used data of Malaysia's 36 major trading partners and employed a panel from 1980 to 2008. Pooled Ordinary Least Squares (OLS), Fixed Effects (FE) and Random Effects (RE) techniques were used for the purpose of estimation and a significant result of Hausman test indicated that fixed effects should be preferred over random effects. The authors found that all the major gravity variables were significant and had the expected signs and all the ICT infrastructure components were positive and significantly explaining Malaysian trade flows.

Tanveer and Manan (2016) studied the impact of physical infrastructure on the economic growth of Pakistan. They employed data from 1974-2011 and estimated it using White test, Jarque-Berra and Breusch-Godfrey techniques. Their results suggest that total road length, total telephone lines, total power generation, per capita health expenditure and gross fixed capital formation are all positive and significant determinants of GDP growth.

Koczan and Plekhanov (2013) analyzed the impact of hard infrastructure and institutional factors such as corruption on the level of trade flows among countries. For this purpose, the authors used an augmented gravity model and employed a panel data set over the period 2000-2011. Ordinary Least Squares (OLS) technique was used for estimating the model. They found that potential gains from improving infrastructure and curbing corruption far exceeds the gains from reducing or eliminating tariff barriers. Another interesting finding of the study is that improvements in infrastructure and institutions in the home country generate greater positive effects on trade flows and economic growth if they are matched or complemented by similar improvements in the partner countries. In this scenario, the role of transport/economic corridors, regional economic integration, customs, economic and political union etc. are further magnified.

Donaubauer et al. (2015) analyzed the impact of infrastructure on three categories of goods viz. (i) consumer goods, (ii) capital goods & (iii) intermediaries. The authors augmented a gravity model and used data for 37 countries employed over the period 1995-2011. They made an index of infrastructure variable by incorporating transportation, communication, energy & finance. The authors also discussed at length the limitations in the literature of gravity models studying the relationship between infrastructure and trade flows. They addressed the concern for heterogeneity by using fixed effects estimation and the issue of endogeneity by using two stage least squares (2SLS) method[3]. The authors found that the impact of overall infrastructure is positive and non-linear for trade in consumer, capital and intermediate goods. Moreover, after accounting for all issues in the gravity model estimations such as heterogeneity and reverse causality, the authors still found a significant and non-linear effect of infrastructure on trade flows.

Celbiş et al. (2013) quantified the impact of infrastructure on trade flows using the meta-analysis and meta-regression techniques that combine and synthesize around 36 studies. Glass (1976) defined meta-analysis simply as 'analysis of analyses' and it is quite widely used in psychology and medical sciences. The technique entails going through a plethora of journal articles, books, publications etc. to identify some common themes and then drawing conclusions vis-à-vis a topic of interest. The type of infrastructure used for analysis mainly comprised of public infrastructure in transportation and communication. After controlling for various estimation issues such as observed heterogeneity, between study unspecified heterogeneity and publication bias, the authors found that a 1% increase in own infrastructure increases exports by about 0.6% and imports by about 0.3%. Besides, the authors concluded that such elasticities are generally larger for developing countries, land infrastructure and panel data estimates.

[3] The authors used GDP per capita as an instrument for infrastructure.

CONCLUSIONS

Finally, we conclude the section on literature review by briefly reviewing Pakistan-China's economic relations especially in terms of trade. China and Pakistan concluded first trade agreement in the year 1963 as their diplomatic ties strengthened. Since then their bilateral trade volume amounted to $4billion in 2006-07 and then rose to $18.9 billion in 2016. Pakistan's exports to China mainly include raw materials and intermediate goods such as cotton yarn/fabric, fish, hides, crude vegetable material while its imports include value added capital goods such as machinery & parts, iron & steel, road vehicles & spare parts etc.

Din et al. (2009) analyzed the impact of free trade agreement (FTA) signed between Pakistan and China in 2006 on their bilateral trade. By following the tradition of Rose (2004) they used an augmented gravity model and estimated it using pooled ordinary least squares (OLS) method. Their results suggest that there exists a huge untapped trade potential between the two neighboring countries. To further consolidate their analysis, the authors employed two popularly used indices viz. (i) the trade specialization index, (ii) Gruble-Lloyd index of intra-industry trade. Based on the estimates, the researchers concluded that in the short run, the trade potential is heavily tilted in the favor of China while in the long run bilateral trade could be more balanced if the FTA is able to influence production structures in both countries.

After thoroughly and comprehensively reviewing the literature available on economic corridors, gravity analysis and infrastructure, the researcher can confidently assert that there exists a gap in these studies vis-à-vis the impact of CPEC on infrastructure and trade. More specifically, no scholar has hitherto studied the impact of a hypothetical bloc(s) as a possible extension of CPEC and its combined effect on trade flows.

The proposed study is pertinent & timely due to the fact that CPEC is in its early implementation phase where governments (of both China & Pakistan) need optimal counsel from scholars & professionals to make its execution smooth. As a pioneering work, analyzing the trade related impact of CPEC and its hypothetical bloc, the study can lead to important policy implications. Based on the results, the study can recommend Ministry of Planning & Development (of government of Pakistan) specific areas to focus upon (vis-à-vis CPEC) that would maximize the trade potential. Moreover, the study shall highlight the boost given to technology, free trade agreements (FTA), foreign direct investments (FDI) and road infrastructure through the creation of blocs as part of the larger economic corridor project.

CHAPTER 4: MODELLING FRAMEWORK, DATA AND ESTIMATION METHODOLOGY

MODELLING FRAMEWORK

Previous section highlighted the positive significant impact that economic corridors have on trade flows of the bloc(s) and the role that the road quality and infrastructure plays in it. In order to conceptualize these ideas, the author intends to use the framework of gravity model.

The basics of the gravity model and its underlying theoretical underpinnings have already been discussed in detail in the literature review section of this paper. In this section, the mathematical version of the gravity model and its functional form is expressed as follows:

$$F_{ij} = G.\frac{X_i.X_j}{D_{ij}}$$

Where F_{ij} is the trade flows between two countries, X_i & X_j are the gross domestic product (GDP) of country i and j respectively and D_{ij} is the distance between them and G is a constant. Considering the objectives of the study and limited availability of the data, the following variables are being used in the augmented gravity model.

$$F_{ij} = \beta_0 + \beta_1 D_{ij} + \beta_2 REMOT_k + \beta_3 Y_{it} + \beta_4 Y_{jt} + \beta_5 (PCY_{it} - PCY_{jt}) + \beta_6 (TB) + \beta_7 (NTB) + \beta_8 CB + \beta_9 LL + \beta_{10} CL + \zeta_1 FTA + \zeta_2 FDI + \zeta_3 RQ + \zeta_4 (CPEC) + \zeta_5 (CPEC_1)$$

Where F_{ij} = Total bilateral trade of Pakistan; D_{ij} = Distance between Pakistan and each of its trading partner; $REMOT_k$ = Relative distance between Pakistan and each of its trading partner;

Y_{it} = GDP of Pakistan; Y_{jt} = GDP of each trading partner; $PCY_{it} - PCY_{jt}$ = the difference between per capita income of Pakistan and each partner country; TB = Tariff barriers; NTB = Non-tariff barriers; CB = Dummy for common border; LL = Dummy for landlocked; CL = Dummy for common language; FTA = Dummy for free trade agreement; FDI = Bilateral FDI; RQ = Road Quality; CPEC = Dummy for China-Pakistan Economic Corridor; CPEC_1 = Dummy for hypothetical bloc comprising Pakistan, China, Iran, India & Afghanistan

(See Section 4.4 for an in depth description of all the variables of the data set)

DATA

To capture the effects of CPEC's physical infrastructure on trade flows, a panel data of Pakistan and its major (regional) trading partners has been employed over the period 1981-2015. The econometrics literature identifies several advantages of panel data over time series and cross-sectional data. It aids in estimating spatial and time specific effects on the dependent variable besides increasing degrees of freedom and controlling for spatial heterogeneity (Hiaso, 2003).

The author has collected the relevant data from the following sources: UN Comtrade for trade flows for the years 1981-2015, World Bank Development Indicators for gross domestic product (GDP) and UNdata for GDP per capita for 1981-2015, ESCAP World Bank for international trade costs (that included both tariff and non-tariff barriers) for years 1995-2014, UNCTAD for bilateral foreign direct investment flows for years 2001-2012 and World Economic Forum (WEF) for the data of road quality for years 2006-2014[2]. In the literature of International Trade, the air distance between two capitals serves as a proxy for the distance between two countries and I intend to use

[2] Limited Data is available for (I) International Trade Costs, (II) Bilateral FDI flows & (III) Road Quality

Google Maps to obtain this data. Common Border is a dummy variable that takes the value of 1 if two countries share a border and 0 otherwise. Common Language is a dummy variable that takes a value of 1 if population of the two countries speaks the same language and 0 otherwise. FTA is a dummy variable that takes a value of 1 if two or more countries are signatories of a free trade agreement and 0 otherwise. Landlocked is also a dummy variable which takes a value of 1 if a country has no open access to sea and 0 otherwise. CPEC is a dummy variable too that takes a value of 1 if a country is part of CPEC project and 0 otherwise. And finally, CPEC1 is a dummy for a hypothetical bloc and which takes a value of 1 if a country is a member of it and 0 otherwise. The data for Common Border and Landlocked is extracted from CEPII data base, while the data for Common Language and Free Trade Agreements is collected from CIA Fact book and WTO data base respectively.

ESTIMATION METHODOLOGY

For the purposes of this research study, the author will estimate the following econometric equation:

$$lnF_{ij} = \beta_0 + \beta_1 lnD_{ij} + \beta_2 lnREMOT_k + \beta_3 lnY_{it} + \beta_4 lnY_{jt} + \beta_5 ln(PCY_{it} - PCY_{jt}) + \beta_6 ln(TB) + \beta_7 ln(NTB) + \beta_8 CB + \beta_9 LL + \beta_{10} CL + \zeta_1 FTA + \zeta_2 lnFDI + \zeta_3 lnRQ + \zeta_4 (CPEC) + \zeta_5 (CPEC_1) + \varepsilon$$

The author intends to use Ordinary Least Squares (OLS) and panel data[3] technique of fixed effects (FE) in order to estimate the gravity model. Fixed Effects estimation is employed as it is one of

[3] There are several panel data estimation techniques. They include pooled OLS estimation, between estimation (that is, estimation over individual/cross-section), within/fixed effects estimation (that is, estimation over time), first-difference estimator and random effects estimator. The chosen estimation technique should preferably be consistent and efficient. Consistent means that the value of estimated coefficient approaches the value of actual coefficient as the number of observations are increased (that is, $\hat{a}_i$ collapses to a). Efficient simply implies that the estimator ought to have minimum variance.

the most robust techniques for estimating gravity equations. According to Wilson et al. (2005: 849), "a correct specification of the gravity model is parsimonious in specific economic variables" and "rich in fixed effects." Moreover, Cheng and Wall (2005:60) state that "the country-pair fixed-effects model is preferred statistically to all other specifications" in so far as controlling heterogeneity in gravity models is concerned.

It is a common practice that before employing Fixed/Random effects, a Hausman[4] Test is run in order to ascertain the choice of the estimation technique. The mathematical treatment of the test is as follows:

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})'(V(\hat{\beta}_{RE}) - V(\hat{\beta}_{FE}))(\hat{\beta}_{RE} - \hat{\beta}_{FE})$$

DATA DESCRITPION

The rationale for incorporating the hypothetical bloc (referred to as CPEC_1) for gravity simulation is as follows: (I) Being a landlocked country, the trade potential of Afghanistan is severely curtailed. If Afghanistan is given access to Gwadar port through CPEC, then it can provide a much needed boost to the country's economy. (II) India is desperate to get access to Central Asian Republics (CARs) to meet its future energy needs as reflected in its 'Connect Central Asia Policy' (CCAP). CPEC provides the shortest and most viable route for India to meet its energy, trade and other commerce requisites. (III) Iranian President Hassan Rouhani expressed his country's desire to become a part of CPEC, in a meeting with ex-Pakistani premier Nawaz

[4] The null hypothesis of the Hausman test is that the preferred model of estimation is random effects. The alternate hypothesis is that fixed effects is the appropriate method of estimating data. Hausman Test essentially checks whether there is any correlation between the independent variables and the white noise error term. The null hypothesis stipulates that there is no correlation between the regressors and the residual term.

Sharif (Abbas, 2016). By joining CPEC, Iran can get the much-needed access to the east, considering that the country is now sanctioning free. Besides, this also bodes well for the stalled Iran-Pakistan (IP) gas pipeline (Nazar, 2015).

A brief description of the rest of the variables is as follows:

D_{ij} represents the distance between Pakistan's capital Islamabad and the capital of its trading partner. In the literature of International Trade, distance serves as a proxy for transportation costs. Therefore, the researcher expects a negative relationship between trade flows and distance as two countries separated by a greater distance would trade less with each other.

$REMOT_k$ [5] is a variable representing 'relative distance'[6] between Pakistan and its trading partners. I use the formula used by Trotignon (2010) which is given in the footnote. Scholars of international trade argue that merely absolute distance between or among trading partners is not enough to explain trade flows. Factors such as political, social and economic circumstances of partner countries' also have an impact on the level of trade. A multilateral resistance term as used by [(Anderson and van Wincoop (2003)] or a relative distance variable captures the impact of such components. The author expects a positive effect of relative distance on trade flows.

[5] Relative distance is measured by following formula as used by Trotignon (2010):

$$REMOT_k = \sum_l \left(DIST_{kl}.GDP_l \div GDP_{World} \right)$$

[6] Traditional gravity model merely includes the size of the economies and the absolute distance between two countries in order to assess the trade flows. However, over the years‟ trade economists have realized that conditions prevail in countries of other potential trading partners‟ or distance separating two trading partners‟ from their other partner countries, that is, *relative* distance, is also an important determinant of trade flows. Theoretically, it can be asserted that two countries located far off from the core (or world‟s largest economic center) are expected to trade at a greater intensity with each other than similar partner countries located close to it. By this logic, Australia and New Zealand are expected to trade more with each other than Austria and Portugal, although both pairs of countries have the same distance separating them. Failure to incorporate relative distance in the gravity analysis surely leads to an omitted variable bias (Trotignon, 2010).

The cross product of Pakistan's and its partner countries gross domestic product impacts trade flows in a positive manner. Therefore, the expected sign of the coefficient is positive for Y_{it} (Pakistan's GDP) and Y_{jt} (Partner Country GDP).

($PCY_{it} - PCY_{jt}$) represents the difference in per capita income/GDP between Pakistan and its trading partners. The variable's coefficient can take both a positive as well as a negative value. A positive coefficient corresponds to the Heckscher-Ohlin (H-O) theory of international trade which states that countries with large differences in per capita income will trade more with each other. Linder Hypothesis states the opposite. It stipulates that countries with similar per capita gross domestic product shall trade more with each other resulting in a negative sign of the coefficient.

Tariff Barriers (TB) and Non-Tariff Barriers (NTBs) are both trade costs[7] such as tariffs, quotas, embargoes, sanctions, levies etc. and has a clear negative relationship with the trade flows. An increase in either one of them shall result in a lower level of trade flows.

Going forward I expect the variables, foreign direct investment (FDI[8]) and road quality

[7] Trade costs included in this piece of research include both tariff and non-tariff costs and/or barriers that hinder the trade between or among different partner countries. The tariff is defined as a tax imposed on imported goods and services so that they can be made more expensive for importers and local consumers. A tariff barrier benefits government and domestic producers at the expense of consumers and foreign producers. Non-tariff barriers, on the other hand, are another option to install trade restrictions and take a form other than the tariff or direct taxes imposed on imported goods/services. Some forms of nontariff barriers include quotas (that is a limitation on a number of goods that can be imported), embargoes, sanctions, levies, etc. These are mainly used by advanced industrialized economies as another way to control their trade policy.

[8] Foreign Direct Investment (FDI) is defined as the investment made by an individual, firm or a business group in the business interests of another country such that it results in either purchase of business assets or establishing business operations from scratch. Foreign Direct Investment (FDI) is distinguished from portfolio investment where an investor merely purchases and claims a stake in the equities of another country's firm. The key feature of Foreign Direct Investment (FDI) is that it involves in the complete control of or at least substantial influence on the decision making of a firm based in a foreign land.

(RQ), to have a positive coefficient. The reason is simple: an increase in FDI flows between two countries would help trade between them and an improvement in quality of a country's road or physical infrastructure will cut transportation costs and hence increase the trade flows.

Lastly, the explanation for the dummy variables, common border, common language, landlocked and free trade agreements is as follows: if two countries share common border with each other, then they are expected to trade more and hence we can expect a positive sign of this coefficient. If a country is landlocked then it has limited access to the ports of the rest of the world and hence trade flows are adversely affected. Therefore, we expect a negative sign of this coefficient. By signing a free trade agreement (FTA[9]), two or more countries agree to cut down costs and control other factors that hinder bilateral/multilateral trade. A significant and positive sign of this coefficient is thus anticipated. Finally, having a common language reduces transaction costs thereby facilitating trade between two countries. Hence the coefficient ought to have a positive sign.

[9] A free trade agreement (FTA) is an agreement between two or more countries in which the signatories pledge to cut down or completely eliminate price controls in the form of tariffs or non-tariff barriers such as quotas, embargoes, levies etc. An FTA has several political, economic and social benefits. From a trade perspective, an FTA allows all the participating countries to focus on their comparative advantages by cutting down inefficiencies and unnecessary bottlenecks. This allows all the members of an FTA to focus on producing goods that they are comparatively more efficient at making, thus boosting productivity and profits.

CHAPTER 5: RESULTS AND DISCUSSION

This section gives a detailed account of all the results, analyses and their relevant discussion on the research problem of the study, which is to capture and inspect the impact of CPEC and CPEC_1 on trade flows.

As has been mentioned in detail in the previous section, this study uses the gravity model of the international trade as its methodology and the trade flows are estimated using panel data estimation techniques.

BASIC GRAVITY MODEL

The results of the basic gravity model reported in Table 5.1. below show clearly that the traditional gravity variables of gross domestic product and distance are all highly significant and show the correct sign. Estimates (Table 5.1; Column 1) reveal that Pakistan's bilateral trade with the regional countries (China, India, Afghanistan, Iran, Nepal, Sri Lanka, Indonesia, Malaysia, Maldives, Bangladesh) would increase by 0.95 percent as the domestic gross domestic product (GDP) increases by 1%. The results also show that the sign of Pakistan's partner countries gross domestic product (GDP) is also positive and significant, implying that the development of partner country in the region is important for trade expansion. According to the table, for a 1% increase in the gross domestic product (GDP) of the partner country, the bilateral trade would expand by as much as 1.08 percent. In the literature on international trade and gravity model, the distance variable is generally used as a proxy for transportation costs. The results on the distance variable show that as the distance between Pakistan and its trading partners increase by 1% on average than the bilateral trade would decrease by -1.45 percent. Thus, we can confidently state that the findings

of this study are in line with the traditional gravity theory which postulates that the trade flows between two or more countries are directly proportional to the cross product of their GDPs and negatively related to the distance between them.

In order to test the Heckscher-Ohlin (H-O) and Linder hypotheses, the author has augmented the gravity model by employing gross national product per capita (GNP per capita) variable. As can be seen in the table, this variable is negative and highly significant. This shows that as the difference in GNP per capita of Pakistan and its trading partners decrease by 0.32%, their bilateral trade increase by 1%. This confirms the Linder Hypothesis in case of Pakistan and its regional trading partners. This result is consistent with the study of Haider *et al.* (2005) who report that the South Asian countries (specifically Pakistan, India and Bangladesh) trade as predicted by Linder Hypothesis. However, this result contradicts the findings of Gul and Yasin (2011) & Iqbal and Nawaz (2017) who report that the regional trade in South Asia is governed by the mechanics of Heckscher-Ohlin hypothesis.

The variable 'landlocked' is negative and highly significant, indicating that countries that do not have access to the sea would trade less with their partner countries and the rest of the world. The coefficient value -0.96 [exp (-3.210) - 1 = -0.96] indicate that the trade between Pakistan and landlocked countries would be lower by almost 96%. Earlier Iqbal and Nawaz (2017) has reported identical results with almost similar values of the coefficient.

Next, we interpret the results of variable 'common language'. According to the standard international trade theory, two countries speaking or understanding the same language will trade more with each other. The positive and significant coefficient values of this variable confirm this

theory. The coefficient value reported in Table 5.1 indicates that countries sharing a common language will trade approximately 1.2 [exp (0.778) – 1 = 1.177] times more than those who speak different languages.

Finally, the dummy variable of 'common border' has a value of 0.011 [exp (0.0108) – 1 = 0.011] which indicates that countries sharing a common border are likely to trade 0.011 times more with each other than those who are not contiguous. This result is also in accordance with the postulations of standard gravity and international trade theory.

Table 5.1 Basic Gravity Model

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	0.946***	1.332***	1.690***
	(0.0236)	(0.0481)	(0.0592)
ln_gdp_partner	1.076***	0.360***	0.0507
	(0.0215)	(0.0397)	(0.0481)
ln_gpc_difference	-0.322***	-0.412***	-0.765***
	(0.0394)	(0.0821)	(0.0970)
ln_dis	-1.448***	-0.557	
	(0.114)	(0.472)	
Land_locked	-3.210***	-2.016***	
	(0.172)	(0.590)	
Common_language	0.778***	1.869**	
	(0.190)	(0.821)	
Common_Border	0.0108	0.900	
	(0.148)	(0.584)	
o.ln_dis			-
o.Land_locked			-
o.Common_language			-
o.Common_Border			-
Constant	-20.77***	-20.30***	-25.70***
	(1.044)	(3.914)	(0.883)
Observations	3,416	3,416	3,416
R-squared	0.633		0.418
Number of group		110	110
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROLE OF FOREIGN DIRECT INVESTMENT (FDI)

The variable foreign direct investment is included by augmenting the traditional gravity model. Various scholars [Otsubo and Umemura (2003); Gopinath and Echeverria (2004); Bolbol and Fatheldin (2005)] have incorporated the FDI variable by augmenting the traditional gravity model in their research work. On a theoretical level foreign direct investment is expected to have a positive and significant impact on the trade flows of any country. This is proven by our Ordinary Least Square (OLS) estimation reported in column 1 of Table 5.2. The result is both positive and significant & suggests that the trade of Pakistan with its partner countries would increase by 1% for every 0.06% [exp(0.058) – 1] increase in bilateral foreign direct investment (FDI).

Table 5.2 The Augmented Gravity Model: Role of FDI

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	0.820***	0.659***	1.074***
	(0.0455)	(0.0507)	(0.251)
ln_gdp_partner	0.968***	0.760***	0.278
	(0.0444)	(0.0554)	(0.265)
ln_gpc_difference	-0.184***	-0.0938	-0.321
	(0.0488)	(0.0793)	(0.239)
ln_dis	-0.262	0.631**	
	(0.179)	(0.303)	
o.Land_locked	-	-	-
Common_language	1.147***	1.641***	
	(0.215)	(0.438)	
Common_Border	-0.264*	0.0105	
	(0.145)	(0.309)	
ln_fdi	0.0575*	-0.0187	-0.0218
	(0.0298)	(0.0149)	(0.0148)
o.ln_dis			-
o.Common_language			-
o.Common_Border			-
Constant	-24.55***	-20.96***	-14.21***
	(1.261)	(2.413)	(1.168)
Observations	189	189	189
R-squared	0.906		0.886
Number of group		30	30
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROLE OF ROAD QUALITY

This section analyzes the impact that road quality (also a proxy of physical infrastructure) would have on trade flows. Theoretically, there should be a positive relationship between trade flows and road quality as better physical infrastructure of any country should have a definite positive impact on its level of trade flows. However, the results reported in Table 5.3 are contrary to our expectations and standard postulations of the theory. The OLS specification is insignificant and hence irrelevant, but the RE and FE specifications show results that are both negative and highly significant. These results can be interpreted as follows: Pakistan's trade with its partner countries would decline by 1% for every 0.91% [exp (0.645) - 1] improvement in the road quality.

There are two ways to explain this unusual result. First, the data that I obtained for road quality variable was limited to merely eight years (2006-2014), which could have resulted in the problem of micronumerosity and hence incorrect results. Secondly, this could actually mean that improvement in the road quality of a country result in decreased international trade flows but increased domestic trade flows as the intra-region connectivity is improved. Other spill-over effects include better employment opportunities, increased mobility and better connectivity among different markets.

Table 5.3 The Augmented Gravity Model: The Role of Road Quality (RQ)

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	1.073***	0.703***	-0.993
	(0.0484)	(0.0884)	(0.810)
ln_gdp_partner	1.149***	1.030***	2.525***
	(0.0302)	(0.0691)	(0.787)
ln_gpc_difference	-0.0573	0.0633	1.846**
	(0.0474)	(0.113)	(0.761)
ln_dis	-1.105***	-0.493	
	(0.149)	(0.360)	
Land_locked	-1.484***	-2.521***	
	(0.255)	(0.610)	
Common_language	0.612**	0.885	
	(0.238)	(0.634)	
Common_Border	-0.322*	0.404	
	(0.185)	(0.451)	
ln_RQ	0.119	-0.571**	-0.645*
	(0.111)	(0.242)	(0.370)
o.ln_dis			-
o.Land_locked			-
o.Common_language			-
o.Common_Border			-
Constant	-29.17***	-20.43***	-17.85***
	(1.493)	(3.271)	(3.415)
Observations	776	776	776
R-squared	0.786		0.206
Number of group		90	90
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROLE OF FREE TRADE AGREEMENTS (FTA)

As stated in the data description section of research methodology, we can expect a positive and significant relationship between trade flows and free trade agreements (FTA). This is confirmed by our regression results in Table 5.4. The sign of the coefficient FTA is positive and significant at 1% which reflects high significance. This result can be interpreted as follows: The countries that are signatories of one or more free trading agreements are likely to trade twice as much [exp (1.122) – 1 = 2.065] than countries who are not a part of such arrangements. This result is consistent with the findings of Baier and Bergstrand (2007) who report that a free trade agreement almost doubles the trade between two member countries after a time span of ten years.

Table 5.4 The Augmented Gravity Model: The Role of FTA

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	0.924***	1.334***	1.690***
	(0.0235)	(0.0481)	(0.0592)
ln_gdp_partner	1.030***	0.354***	0.0507
	(0.0220)	(0.0397)	(0.0481)
ln_gpc_difference	-0.280***	-0.402***	-0.765***
	(0.0394)	(0.0822)	(0.0970)
ln_dis	-1.026***	-0.0985	
	(0.124)	(0.505)	
Land_locked	-2.785***	-1.577**	
	(0.178)	(0.614)	
Common_language	0.856***	1.878**	
	(0.188)	(0.823)	
Common_Border	0.299**	1.234**	
	(0.150)	(0.600)	
FTA	1.122***	1.429***	
	(0.132)	(0.552)	
o.ln_dis			-
o.Land_locked			-
o.Common_language			-
o.Common_Border			-
o.FTA			-
Constant	-23.42***	-25.09***	-25.70***
	(1.079)	(4.335)	(0.883)
Observations	3,416	3,416	3,416
R-squared	0.640		0.418
Number of group		110	110
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROLE OF TRADE COSTS

According to the theory of international trade, trade costs possess a negative relationship with trade flows as an increase in tariff and/or non-tariff barriers adversely impact the level of exports/imports between or among partner countries. Various scholars [Bhattacharya (2004); Gopinath and Echeverria (2004); Iqbal and Nawaz (2017)] have incorporated tariff barriers in the augmented versions of gravity model in the International Economics literature. Table 5.5 on the next page shows the regression results of the extended gravity model with trade costs. The variable ln_tradecost is highly significant and shows the correct negative sign. The variable can be interpreted as follows: For every 0.81% [exp (-1.684) – 1 = -0.815] increase in the trade costs between Pakistan and its trading partner(s), the level of its trade flows would decline by 1%. Regression results from other specifications yield similar results.

Table 5.5 The Augmented Gravity Model: The Role of Trade costs

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	0.555***	0.592***	0.238
	(0.0198)	(0.0416)	(0.294)
ln_gdp_partner	0.584***	0.651***	1.021***
	(0.0202)	(0.0422)	(0.294)
ln_gpc_difference	-0.0426	0.00399	0.486*
	(0.0271)	(0.0706)	(0.283)
ln_dis	0.0354	-0.0417	
	(0.0817)	(0.237)	
Land_locked	0.0748	-0.280	
	(0.142)	(0.386)	
Common_language	-0.0614	0.345	
	(0.126)	(0.393)	
Common_Border	0.334***	0.461	
	(0.102)	(0.283)	
ln_tradecost	-2.859***	-2.173***	-1.684***
	(0.0905)	(0.159)	(0.188)
o.ln_dis			-
o.Land_locked			-
o.Common_language			-
o.Common_Border			-
Constant	4.742***	-0.957	-3.931**
	(1.045)	(2.302)	(1.809)
Observations	1,289	1,289	1,289
R-squared	0.824		0.487
Number of group		93	93
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROLE OF RELATIVE DISTANCE

Relative distance has also been referred to as the 'multilateral resistance term/variable' in the literature and has been used by various authors [Deardorff (1995); S. Wei (1996); J. Harrigan (2001); J. Anderson and E. van Wincoop (2003); R. Baldwin and D. Taglioni (2006); (Trotignon, 2010)].

When incorporated in the augmented version of the gravity model, the relative distance variable should be positively linked with the trade flows, indicating that countries located away from the world's economic center of gravity (or core) would trade at a greater volume with each other. Our OLS results shown in Table 5.6 confirm this hypothesis. As the distance between a pair of countries with the core increases by 0.573% [exp (0.453) – 1=0.573] their mutual trade rises by 1%.

However, our RE and FE specifications shown in the Table 5.6 show negative and highly significant signs. This is an anomaly and contrary to our theory and expectations. Although, the result is surprising but not quite unrealistic! This study has taken the data of South Asian countries which are major (regional) trading partners of Pakistan. It is an open fact that the South Asian countries and especially Pakistan and its neighboring countries share bitter if not hostile diplomatic and political relationships. As stated earlier in the stylized facts section, it is 20% cheaper for India to trade with Brazil than the neighboring Pakistan! Considering this state of affairs, it is no surprise that the relative distance variable has a negative sign for the South Asian region. This essentially means that as countries' distance would increase by 0.762% [exp (-1.437) – 1 = -0.762], their mutual trade would rise by 1%!

Table 5.6 The Augmented Gravity Model: The Role of Relative Distance

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	1.003***	0.743***	0.777***
	(0.0263)	(0.0759)	(0.112)
ln_gdp_partner	0.666***	1.412***	1.444***
	(0.0868)	(0.113)	(0.153)
ln_gpc_difference	-0.302***	-0.267***	-0.330***
	(0.0395)	(0.0824)	(0.106)
ln_dis	-1.994***	1.317***	
	(0.160)	(0.504)	
Land_locked	-3.017***	-3.172***	
	(0.176)	(0.596)	
Common_language	0.775***	2.082**	
	(0.190)	(0.814)	
Common_Border	-0.161	2.119***	
	(0.152)	(0.592)	
ln_relativedis	0.453***	-1.207***	-1.437***
	(0.0928)	(0.121)	(0.150)
o.ln_dis			-
o.Land_locked			-
o.Common_language			-
o.Common_Border			-
Constant	-8.400***	-44.89***	-35.29***
	(2.740)	(4.596)	(1.328)
Observations	3,416	3,416	3,416
R-squared	0.635		0.434
Number of group		110	110
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROLE OF CPEC AND CPEC_1

We are finally shifting our attention to the most interesting and important variables of this research work, that is, CPEC and the hypothetical bloc CPEC_1 (an assumed extension of CPEC). Results are displayed in Table 5.7. As can be seen from the table on the next page, the variable CPEC is positive and significant for most of the specifications. This implies that the project of China, Pakistan Economic Corridor (CPEC) is going to have a significant trade creating impact on the Pakistan's economy. The value of the variable CPEC can be interpreted as follows: the road infrastructure of China Pakistan Economic Corridor (CPEC) is going to increase Pakistan's bilateral and regional trade flows by approximately 120% [exp(0.789) = 1.20] than the present level. This is consistent with a South Asian trade economist Prabir Dee's assertion that improvement in physical infrastructure leads to reduction in costs and enhancement of trade flows in a particular region.

On the other hand, the hypothetical bloc CPEC_1 created by this author and which includes India, Iran & Afghanistan as additional members of CPEC project, results in significant but negative results. This means that CPEC_1 entails significantly trade diverting effects and would translate into a loss of economic welfare. The result CPEC_1 can be interpreted as follows: In case, Pakistan's neighboring countries (India, Afghanistan and Iran) are given access to CPEC's road infrastructure, then it would result in a decline of regional trade by approximately 55% [exp (-0.805) – 1 = -0.553].

The results obtained for the hypothetical bloc CPEC_1 are rather surprising but not unexplainable. For each of the three countries- Iran, India and Afghanistan- I will offer some elucidation for the startling outputs of the regression models.

First, let's consider the case of Iran. The trade of China with Iran reached about $52 billion in 2014 which was an increase of around 31% from the previous year's figure of around $39.5 billion. In a visit to Tehran in 2016, Chinese President Xi Jinping stipulated that China intends to increase its bilateral trade with Iran to a volume of about $600 billion which is colossal. This boost in trade and economic activity with China is entirely possible for Iran considering that the country is now relatively sanction free, owing to its landmark nuclear agreement reached with the United States and other major powers of the world. Considering these on ground facts, the Chinese One-Belt-One-Road (OBOR) initiative shall prove to be critical for Iranian economic development and trade expansion. To quote a top Iranian official:

"Our goal in the Silk Road plan is first to connect Iran's market to China's via railway for our domestic consumption and second to send Iranian and Chinese products to European markets"

China has already started a railway service running from its eastern province of Xinjiang and extending to Kazakhstan and Turkmenistan to finally reach Tehran. The first freight train that ran on this ancient Silk Route reached Tehran in about 14 days – compared with around 45 days by sea.

This duration in days for freight travel is almost identical for the western route of China-Pakistan Economic Corridor (CPEC). The supply of oil and other commodities from Middle East take around 12 days to reach from Gwadar to Kashgar. Moreover, the road infrastructure of Iran is comparatively well developed and is much popular, thanks to the low cost of oil in the country.

Therefore, in the view of this author, Iran's trade with China can be much fruitful if it utilizes its own road and rail infrastructure rather than becoming a part of China-Pakistan Economic Corridor (CPEC).[10]

Secondly, consider the case of India. India shares a long and porous border with China spanning 3,500km (approximately 2,174 mile) in length. The bilateral trade of the two countries amounts to $72 billion in aggregate, which is about four times as high as Pakistan-China trade. Trade between the two countries takes place through road, sea and airways. China's major exports to India include Iron and Steel, Organic Chemicals, Electrical machinery and mineral fuels & related products while Indian exports to the country include cotton, copper, ores, slag & ash. China and India share three border trading posts located in the Himalayan mountainous range. These include Shipkila in Himachal Pradesh, Lipulekh (or Lipulech) at the trisection point of Uttarakhand–India, Nepal and China and Nathu La which connects the Indian state of Sikkim with China's Tibet Autonomous Region. Of these three, the trade route via Nathu La holds special significance. It forms a part of the ancient Silk Route and holds enormous export potential for both countries. The only impediment that deters Nathu La from realizing its full potential is inadequate physical infrastructure coupled with lack of storage & warehousing facilities and harsh weather conditions. The Indian government can for sure create more trade by upgrading and developing this mountainous path rather than investing in CPEC's physical infrastructure as it is untenable and trade diverting and this has been demonstrated by our results as well.

[10] It should be noted that Iranian rail/road connectivity with China and CPEC should NOT be considered as two different or competitive routes. Both of these projects are complimentary and part of the larger Chinese One -Belt-One-Road (OBOR) initiative.

Lastly, we consider the case of Afghanistan and its bilateral trade with China as well as with other countries in the region. Afghanistan is a landlocked country situated in Asia with a GDP of $19.47 billion. As of 2015, its total exports amounted to $571,404,966 while the volume of its imports was $7,722,865,049. Pakistan, India, Iran, United Arab Emirates (UAE) and China are some of the top trading partners of Afghanistan. Afghanistan's top exports include Fruit & Nuts, Carpets, Gums & Resins, Oil Seeds, Coffee & Spices and Vegetables while its imports include Items nesoi, Oil & Mineral Fuels, Milling Products, Fats & Oil and Iron & Steel.

Afghanistan has a tumultuous and conflict ridden history. In 1978, the People's Democratic Party of Afghanistan (PDPA) overthrew the presidency of Mohammad Daoud Khan in a military coup thereby ushering in a communist revolution. Thereafter, in order to protect the vested interests of the communist regime, the Soviet Union intervened in 1979 which ignited a political and military conflict in the country. In the aftermath of Afghan jihad in which various world powers acted as stakeholders, the communist regime in Kabul was replaced by right-wing Islamist hardliners called Tehreek-e-Taliban. The situation further aggravated due to the September 11 attacks on the World Trade Center, which motivated the US government to invade the country with the partnership of NATO forces. Since then, Afghanistan has witnessed successive military conflicts, periods of political instability, economic recession, war and terrorism. Although the recent Afghan government led by President Ashraf Ghani is making sincere efforts to broker a peace deal with the Taliban and other militant outfits, the terror threat still looms large. This environment of instability and political uncertainty is a major reason hindering Afghanistan's economic progress and its trade with Pakistan, China and other regional countries.

The fate of Pakistan and Afghanistan appears to be intertwined as the political stability of Pakistan started to deteriorate right after the beginning of the Afghan jihad. After the invasion of Afghanistan by US & NATO troops as a retaliation of 9/11, the Islamist factions of Al-Qaeda and Taliban took advantage of the long and porous Pak-Afghan border also called the *'Durand Line'* and sought refuge in the disruptive tribal areas. They later on integrated their capacities to form a militant outfit named "Tehreek-e-Taliban Pakistan" (TTP) and which is posing a threat to Pakistan's national security to date. Official government figures claim that the Islamist insurgency has cost Pakistan $80 billion besides resulting in the deaths of at least 50,000 civilians and military personnel.

TTP is aided and abetted by like-minded foreign & local militant outfits such as East Turkestan Islamic Movement (ETIM), Lashkar-e-Jhangvi (LeJ), Daesh (ISIS), Lashkar-e-Tayyiba etc. The situation is further precarious in Baluchistan, where a secular political insurgency is being waged by anti-Pakistan Baluch separatists through various platforms such as Baluchistan Liberation Army (BLA), Baluchistan Liberation Front (BLF), United Baluch Army (UBA) etc.

This combination of insurgency from both Islamic and secular backgrounds compromises the security and stability of Khyber Pakhtunkhwa (KP), Federally Administered Tribal Areas (FATA) and Baluchistan – provinces that comprise the main route of CPEC. This is the main reason why Pakistan's neighboring countries might not be able to get much benefit from the CPEC project as far as regional trade and connectivity is concerned. In the long run, if both Pakistan and Afghanistan are able to restore peace and law & order, then this situation might be different.

Table 5.7 The Augmented Gravity Model: CPEC & CPEC_1

VARIABLES	(OLS) ln_trade	(RE) ln_trade	(FE) ln_trade
ln_gdp_rep	0.967***	1.333***	1.690***
	(0.0239)	(0.0481)	(0.0592)
ln_gdp_partner	1.094***	0.359***	0.0507
	(0.0218)	(0.0397)	(0.0481)
ln_gpc_difference	-0.322***	-0.413***	-0.765***
	(0.0393)	(0.0822)	(0.0970)
ln_dis	-1.504***	-0.575	
	(0.116)	(0.478)	
Land_locked	-3.203***	-2.006***	
	(0.172)	(0.591)	
Common_language	0.822***	1.897**	
	(0.190)	(0.828)	
Common_Border	0.245	0.912	
	(0.169)	(0.706)	
CPEC	0.789**	0.478	
	(0.374)	(1.702)	
CPEC_1	-0.805***	-0.134	
	(0.168)	(0.691)	
o.ln_dis			-
o.Land_locked			-
o.Common_language			-
o.Common_Border			-
o.CPEC			-
o.CPEC_1			-
Constant	-21.23***	-20.17***	-25.70***
	(1.055)	(3.959)	(0.883)
Observations	3,416	3,416	3,416
R-squared	0.635		0.418
Number of group		110	110
Hausman Test	0.078		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CHAPTER 6: CONCLUSIONS & POLICY RECOMMENDATIONS

The project of China-Pakistan Economic Corridor (CPEC) has become a topic of hot discussion and debate in the Pakistan, and it is likely to remain so for a long time to come. Given the importance attached to it by the Chinese and Pakistani governments & policymakers, the project is bound to have long-term repercussions for Pakistan's and region's political economy. This research dissertation was an attempt to analyze the potential impact that CPEC's road infrastructure can have on the bilateral as well as regional trade flows. Moreover, a hypothetical bloc as a possible extension of CPEC was constructed by the author to check any trade creating or diverting effects, and the simulation was carried out using a gravity model.

The author used an augmented gravity model and included all the traditional variables viz. gross domestic product (GDP), distance, common border (CB), landlocked (LL), common language (CL) besides incorporating additional relevant variables such as GDP per capita difference, foreign direct investment (FDI), road quality, free trade agreements (FTA), trade costs (in the form of tariff and non-tariff barriers) and dummies for CPEC and CPEC_1 (the hypothetical extension of CPEC).

The results[11] of this dissertation indicate that CPEC would have a positive and significant impact on the trade flows. In fact, the road infrastructure of CPEC would boost the trade flows by 120%. However, the results for CPEC_1 indicate that such a bloc in the region would impact trade negatively. The estimations made by this author suggest that such a bloc in the region would result in a decline of trade flows by 55%.

[11] It should be noted that the results of all the other variables included in the gravity model, give correct and precise estimates in accordance with the theory.

In the view of this author, the political and security conditions of Pakistan's tumultuous western provinces (i.e. Khyber Pakhtunkhwa and Baluchistan) and tribal areas (FATA) that constitute the geographic space for CPEC's western route are the main impediments in the regional trade and connectivity. In order to maximize the economic gains and meet the full potential for regional economic integration and trade flows, the Government of Pakistan in collaboration with all the state organs needs to quell the Islamist insurgency in the tribal areas all along the Afghan border and the political separatist's insurgency in the different areas of Baluchistan. However, this author is of the view that in the long run, the government need to tackle the Islamist insurgency by countering the radical ideology through militant rehabilitation in the society (for instance providing them with jobs, psychological counseling, making them part of a legitimate & recognized political faction, educating them in different vocational skills etc.). A similar approach should be adopted for the secular Baluch insurgents who are waging a war for independence from Pakistan. The federal government and the state institutions should address the genuine grievances of Baluch people and mainstream the province by increasing its quota in different federal jobs, enhancing its representation in the parliament, creation of more educational and technical institutes in the main and far flung areas of Baluchistan, encouraging private sector to invest in the province and providing infrastructure and basic services to the residents of Baluchistan. This would not only facilitate the smooth execution and implementation of CPEC plan, but in the long run Pakistan's neighboring countries might also be able to join and benefit from this project.

Finally, as the author had asserted in an earlier section that limited availability of data and CPEC's work in progress status are the major limitations of this research dissertation. A researcher can take up a similar study at a future date (ideally when the project of CPEC is fully operational)

and then analyze its impact on trade flows, for the purposes of comparison. This would make the research on CPEC more interesting and would prove immensely useful for academics, policy makers, government officials, media personnel and the general public.

APPENDIX

Stages of Development of an Economic Corridor

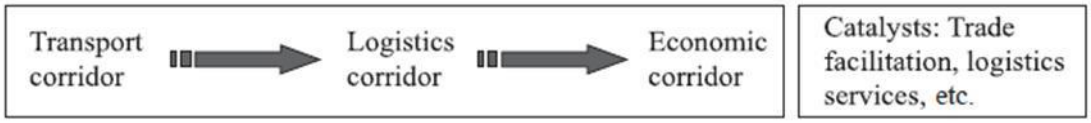


Figure 1
Source: (Srivastava, 2011)
Greater Mekong Subregion Economic Corridors, 2000-2008

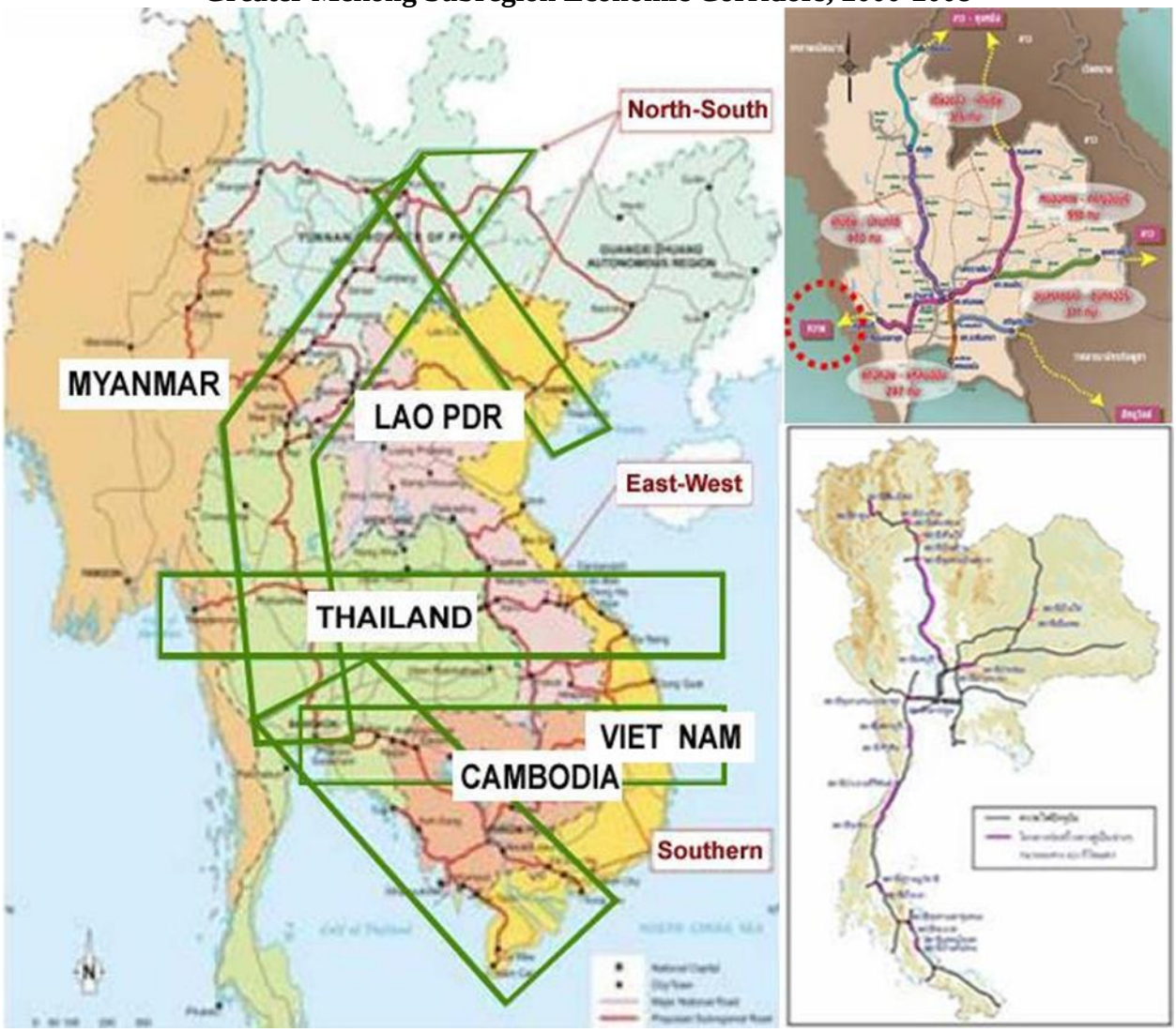


Figure 2
Source: Thai Trade Center North America

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