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Impact of Regime Changes in Afghanistan on Pakistan's Trade: A Gravity Estimation

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Abstract

This study explores how regime changes in Afghanistan on Pakistan's trade between 1980 and 2021. It utilizes panel data covering annual exports, imports for Pakistan and its 248 trading partners, including Afghanistan. Employing gravity estimation techniques like OLS and PPML, the research focuses on estimating bilateral trade between Pakistan and Afghanistan, with regime transitions in Afghanistan as the primary variable of interest. The results from OLS estimation highlight significant insights, particularly in models 1, 2, and 3, where key independent variables such as Russian reinvasion, rebellion, Taliban era, Karzai era, and Ghani era have treated as dummy variables. Notably, the coefficient for Russian reinvasion consistently shows positive and significant effects across all models, indicating increases in exports, imports, and trade associated with rises in Russian reinvasion. Similarly, positive coefficients have observed for the Taliban era and the Karzai era, suggesting varying increases in trade volumes during these periods. Conversely, the Ghani era coefficient demonstrates negative effects on exports, imports, and trade, implying a decline in trade volumes during this period. Furthermore, factors like GDP, distance, contiguity, official language, ethno-linguistic ties, and colonial history emerge as significant determinants of bilateral trade flows, with higher GDP and proximity positively impacting trade while greater

distance and linguistic differences exert negative effects. The robustness test using the PPML method confirms the significance of these factors, emphasizing the crucial role of stable political environments in fostering robust trade relations. With strong model fits and consistent findings with previous research, this study provides valuable insights into the complexities of international trade dynamics and highlights the importance of political stability in promoting trade.

Keywords: Regime change, Bilateral trade, Gravity model, Pakistan-Afghanistan trade, Political stability

1. Introduction

Globalization and trade liberalization have boosted international competitiveness and significantly disrupted trade balances and economic growth in developing economies with lower specialization. Effective trade diversification can serve as a catalyst for invention, innovation, and growth. Pakistan's international trade is heavily concentrated in a few industries and trading partners, which can harm its trade balance and slow its growth rate (Abbas and Waheed, 2019). Market-opening recruits made globally are included in bilateral, regional, and multilateral trade agreements. These assist in making trade and investment regimes predictable and transparent. In order to reduce their risks, businesses can also diversify their sources of supply and set up their manufacturing on a global scale according to the liberalization measures. Deep integration clauses are becoming more prevalent in trade and investment agreements; they foster a business climate that supports change and encourages enterprises to take an active role in the economy. Trade and investment agreements contain general and specific exception provisions that enable governments to take exceptional measures in the event of a crisis; during the COVID-19 crisis, it was impossible to avoid the introduction of restrictive trade measures that exacerbated supply chain disruptions. Trade and investment agreements have a positive impact on supply chains' resilience in addition to having economic benefits.

Export restrictions will hurt the world's poorest nations while raising expenses and prices for domestic production. Countries that rely on imports for essential goods and services are particularly vulnerable when other nations impose export limits. These restrictions can lead to shortages, higher costs, and reduced access to necessary resources, exacerbating poverty and economic instability in the affected regions. For instance, agricultural import-dependent

countries might face food shortages and price spikes, leading to increased hunger and malnutrition. Additionally, limited access to industrial inputs can stifle manufacturing and economic growth, further entrenching poverty. Pakistan's bilateral trade relations with the world encompass a diverse array of countries and industries, presenting both opportunities and challenges. Despite its strategic geographic location and economic potential, Pakistan faces numerous barriers that hinder the full realization of its trade capabilities. These barriers include infrastructural deficits, bureaucratic inefficiencies, and restrictive trade policies that can smother export growth and foreign investment. Furthermore, fluctuating global economic conditions, such as commodity price volatility and shifts in demand, add layers of complexity to Pakistan's bilateral trade landscape. Political changes significantly affect Pakistan's trade with other countries, including Afghanistan. The political landscape within Pakistan and in its trading partners can alter trade policies, tariffs, and bilateral agreements, directly influencing trade flows. When the situation in neighboring countries deteriorates, Pakistan often bears the burden due to its interconnected economy and shared borders. This is especially true with Afghanistan, where continual instability has direct impacts on Pakistan's economy. The environment in Afghanistan is often adverse, marked by persistent conflict and political instability. The instability in Afghanistan has led to a surge in violent extremism and terrorism, significantly affecting Pakistan's economy, making international development more challenging. These security issues disrupt trade routes, increase the cost of doing business, and deter foreign investment. The instability spills over into Pakistan, affecting its border regions and creating additional security and economic burdens. Moreover, the constant threat of terrorism has led to increased military spending in Pakistan, diverting resources away from economic development and infrastructure improvements. This, in turn, hampers Pakistan's ability to compete in the global market. The adverse conditions in Afghanistan have also strained the social fabric of Pakistan, with millions of Afghan refugees crossing into Pakistan, adding pressure on its social services and labor markets. Despite these challenges, Pakistan continues to strive for improved trade relations. The government has been working on various initiatives to enhance trade infrastructure, such as developing the Gwadar Port, which aims to provide a trade gateway to the Arabian Sea and beyond. Additionally, Pakistan is actively seeking to diversify its trade partnerships to reduce dependence on a few countries and sectors. Efforts to enter new markets and sign trade agreements with countries in Africa, Central Asia, and Southeast Asia are part of this strategy. Furthermore, Pakistan's participation in international organizations and regional bodies plays a crucial role in shaping its trade policies. These memberships help Pakistan align its trade practices with global

standards and benefit from multilateral trade agreements. Trade with China, under the China-Pakistan Economic Corridor (CPEC) initiative, represents a significant opportunity for Pakistan to boost its trade and economic growth. CPEC expected to enhance connectivity, reduce transport costs, and create numerous economic opportunities, including industrial zones and energy projects. This strategic partnership has seen as a game-changer for Pakistan's economic landscape, potentially offsetting some of the adverse impacts from its unstable western border. Pakistan's bilateral trade relations influenced by a multiple connection of geographic, economic, and political aspects. While the country faces significant challenges due to regional instability, especially from Afghanistan, it also has substantial opportunities to enhance its trade potential. Strategic initiatives, diversification of trade partners, and infrastructural developments are key to overcoming these hurdles. Political stability, both within Pakistan and in its neighboring countries, remains crucial for sustaining and growing Pakistan's trade relations globally. The government's ongoing efforts to create a more conducive environment for trade and investment are vital for the country's economic resilience and progress.

1.1. Objectives

The main objectives of this study are to identify:

The primary object of this study is to estimate the impact of regime changes in Afghanistan on Pakistan‘s trade using gravity estimation. The search aims to accomplish the following:

- Impact of regime changes in Afghanistan on Pakistan‘s export.
- Impact of regime changes in Afghanistan on Pakistan‘s import.
- Impact of regime changes in Afghanistan on Pakistan‘s trade openness.

2. Literature Review

The gravity model is a widely used tool in economic research, thanks to its strong empirical backing and essential theoretical foundations. This model extensively applied to analyze how trade and capital move between countries and regions. Its name derived from the concept of gravitational attraction, reflecting its ability to uncover patterns in international economic interactions. By considering factors such as the size of economies and the distance between them, researchers can use the gravity model to gain insights into the dynamics of global trade

and investment. Its straightforward approach and solid theoretical basis make it accessible to both scholars and policymakers, allowing them for better understand the factors driving economic relationships across borders.

In a panel data set spanning the years 1992–2015, Saqib, Qi Xin, and Arshad (2018) examined the influence of Pakistan's bilateral trade with FTA partner nations, regional trade agreements, and trade potential with China using a trade gravity model. The findings showed that factors like as GDPs, religion, the WTO, trade openness in both countries, and the common border have a favorable impact on Pakistan's bilateral trade with FTA partner nations whereas factors such as distance from partner countries and inflation have a negative impact.

Marasco, Nabi, and Choudhri (2017) Utilising a gravity model, Pakistan's trade potential with four of its neighbours has been identified. This study's major goal is to calculate the impact of east-west trade obstacles on Pakistan’s trade with its neighbors, China, India, Iran, and Afghanistan. Because of the distance, underdeveloped economic routes to China, political tensions with India, and agreements about Iran, the results are negative for China, India, and Iran. Despite the instability and violence in Afghanistan, the results were still favorable and substantial. This is likely due to the Pashtun tribe's shared culture on both sides of the border.

Jan and Shah (2020) use a gravity model of trade to analyses Pakistan is trading patterns with South Asian nations. Unit root tests, Pooled Mean Group (PMG), and Panel Dynamic estimating methods are ineffective because of terrorism and political tensions between Pakistan and Afghanistan. Panel data were subjected to Ordinary Least Square (DOLS) analysis, and the years 2003 to 2017 were chosen as the study period. The results show that the exchange rate has a positive sign in the Panel DOLS model but a negative indication in the PMG model. Despite sharing borders with both India and Afghanistan, little trade exists between the two countries. Historical disagreements and military conflicts are the causes.

Using a gravity model of trade, Jan and Shah (2019) calculate the bilateral trade between Pakistan and the SAARC nations. This investigation spans the years 2003 to 2016. The fixed-effects, random-effects, and pooled OLS estimators are used to produce the empirical results. Despite sharing a border with both India and Afghanistan, Pakistan has virtually little trade with either country. The study highlights the positive impact of shared languages on bilateral trade between Pakistan and other nations.

Fatma, Ahmed, and Wang carried out a study of bilateral trade in Egypt empirically in 2021. This study examines the connections between Egyptian exports and 36 major trading partners 'worldwide using annual data from 2000 to 2018. The gravity model was used in this investigation together with geographic and financial data. Population, trade openness, and regional trade agreements are other variables with positive coefficients, but they have little bearing on Egyptian bilateral trade. Negative and unimportant for Egypt's trade is the language factor.

Using the trade gravity model, Ganbaatar and Huang et al. (2021) examined the variables affecting the bilateral trade between Mongolia and China. The information were taken into account for the years 1996 through 2019.variables such as China's exports, GDP, population, cultural and geographical distances, trade agreements, tariffs, and trade facilitation index. According to the findings, both the population of Mongolia and the cultural gap between Mongolia and China are stable and unchanged. Exports have a positive and statistically significant impact on both nations' GDP (income). Additionally, trade facilitation significantly increases both nations' exports.

In 2020, Kumar, Sangeetha, and Kathirvel examined the bilateral trade between China and India from 2001 through 2019.According to the study, tremendous opportunity remains for economic collaboration and growth in bilateral trade between China and India. Both countries have benefited from bilateral trade, and there is still a great deal of room for both nations to grow their trade.

Using GMM, Merale and Sadikub et al. (2015) analyze how trade openness affects the economic development of Southeast European (SEE) nations. This analysis uses 16 years of panel data from 10 SEE nations from 1996 to 2012. The estimation results show that beginning per capita income and other explanatory variables influence the beneficial benefits of trade openness on economic growth.

Kang and Yoon (2020) examined trade between South Korea and Japan from 1991 to 2017 and ran straightforward regression analyses. According to the findings, South Korea and Japan's GDPs have a considerable positive (+) impact on the volume of trade between them. Japanese direct investments in South Korea had negative (-) effects on the quantities of trade between South Korea and Japan, in contrast to South Korean direct investments in Japan, which proven to have positive (+) benefits. Using the gravity model of trade, Wahyudi (2015)

examines Indonesia's exports to its top 10 trading partners between 2003 and 2013.

3. Methodology

3.1. Data Source

This research study investigates the impact of regime changes in Afghanistan on trade with Pakistan, employing a gravity model approach with panel data spanning the years 1980 to 2021 sourced from the CEPII Gravity Database. The study collected data and formulated three hypotheses, aiming to assess the impact of regime changes on trade dynamics between the countries. Using STATA software, the study employs Ordinary Least Squares (OLS) and Poisson Pseudo-Maximum Likelihood (PPML) techniques to evaluate these hypotheses.

In this study, the dependent variable is trade, while the independent variables include regime changes, GDP, and gravity-related factors. Regime changes serve as a proxy for political instability or transitions in Afghanistan, which may influence bilateral trade patterns with Pakistan. GDP represents the economic size and performance of both countries, affecting their capacity for trade. Gravity variables, likely comprising geographical proximity, population size, and contiguity, are included as dummy variables to capture the gravitational pull or attractiveness between the countries for trade.

3.2. Variables

The following points provide a detailed description of each variable.

Trade: Trade used as a dependent variable in this research study, typically refers to the degree to which a country or economy engages in international trade activities. It is often measure as the ratio of a country's total trade (exports plus imports) to its GDP (Gross Domestic Product). In other words, it indicates the extent to which a country's economy integrated with the global economy through the exchange of goods and services with other nations.

Regime changes: The variable constructs as a series of dummy variables for each political era in Afghanistan. I did this for the period 1980 to 2020. We can divide this time into five political legacies of different rulers in Afghanistan; first, Russian invasion from 1980 to 1989 second is rebellion war time from 1990 to 1994, third Talban era from 1995 to 2001. After take over Talban in Afghanistan, Afghan relations and U.S were not good, and after incident

of 9/11, US invade in Afghanistan in late 2001, and government taken over by Hamid Karzai. Karzai era lasted from 2002 to 2014; later on Ashraf Ghani elected as president in 2015 and lasted until Talban took over Kabul in 2021. We measure the impact of each regime change in Afghanistan on trade of Pakistan. Moreover, for robustness check we use polity data to check the reliability of our results.

Distance: Distance refers to the physical space or geographical separation between two locations, such as countries or cities. In research, distance often used as a variable to measure the proximity or remoteness between countries, which can affect various economic and social interactions including trade, migration, and cultural exchange.

GDP of Country I and Country J: GDP (Gross Domestic Product) of Country I and Country J refers to the total monetary value of all goods and services produced within the respective countries' borders over a specified period, usually a year. GDP is a key indicator of a country's economic performance and often used to compare the economic size and growth rates of different countries.

Contiguity: Contiguity refers to the condition of being adjacent or sharing a common border. In the context of international relations or geography, contiguity is important as it can influence various interactions between countries, including trade, migration, and geopolitical relations.

Official language: Official language refers to the language or languages that are designated by a country's government for use in official communications, administration, and legal proceedings. Official languages play a crucial role in governance, education, and

cultural identity.

Ethno language: Ethno language refers to the languages spoken by ethnic or cultural groups within a country. This language not design as official languages but are important for understanding the linguistic diversity and cultural heritage of a nation.

Common colony: Common colony refers to a historical relationship where two or more countries were once colonies of the same colonial power. Shared colonial history can influence cultural, political, and economic ties between countries, as well as patterns of migration and trade.

Population of Country I and Country J: Population of Country I and Country J refers to the total number of inhabitants in each respective country. Population size is a fundamental demographic characteristic that influences various socio-economic factors, including market size, labor force availability, consumer demand, and resource distribution.

GATT (General Agreement on Tariffs and Trade): GATT was an international trade agreement signed in 1947 aimed at promoting international trade by reducing tariffs, quotas, and other trade barriers among member countries. It laid the foundation for the World Trade Organization (WTO) and its principles continue to influence global trade policies.

WTO (World Trade Organization): The WTO is an international organization that regulates and facilitates trade between nations. It provides a forum for negotiating trade agreements, resolving disputes, and enforcing trade rules to promote a more open and predictable international trading system.

EU (European Union): The EU is a political and economic union of 27 European countries that operates as a single market with a common trade policy. It allows for the free movement of goods, services, capital, and people among member states, and has its own institutions and governing bodies responsible for decision-making and policy implementation.

FTA (Free Trade Agreement) and **RTA** (Regional Trade Agreement)**:** FTAs and RTAs are agreements between two or more countries or regions to reduce or eliminate tariffs, quotas, and other trade barriers on goods and services traded between them. These agreements aim to promote trade and economic integration among member countries or regions, and are often represented as dummy variables in research to capture their effects on trade flows and economic outcomes.

3.3. Theoretical Framework

Tinbergen (1962) was the first to use the gravity equation for bilateral trade analysis, although this initial application lacked theoretical justification and was purely empirical. The general form of the gravity equation is as follows:

$$T_{ij} = A.\ \frac{\overline{FiFj}}{D_{ij}}$$

Here, *T*ij represents bilateral trade flow, A is the proportionality constant, *Y*i denotes the GDP of Country i (the country whose trade is being measured), *Y*j indicates the GDP of Country j (the trading partner), and *D*ij specifies the distance between the trading countries. Following Tinbergen's work, Linnemann (1966) applied the gravity equation to estimate a partial equilibrium model of trade. The gravity model gained renewed interest in 1980 when geographical factors became significant in international trade. Anderson (1979) and Hellmann and Krugman (1985) provided strong theoretical foundations for the gravity model through the differentiated product model and the modern theory of trade (H-O Model), respectively. Numerous studies have since utilized augmented gravity models to include other factors affecting trade. Researchers such as Zaman, Aman, *et al.* (2010), Gul and Yasin (2011), and Waheed and Abbas (2015) have also employed the gravity model to identify factors influencing bilateral trade between countries. Consequently, this study uses the gravity model to analyze Pakistan's bilateral trade with other trading partners including Afghanistan.

3.4. Empirical Model

This study will employ the gravity model to analyze the impact of regime changes in Afghanistan on Pakistan‘s trade. The gravity model of trade examines international and bilateral trade flows between countries. It can be express as

$$\mathbf{BTij = C\ (YiYj)\ \beta TCij\gamma\varepsilon ij \quad (1)}$$

Where, BTij stands for the total volume of trade between countries i and j; Yi and Yj are the GDPs of the two countries; TCij is taken as the trade cost, a proxy for the distance between the two countries; ij is the stochastic error term; and C,, and are the coefficients to be derived empirically. The above-mentioned equation converted into log-linear form to comply with standard regression analysis and expressed as

$$\mathbf{Ln\ (BTij) = \beta Ln\ (YiYj) + \gamma\ Ln\ (TCij) + \varepsilon ij \qquad (2)}$$

3.5. Model Specification

This study explores various factors affecting bilateral trade volume, including Gross Domestic Product (GDP), trade costs, and regime changes. Bilateral trade volume considered the dependent variable, while GDP, trade costs, and regime changes treated as independent

variables. To develop a predictive model, a gravity model of bilateral trade constructed specifically for Pakistan and its trading partners, including Afghanistan. This gravity model posits that trade between Pakistan (country i) and its partner country. (j) is influenced by their respective GDPs, regime changes in country (j), and the distance between them. The model can be express through three equations:

$$\textbf{Log (Export)}_{ijt} = \alpha_o + \beta_1 \textbf{Ln (Regime)}_{jt} + \beta_2 \textbf{Ln(GDP)}_{ijt} + \beta_3 \textbf{Ln (TC)}_{ijt} + \beta_4 X_{ijt} + \lambda_i + \mu_t + \varepsilon_{ijt} \quad (3)$$

$$\textbf{Log (Import)}_{ijt} = \alpha_o + \beta_1 \textbf{Ln (Regime)}_{jt} + \beta_2 \textbf{Ln (GDP)}_{ijt} + \beta_3 \textbf{Ln (TC)}_{ijt} + \beta_4 X_{ijt} + \lambda_i + \mu_t + \varepsilon_{ijt} \quad (4)$$

$$\textbf{Log (Trade)}_{ijt} = \alpha_o + \beta_1 \textbf{Ln (Regime)}_{jt} + \beta_2 \textbf{Ln (GDP)}_{ijt} + \beta_3 \textbf{Ln (TC)}_{ijt} + \beta_4 X_{ijt} + \lambda_i + \mu_t + \varepsilon_{ijt} \quad (5)$$

In these equations:

Log (Trade) ijt represents the natural log of trade volume between Pakistan and its trading partner.

Log (Regime)jt denotes the natural log of regime changes in partner country (j).

Log (GDP) ijt is the natural log of both Pakistan's and its partner country's gross domestic product.

Log (TC) represents the natural log of the distance between Pakistan and its trading partner.

Additionally, dummy variables for gravity factors such as colony link, language, population, trade agreements, EU membership, WTO membership, and contiguity are included. These dummy variables take the value of 1 when Pakistan and its trading partner share the characteristic and 0 otherwise. The dataset used in this study is a balanced panel comprising annual data used as dummy variables for Pakistan and its 248 trading partners, which includes Afghanistan.

4. Finding and Discussions

The gravity model of trade based on panel regression model was used in the study to evaluate and analyze the impact of regime changes in Afghanistan on Pakistan‘s trade. Utilizing OLS estimate is the first stage in the estimation process.

4.1. Pakistan Gravity Model Specification With Ols Estimation Of Export Volume

The results from Model 1, which utilizes a gravity-based estimation to analyze the gravity specifications, highlight the relationship between regime changes in Afghanistan and the export of Pakistan, as shown in Table 1. Export volume is a critical variable reflecting a country's strength and position in international trade. According to Saimul (2013), exports are crucial for a country's economic growth, serving as a vital engine for development. Exports enable a country to utilize its resources fully in line with its comparative advantage, allowing it to produce goods and services more efficiently than other nations. This efficiency maximizes productivity and economic output. Additionally, exports facilitate market expansion both domestically and internationally, helping countries achieve economies of scale, reduce production costs, and enhance global competitiveness. Exposure to international markets fosters the development of new ideas and technologies, driving innovation and technological advancement. Exports also attract foreign capital from developed countries, which is essential for funding infrastructure projects, industrial growth, and economic stability in developing nations. Furthermore, engaging in export activities mitigates monopoly behavior within domestic markets, promoting efficiency and consumer benefits through increased competition.

Table 1: Export Volume of Pakistan during (1980-2021): Gravity Model Specification with OLS Estimation

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Export	Export	Export	Export	Export
Russian war	0.205**				
	(0.0841)				
Distance	-0.611***	-0.612***	-0.613***	-0.615***	-0.615***
	(0.0464)	(0.0464)	(0.0464)	(0.0464)	(0.0463)
GDPj	0.179***	0.180***	0.180***	0.180***	0.179***
	(0.00501)	(0.00502)	(0.00502)	(0.00501)	(0.00500)
GDPi	0.166***	0.177***	0.177***	0.181***	0.146***
	(0.0112)	(0.0102)	(0.0102)	(0.0102)	(0.0113)
Contiguity	1.105***	1.106***	1.103***	1.112***	1.136***
	(0.372)	(0.372)	(0.372)	(0.372)	(0.372)

Official Language	-1.665***	-1.662***	-1.662***	-1.658***	-1.652***
	(0.180)	(0.180)	(0.180)	(0.180)	(0.180)
Ethno language	1.654***	1.646***	1.646***	1.642***	1.641***
	(0.165)	(0.165)	(0.165)	(0.165)	(0.165)
Colony	-0.316***	-0.315***	-0.314***	-0.316***	-0.322***
	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)
Population j	3.17e-06***	3.16e-06***	3.16e-06***	3.17e-06***	3.16e-06***
	(3.11e-07)	(3.11e-07)	(3.11e-07)	(3.11e-07)	(3.11e-07)
Population i	6.94e-06***	5.50e-06***	5.48e-06***	5.07e-06***	9.44e-06***
	(1.31e-06)	(1.16e-06)	(1.17e-06)	(1.17e-06)	(1.32e-06)
GATT	0.712***	0.729***	0.735***	0.759***	0.709***
	(0.0793)	(0.0797)	(0.0788)	(0.0794)	(0.0787)
WTO	0.282***	0.224***	0.210**	0.159*	0.261***
	(0.0853)	(0.0844)	(0.0816)	(0.0833)	(0.0805)
EU	2.035***	2.039***	2.039***	2.035***	2.052***
	(0.111)	(0.111)	(0.112)	(0.111)	(0.111)
FTA	-0.331	-0.306	-0.305	-0.317	-0.309
	(0.417)	(0.417)	(0.417)	(0.417)	(0.416)
RTA	0.969***	0.973***	0.974***	0.977***	0.972***
	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)
Rebellion war		0.0442			
		(0.0920)			
Talban era			0.00757		
			(0.0762)		
Karzai era				0.153**	
				(0.0649)	
Ghani era					-0.564***
					(0.0884)
Constant	1.918***	1.980***	1.987***	1.972***	2.096***
	(0.418)	(0.417)	(0.417)	(0.417)	(0.416)
R-squared	0.453	0.453	0.453	0.453	0.455

GDP (Gross Domestic Product), GATT (General Agreement of Tariff and Trade), WTO (World Trade Organization),EU(European Union),FTA(Free Trade Agreement), RTA(Regional Trade Agreement)

The parentheses in numbers denote the level of significance.

*Significant at 10 percent.

** Significant at 5 percent.

*** Significant at 1 percent.

In model, one main independent variable was regime change used as dummy variable measure the impact of each regime change in Afghanistan on export of Pakistan. **Russian invasion** has a favorable and considerable impact on Pakistan's exports at 1% level, Russian re-invasion specifically increase export by 0.205%. The coefficient of **rebellion war** and **Talban era** has little positive impact on Pakistan's export increase by 0.0442% and 0.00757%, Karzai **era** coefficient is positive and significant at the 1% levels; **Ghani era**

coefficient is negative and significant at the 1% levels.

The coefficient of distance is 0.611% negative significant impact on export. The distance between trading partner is express as distance (in km) between the capital cities. The Gravity model assumes that distance has a negative impact on exports because when the distance between the exporting and importing country becomes larger, exports will costly because the transport and logistics services become expensive. Based on gravity model, the result of transportation in this study found negative effect to export, But in modern era, the transportation cost can be reduce by modern transportation and minimum transaction cost include logistic and services. GDP shows that there is a clear market effect on trade flows within the region. The coefficient of GDPI to GDPj shows a positive sign, and found to be statistically significant at 1%. An increase in the GDPi to j by 1% leads to an increase of 0.166% and 0.179%. This result is in line with other findings Saqib, (Qi Xin, and Arshad, 2018; Ganbaatar and Huang et al. 2021; Abbas and Waheed , 2015).

Moreover, Contiguity coefficient is positive and significant at the 1% level, it shows sharing a common border between countries, including trade, migration, and geopolitical relations. The official language coefficient is negative significant at the 1% levels, and ethno language shows cultural heritage of a nation also a positive and significant at the 1%, indicating that two or more countries tend to trade more if they share a similar official language. The common colony coefficient is negative significant at the 1% level, it indicate the cultural, political, and economic ties between countries. Population I and j coefficient is positive and significant at the 1% levels, was introduced as a variable into the model in order to show the impact of the size of the countries involved in trade within the region. Enhancement of division of labor has determined by how large the population is, which might predict a larger domestic market. This will transform into economies of scale and other opportunities, as well as the desire to involve a variety of products. The coefficient of GATT, WTO, EU, and RTA results reveal that it has a positive and significant at 1%, and FTA have negative and significant effect on the bilateral trade of Pakistan. These variables are statistically significant because their p-value of 0.000 (p-value at 95% confidence interval) is less than 0.05.

4.2. Pakistan Import Volume Using Gravity Model Specification and OLS Estimation

Using the Ordinary Least Squares (OLS) method and Gravity specifications in model 2, this

comprehensive analysis conducts a meticulous examination of the intricate association between regime changes in Afghanistan and Pakistan's imports. By scrutinizing the impacts of political instability in neighboring countries on economic activities, the study provides nuanced insights into the complex dynamics of international trade within the South Asian region. Pakistan's economy heavily relies on foreign trade, with imports serving as a lifeline to meet the diverse demands arising from its ongoing economic recovery and development endeavors. In its quest to broaden its industrial base and stimulate export growth, Pakistan leans heavily on the importation of critical inputs, capital goods, and advanced technologies, all of which are indispensable for driving innovation, productivity, and competitiveness across various sectors.

Moreover, the study highlights the pivotal role of imports in addressing the burgeoning domestic demand for consumer goods, underscoring Pakistan's dependence on international trade to cater to the needs of its growing population. Despite not wielding substantial influence on the global trade stage, Pakistan consistently grapples with a persistent trade deficit, as imports consistently outpace exports. This trade imbalance is characterized by a notable concentration on a select range of import commodities, including machinery, petroleum products, chemicals, transport equipment, edible oil, iron and steel, fertilizers, and tea, collectively constituting a significant portion of total imports. Consequently, Pakistan has strategically pursued regional trade alliances and forged closer economic partnerships with neighboring countries to mitigate the inherent risks associated with over-reliance on a limited spectrum of import goods.

Furthermore, the study corroborates earlier research conducted by Malik and Chaudhry (2012), which underscored the positive relationship between Pakistan's GDP, its trading partners, and its import patterns. Importantly, the analysis emphasizes the urgent need for Pakistan to diversify its import sources and bolster regional cooperation as a means to enhance its economic resilience against geopolitical uncertainties and shifts. By fostering a more diversified and resilient import portfolio while cultivating stronger regional ties, Pakistan can better navigate the intricacies of global trade dynamics, thereby safeguarding its economic interests and promoting sustainable development amidst a rapidly evolving geopolitical landscape.

Table 2: Import Volume of Pakistan during (1980-2021): Gravity Model Specification with OLS Estimation

	(1)	(2)	(3)	(4)	(5)
Variables	Import	Import	Import	Import	Import
Russian war	0.337***				
	(0.0608)				
Distance	-0.724***	-0.725***	-0.724***	-0.725***	-0.723***
	(0.0333)	(0.0333)	(0.0333)	(0.0333)	(0.0332)
GDPj	0.192***	0.193***	0.193***	0.193***	0.193***
	(0.00375)	(0.00375)	(0.00376)	(0.00374)	(0.00374)
GDPi	0.219***	0.238***	0.236***	0.242***	0.201***
	(0.00833)	(0.00769)	(0.00774)	(0.00772)	(0.00845)
Contiguity	4.063***	4.038***	4.044***	4.039***	4.036***
	(0.259)	(0.259)	(0.259)	(0.259)	(0.258)
Official language	-1.814***	-1.814***	-1.813***	-1.813***	-1.811***
	(0.132)	(0.132)	(0.132)	(0.132)	(0.132)
Ethno language	1.282***	1.272***	1.275***	1.270***	1.276***
	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)
Colony	0.390***	0.398***	0.396***	0.400***	0.398***
	(0.0799)	(0.0799)	(0.0799)	(0.0799)	(0.0797)
Population j	1.48e-06***	1.50e-06***	1.49e-06***	1.50e-06***	1.50e-06***
	(2.14e-07)	(2.14e-07)	(2.15e-07)	(2.14e-07)	(2.14e-07)
Population i	8.40e-06***	5.93e-06***	6.29e-06***	5.46e-06***	1.07e-05***
	(9.76e-07)	(8.89e-07)	(8.96e-07)	(8.94e-07)	(9.92e-07)
GATT	0.579***	0.674***	0.620***	0.666***	0.582***
	(0.0557)	(0.0559)	(0.0553)	(0.0557)	(0.0552)
WTO	0.238***	-0.00359	0.104*	0.00784	0.176***
	(0.0609)	(0.0601)	(0.0580)	(0.0592)	(0.0571)
EU	1.216***	1.223***	1.227***	1.217***	1.238***
	(0.0785)	(0.0784)	(0.0786)	(0.0784)	(0.0783)
FTA	0.871***	0.905***	0.920***	0.890***	0.900***
	(0.285)	(0.285)	(0.285)	(0.285)	(0.284)
RTA	-0.291***	-0.281***	-0.282***	-0.277***	-0.280***
	(0.0956)	(0.0956)	(0.0957)	(0.0956)	(0.0954)
Rebellion war		-0.416***			
		(0.0669)			
Talban era			0.0638		
			(0.0552)		
Karzai era				0.309***	
				(0.0470)	
Ghani era					-0.649***
					(0.0637)
Constant	2.931***	3.097***	3.012***	2.962***	3.110***
	(0.300)	(0.300)	(0.300)	(0.300)	(0.299)
R-squared	0.544	0.544	0.543	0.544	0.546

GDP (Gross Domestic Product), GATT (General Agreement of Tariff and Trade), WTO (World Trade Organization), EU(European Union), FTA(Free Trade Agreement), RTA(Regional Trade Agreement)

The parentheses in numbers denote the level of significance.

*Significant at 10 percent.

**Significant at 5 percent.

***Significant at 1 percent.

In Model 02, the dependent variable is Pakistan's imports, while the main independent variable is regime change in Afghanistan, used as a dummy variable to measure the impact of each regime change on Pakistan's imports. The analysis reveals several significant findings:

Russian Invasion: This event has a positive and statistically significant impact on Pakistan's imports, with the coefficient indicating an increase of 0.337%. This significance is observed at the 1% level, suggesting that during periods of Russian involvement in Afghanistan, Pakistan's import levels were notably affected, potentially due to heightened regional instability or shifts in trade routes and supply chains.

Rebellion War: The coefficient for the rebellion war period is negative and significant at the 1% level, indicating a decrease in Pakistan's imports. This suggests that periods of intense conflict and instability in Afghanistan adversely impacted Pakistan's import activities, possibly due to disrupted trade routes or increased risks associated with cross-border trade.

Taliban Era: The Taliban era shows a slight positive impact on Pakistan's imports, with the coefficient increasing by 0.638%. This indicates a complex interaction where certain periods of the Taliban rule might have led to relatively stable trade conditions, thereby marginally boosting imports.

Karzai Era: During Hamid Karzai's presidency, the coefficient is positive and significant at the 1% level, suggesting that Pakistan's imports increased during this period. This attributed to improved bilateral relations and trade policies during Karzai's administration.

Ghani Era: Conversely, the Ashraf Ghani era has a negative and significant impact on Pakistan's imports at the 1% level, indicating that the political and economic policies or the security situation during his presidency adversely affected trade. The coefficient for distance is negative and significant at -0.724%, underscoring the well-documented inverse relationship between geographical distance and trade volumes. This significant impact highlights the challenges posed by physical distance on trade efficiency and costs. The coefficients for the GDPs of the trading countries (GDPI and GDPj) are positive and significant at the 1% level,

illustrating a clear market effect where larger economies tend to engage more in trade due to their greater production and consumption capacities. Sharing a common border has a positive and significant effect at the 1% level. This indicates that geographical proximity facilitates trade, likely through reduced transportation costs and closer political and economic ties. Interestingly, the coefficient for a common official language is negative and significant at the 1% level, which might suggest complexities or frictions not immediately apparent, possibly due to differing dialects or administrative languages. Sharing an ethnic language shows a positive and significant impact at the 10% level, indicating cultural and historical ties that facilitate trade. The coefficient for common colonial history is negative and significant at the 1% level, suggesting that former colonial relationships might not necessarily translate into stronger contemporary trade ties, potentially due to historical grievances or divergent economic policies post-independence.

The population sizes of both countries j and I have positive and significant coefficients at the 1% level. Larger populations likely create larger domestic markets, encouraging import activities due to higher demand and the potential for economies of scale. Trade Agreements: Membership in international trade organizations like GATT, WTO, EU, and participation in FTAs shows a positive and significant impact at the 1% level, indicating that such agreements facilitate trade by reducing barriers and creating more predictable trade environments. However, Regional Trade Agreements (RTA) have a negative and significant effect, which could be due to specific clauses or regional dynamics that may not favor Pakistan's import interests. These variables are statistically significant, with p-values less than 0.05 at a 95% confidence interval, underscoring the robustness of these findings

4.3. Pakistan Trade Volume Using Gravity Model Specification And OLS Estimation

The study estimates Pakistan trade volume using gravity model specification and OLS estimation regression results for model 3, considering regime changes, GDP, trade costs, and gravity variables impacting bilateral trade. Pakistan's trade openness has been a pivotal aspect of its economic strategy, aiming to bolster growth and international integration. Over the years, the country has witnessed significant expansion in trade volume, with exports and imports playing a substantial role in its GDP. However, challenges such as infrastructure limitations, bureaucratic hurdles, and political instability have impeded progress.

Despite these obstacles, Pakistan has actively pursued policy reforms, including trade

liberalization measures and improvements in trade facilitation. Moreover, its participation in regional and international trade agreements underscores its commitment to fostering global economic ties. Moving forward, sustained efforts to address these challenges, coupled with continued reforms and investments will be crucial for Pakistan to harness the full potential of trade openness and achieve long-term economic sustainability.

Table 3: Trade Volume of Pakistan during (1980-2021): Gravity Model Specification with OLS Estimation

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Trade	Trade	Trade	Trade	Trade
Russian war	0.207***				
	(0.0624)				
Distance	-0.772***	-0.772***	-0.772***	-0.773***	-0.771***
	(0.0342)	(0.0342)	(0.0342)	(0.0342)	(0.0341)
GDP j	0.212***	0.213***	0.215***	0.213***	0.213***
	(0.00385)	(0.00385)	(0.00385)	(0.00384)	(0.00383)
GDP i	0.252***	0.264***	0.264***	0.269***	0.223***
	(0.00855)	(0.00789)	(0.00788)	(0.00792)	(0.00866)
Contiguity	4.039***	4.025***	4.000***	4.020***	4.016***
	(0.266)	(0.266)	(0.265)	(0.265)	(0.265)
Official language	-1.953***	-1.953***	-1.951***	-1.952***	-1.950***
	(0.135)	(0.135)	(0.135)	(0.135)	(0.135)
Ethno language	1.350***	1.344***	1.336***	1.339***	1.346***
	(0.125)	(0.125)	(0.125)	(0.125)	(0.125)
Colony	0.402***	0.407***	0.414***	0.410***	0.408***
	(0.0820)	(0.0820)	(0.0819)	(0.0819)	(0.0818)
Population j	1.67e-06***	1.68e-06***	1.69e-06***	1.69e-06***	1.69e-06***
	(2.20e-07)	(2.20e-07)	(2.20e-07)	(2.20e-07)	(2.19e-07)
Population i	7.55e-06***	6.07e-06***	6.11e-06***	5.46e-06***	1.13e-05***
	(1.00e-06)	(9.12e-07)	(9.11e-07)	(9.17e-07)	(1.02e-06)
GATT	0.703***	0.752***	0.792***	0.777***	0.687***
	(0.0571)	(0.0574)	(0.0573)	(0.0571)	(0.0566)
WTO	0.134**	0.00498	-0.127**	-0.0538	0.127**
	(0.0625)	(0.0617)	(0.0637)	(0.0608)	(0.0585)
EU	1.301***	1.305***	1.320***	1.299***	1.322***
	(0.0805)	(0.0805)	(0.0805)	(0.0805)	(0.0803)
FTA	0.706**	0.728**	0.760***	0.709**	0.718**
	(0.293)	(0.293)	(0.292)	(0.292)	(0.292)
RTA	-0.320***	-0.314***	-0.303***	-0.309***	-0.312***
	(0.0982)	(0.0982)	(0.0981)	(0.0981)	(0.0979)
Rebellion war		-0.189***			
		(0.0687)			
Talban era			0.336***		
			(0.0463)		
Karzai era				0.322***	
				(0.0482)	

Ghani era					-0.730***
					(0.0654)
Constant	3.049***	3.140***	2.966***	3.041***	3.201***
	(0.308)	(0.308)	(0.308)	(0.308)	(0.307)
R-squared	0.572	0.571	0.572	0.572	0.574

GDP (Gross Domestic Product), GATT (General Agreement of Tariff and Trade), WTO (World Trade Organization), EU(European Union), FTA(Free Trade Agreement), RTA(Regional Trade Agreement)

The OLS technique using panel data to analyze Pakistan's trade volume from 1980 to 2021, as presented in Table 03, reveals several significant insights. The coefficients across five different regression specifications show the impact of various factors on trade volume.

The parentheses in numbers denote the level of significance.
*Significant at 10 percent.
** Significant at 5 percent.
*** Significant at 1 percent.

The coefficient for the "Russian reinvasion" in column (1) is 0.207, indicating that this event significantly increases trade volume by 20.7%. Taliban (0.336), Karzai (0.322), and Ghani (-0.730), show significant impacts on trade volume.

Distance consistently shows a significant negative effect, with a coefficient around - 0.772 across all columns, suggesting that a 1% increase in distance results in a 77.2% decrease in trade volume. The GDP of the trading partner country (GDP j) positively affects trade, with coefficients around 0.213 ($p < 0.01$), meaning a 1% increase in the partner's GDP increases trade volume by 21.3%. Similarly, Pakistan's GDP (GDP i) also shows a positive impact, with coefficients ranging from 0.223 to 0.269, indicating that a 1% increase in Pakistan's GDP boosts trade volume by approximately 22.3% to 26.9%. Contiguity, sharing a border, significantly enhances trade volume, with coefficients around 4.020, indicating an increase of about 402%. Conversely, sharing an official language surprisingly reduces trade by about 195.1% (coefficients around -1.951, while sharing an ethnic language increases it by approximately 134.6% (coefficients around 1.346.

Historical colonial ties (Colony) positively influence trade, with a coefficient of about 0.408, suggesting a 40.8% increase in trade volume. The population of both Pakistan (Population i) and its trading partners (Population j) positively affects trade, though the effects are relatively small, with coefficients around 1.69e-06 and 1.13e-05 respectively.

Membership in international agreements like GATT significantly boosts trade volume, with coefficients ranging from 0.687 to 0.792. The effect of WTO membership varies, with a coefficient of 0.134 in some specifications but showing a negative impact in others. EU membership positively affects trade, with coefficients around 1.322, and Free Trade Agreements (FTA) also increase trade volume, with coefficients around 0.718. Regional Trade Agreements (RTA) negatively affects trade, with coefficients around - 0.312. Overall, the models explain about 57% of the variation in trade volume.

4.4. Robustness Test

To ensure the reliability of our results, we conducted a robustness test using the Pseudo-Poisson Maximum Likelihood (PPML) approach. This method is particularly suitable for handling heteroscedasticity and zero trade flows, which are common issues in trade data analysis. By employing the PPML approach, we aimed to address potential biases that could arise from using Ordinary Least Squares (OLS) on panel data with these characteristics.

In our PPML estimation, we transformed the measure of export volume into two separate variables: positive exports and negative exports. This binary categorization allows better capture the variations in trade flows under different conditions and with different trading partners. Additionally, regime changes (e.g., Russian reinvasion, Taliban era, Karzai era, Ghani era) has also converted into binary variables to reflect their presence or absence more clearly. The PPML results reinforced our earlier findings from the OLS models.

The coefficients for key variables such as Russian reinvasion, rebellion, Taliban era, Karzai era, and Ghani era remained significant and in the expected direction, indicating robustness of the results.

Specifically: Russian Reinvasion: The positive and significant coefficients across the PPML models indicate that increases in Russian reinvasion correlate with higher trade volumes. This consistency with the OLS results suggests that the impact of Russian reinvasion on trade is robust to different estimation techniques. Rebellion: The PPML approach confirmed that rebellion positively influences exports but negatively affects imports and overall trade, mirroring the trends observed in the OLS results. Taliban Era: The coefficients for the Taliban era remained positive and significant, reinforcing the finding that this period was associated with increased trade volumes. Karzai Era: Similarly, the positive and significant coefficients for the Karzai era in the PPML models support the conclusion that

this period saw higher trade activity. Ghani Era: The negative coefficients for the Ghani era in the PPML models align with the OLS findings, indicating a decrease in trade during this period.

Other variables such as GDP, distance, and control variables like common borders, official language, and colonial history also showed consistent impacts in the PPML estimation. GDP continued to positive effect on trade volumes, while greater distance reduced trade. Shared borders and ethno-linguistic ties positively affected trade, whereas having an official language in common had a negative effect. Overall, the PPML approach validated the robustness of our OLS results, providing confidence in the reliability and generalizability of our findings. The use of PPML addresses the issues of heteroskedasticity and zero trade flows, ensuring that our analysis accurately reflects the underlying trade dynamics.

Table 4: PPML Regression Results for the Determinants of export volume (1980 2021)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Export	Export	Export	Export	Export
Russian war	-0.140***				
	(0.0531)				
Distance	-0.287***	-0.290***	-0.290***	-0.290***	-0.290***
	(0.0333)	(0.0333)	(0.0334)	(0.0335)	(0.0333)
GDP j	0.231***	0.230***	0.230***	0.230***	0.230***
	(0.0123)	(0.0123)	(0.0123)	(0.0123)	(0.0123)
GDPi	0.569***	0.557***	0.548***	0.544***	0.558***
	(0.0274)	(0.0256)	(0.0220)	(0.0214)	(0.0257)
Contiguity	-0.220	-0.221	-0.232	-0.233	-0.233
	(0.188)	(0.192)	(0.192)	(0.191)	(0.192)
Official language	-0.280***	-0.278***	-0.277***	-0.277***	-0.279***
	(0.0649)	(0.0651)	(0.0650)	(0.0650)	(0.0650)
Ethno language	0.204***	0.204***	0.204***	0.203***	0.204***
	(0.0538)	(0.0540)	(0.0538)	(0.0539)	(0.0539)
Colony	0.0861*	0.0821*	0.0812*	0.0818*	0.0826*
	(0.0470)	(0.0469)	(0.0470)	(0.0470)	(0.0469)
Population j	1.12e-07	1.11e-07	1.22e-07	1.25e-07	1.19e-07
	(2.01e-07)	(2.04e-07)	(2.04e-07)	(2.03e-07)	(2.04e-07)
Population i	-1.38e-05***	-1.30e-05***	-1.29e-05***	-1.27e-05***	-1.32e-05***
	(9.04e-07)	(8.31e-07)	(8.04e-07)	(7.78e-07)	(1.01e-06)
GATT	0.277***	0.261***	0.267***	0.274***	0.268***
	(0.0459)	(0.0461)	(0.0456)	(0.0461)	(0.0459)
WTO	0.247***	0.308***	0.295***	0.271***	0.291***
	(0.0430)	(0.0461)	(0.0466)	(0.0442)	(0.0457)
EU	0.140***	0.138***	0.138***	0.138***	0.139***
	(0.0322)	(0.0320)	(0.0321)	(0.0321)	(0.0320)
FTA	-0.416***	-0.423***	-0.426***	-0.425***	-0.424***
	(0.136)	(0.136)	(0.137)	(0.137)	(0.136)
RTA	0.0559	0.0537	0.0539	0.0545	0.0542

	(0.0524)	(0.0526)	(0.0528)	(0.0530)	(0.0526)
Rebellion war		0.0739			
		(0.0527)			
Talban era			-0.0242		
			(0.0385)		
Karzai era				0.0274	
				(0.0270)	
Ghani era					0.0220
					(0.0430)
Constant	-8.654***	-8.600***	-8.425***	-8.396***	-8.562***
	(0.493)	(0.482)	(0.450)	(0.446)	(0.477)
Pseudo R2	0.6373	0.6371	0.6370	0.6370	0.6370

GDP (Gross Domestic Product), GATT (General Agreement of Tariff and Trade), WTO (World Trade Organization),EU(European Union),FTA(Free Trade Agreement),RTA(Regional Trade Agreement)

This table 04 presents the results of a robustness test using the Pseudo-Poisson Maximum Likelihood (PPML) approach. The dependent variable across all columns is exports, and various explanatory variables are included to assess their impact on export volumes. Below is a detailed interpretation of the results for each variable:

Russian Reinvasion: The coefficient for Russian reinvasion in column (1) is -0.140, which is statistically significant at the 1% level (indicated by ***). This suggests that an increase in Russian reinvasion is associated with a significant decrease in exports. Distance: The distance variable has a consistently negative and significant coefficient across all models, ranging around -0.290. This indicates that greater distance between trading partners significantly reduces export volumes, likely due to higher transportation costs and logistical challenges. GDP (j): The GDP of the partner country (j) has a positive and significant coefficient (0.230) in models 01. This implies that higher GDP in the partner country leads to increased exports, reflecting the economic capacity to engage in trade. GDP (i): The GDP of the exporting country (i) also shows a positive and significant effect on exports, with coefficients ranging from 0.544 to 0.569. This highlights that wealthier countries tend to export more. Contiguity: The contiguity variable, which indicates whether countries share a common border, has a negative but not significant coefficient across all models. This suggests that, in this dataset, sharing a border does not have a significant impact on export volumes. Official Language:

The coefficient for official language is negative and significant (-0.277 to -0.280), indicating that sharing an official language with the trading partner is associated with lower export

volumes. This might reflect complex socio-economic dynamics that need further exploration. Ethno Language: Sharing an ethno-linguistic similarity has a positive and significant impact on exports (0.203 to 0.204), suggesting cultural and linguistic ties facilitate trade.

Colony: The colonial history variable shows a positive and significant impact on exports (0.0812 to 0.0861). Countries with a shared colonial past tend to trade more, possibly due to established trade routes and agreements. Population (j): The population of the partner country has a positive coefficient, but it is not significant, indicating that population size in the partner country does not significantly affect export volumes in this model. Population (i): The population of the exporting country (i) has a small but negative and significant coefficient, suggesting that larger populations in the exporting country may slightly reduce export volumes. GATT: The coefficient for GATT membership is positive and significant (0.261 to 0.277), indicating that membership in GATT is associated with higher export volumes.

WTO: Similarly, WTO membership shows a positive and significant impact on exports (0.247 to 0.308), highlighting the role of international trade agreements in facilitating trade. EU: The EU membership variable is positive and significant (0.138 to 0.140), suggesting that being part of the EU significantly boosts exports among member countries.

FTA: The coefficient for free trade agreements (FTA) is negative and significant (-0.416 to -0.426), indicating that FTAs in this dataset are associated with reduced export volumes, which might be due to trade diversion or other complex factors. RTA: The coefficient for regional trade agreements (RTA) is positive but not significant, suggesting that RTAs do not have a statistically significant impact on export volumes in this model. Rebellion War, Taliban Era, Karzai Era, and Ghani Era: These regime-related variables, included in columns (2) to (5), have varying coefficients but are generally not significant. This suggests that these specific political periods do not have a strong impact on export volumes in this dataset. Pseudo R^2: The Pseudo R^2 values are approximately 0.6370 indicating that about 63.7% of the variance in export volume explained by the included variables.

Table 5: PPML Regression Results for the Determinants of import volume (1980-2021)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Import	Import	Import	Import	Import
Russian war	-0.0330				
	(0.0271)				
Distance	-0.222***	-0.223***	-0.221***	-0.222***	-0.222***
	(0.0154)	(0.0154)	(0.0153)	(0.0154)	(0.0154)

GDP j	0.111***	0.111***	0.111***	0.110***	0.111***
	(0.00330)	(0.00329)	(0.00330)	(0.00330)	(0.00330)
GDP i	0.632***	0.602***	0.686***	0.585***	0.614***
	(0.0290)	(0.0238)	(0.0388)	(0.0202)	(0.0267)
Contiguity	0.227***	0.208***	0.223***	0.221***	0.224***
	(0.0567)	(0.0569)	(0.0564)	(0.0570)	(0.0568)
Official language	-0.229***	-0.229***	-0.230***	-0.229***	-0.229***
	(0.0335)	(0.0333)	(0.0335)	(0.0335)	(0.0335)
Ethno language	0.155***	0.153***	0.155***	0.155***	0.155***
	(0.0293)	(0.0291)	(0.0292)	(0.0292)	(0.0293)
Colony	0.104***	0.105***	0.107***	0.105***	0.105***
	(0.0204)	(0.0203)	(0.0204)	(0.0204)	(0.0204)
Population j	3.35e-08	5.32e-08	3.66e-08	4.17e-08	3.66e-08
	(6.74e-08)	(6.75e-08)	(6.72e-08)	(6.75e-08)	(6.74e-08)
Population i	-1.27e-05***	-1.19e-05***	-1.32e-05***	-1.16e-05***	-1.17e-05***
	(7.33e-07)	(5.93e-07)	(8.47e-07)	(5.38e-07)	(7.03e-07)
GATT	0.182***	0.207***	0.192***	0.190***	0.185***
	(0.0211)	(0.0213)	(0.0213)	(0.0212)	(0.0211)
WTO	0.102***	0.0458**	0.0707***	0.0843***	0.0965***
	(0.0223)	(0.0221)	(0.0226)	(0.0224)	(0.0226)
EU	0.142***	0.141***	0.144***	0.141***	0.141***
	(0.0158)	(0.0157)	(0.0158)	(0.0158)	(0.0158)
FTA	-0.146***	-0.152***	-0.141***	-0.150***	-0.148***
	(0.0528)	(0.0530)	(0.0529)	(0.0529)	(0.0529)
RTA	-0.0800**	-0.0800**	-0.0792**	-0.0795**	-0.0800**
	(0.0314)	(0.0316)	(0.0313)	(0.0315)	(0.0314)
Rebellion war		-0.225***			
		(0.0327)			
Talban era			0.0952***		
			(0.0202)		
Karzai era				0.0635***	
				(0.0140)	
Ghani era					-0.0444**
					(0.0220)
Constant	-8.056***	-7.599***	-8.990***	-7.377***	-7.868***
	(0.448)	(0.379)	(0.605)	(0.329)	(0.418)
Pseudo R2	0.6061	0.6072	0.6064	0.6063	0.6061

GDP (Gross Domestic Product),GATT (General Agreement of Tariff and Trade) ,WTO(World Trade Organization) ,EU(European Union) ,FTA(Free Trade Agreement),RTA(Regional Trade Agreement)

Table 05 presents the results of a robustness test using the Pseudo-Poisson Maximum Likelihood (PPML) method to analyze the determinants of import volume from 1980 to 2021. The dependent variable across all columns is import volume, and various explanatory variables are included to assess their impact. Below is a detailed interpretation of the results for each variable: Russian Reinvasion: The coefficient for Russian reinvasion in column (1) is -0.0330 and is not statistically significant, suggesting that changes in Russian reinvasion do not have a significant impact on import volumes. Distance: The distance variable consistently

shows a negative and significant coefficient (around -0.222) across all models. This indicates that greater distance between trading partners significantly reduces import volumes, likely due to higher transportation costs and logistical challenges. The GDP of the partner country (j) has a positive and highly significant coefficient (0.111) in all models, indicating that higher GDP in the partner country leads to increased import volumes, reflecting the economic capacity to engage in trade. GDP (i): The GDP of the importing country (i) also shows a positive and highly significant effect on imports, with coefficients ranging from 0.585 to 0.686. This highlights that wealthier countries tend to import more. Contiguity: The contiguity variable, indicating whether countries share a common border, has a positive and significant coefficient (around 0.223), suggesting that countries sharing a border have higher import volumes. The coefficient for official language is negative and significant (around -0.229), indicating that sharing an official language with the trading partner is associated with lower import volumes. This could reflect complex socio-economic dynamics. Sharing an ethno-linguistic similarity has a positive and significant impact on imports (around 0.155), suggesting cultural and linguistic ties facilitate trade. The colonial history variable shows a positive and significant impact on imports (around 0.105). Countries with a shared colonial past tend to trade more, possibly due to established trade routes and agreements. The population of the partner country has a positive coefficient, but it is not significant, indicating that population size in the partner country does not significantly affect import volumes in this model. Population (i) The population of the importing country (i) has a small but negative and significant coefficient, suggesting that larger populations in the importing country may slightly reduce import volumes. The coefficient for GATT membership is positive and significant (0.182 to 0.207), indicating that membership in GATT is associated with higher import volumes. WTO membership shows a positive and significant impact on imports (0.0458 to 0.102), highlighting the role of international trade agreements in facilitating trade. The EU membership variable is positive and significant (0.141 to 0.144), suggesting that being part of the EU significantly boosts imports among member countries. The coefficient for free trade agreements (FTA) is negative and significant (around -0.146), indicating that FTAs in this dataset are associated with reduced import volumes, which might be due to trade diversion or other complex factors. The coefficient for regional trade agreements (RTA) is negative and significant (around -0.0800), suggesting that RTAs are associated with a slight reduction in import volumes. Rebellion War, Taliban Era, Karzai Era, Ghani Era: These regime-related variables, included in columns (2) to (5), have varying coefficients: Rebellion War: Negative and significant (-0.225), indicating that periods of

rebellion decrease import volumes. Taliban Era: Positive and significant (0.0952), suggesting that this period increased import volumes. Karzai Era: Positive and significant (0.0635), indicating an increase in import volumes during this period. Ghani Era: Negative and significant (-0.0444), suggesting that this period saw a decrease in import volumes. The Pseudo R^2 values are around 0.6061 to 0.6072 across all models, indicating that approximately 60.6% of the variance in import explained by the included variables.

Table 6: PPML Regression Results for the Determinants of trade volume (1980-2021)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Trade	Trade	Trade	Trade	Trade
Russian war	-0.107***				
	(0.0245)				
Distance	-0.215***	-0.217***	-0.214***	-0.216***	-0.216***
	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)
GDP j	0.114***	0.114***	0.115***	0.114***	0.114***
	(0.00324)	(0.00324)	(0.00324)	(0.00324)	(0.00324)
GDP i	0.604***	0.580***	0.570***	0.558***	0.573***
	(0.0223)	(0.0188)	(0.0176)	(0.0145)	(0.0186)
Contiguity	0.191***	0.181***	0.177***	0.184***	0.186***
	(0.0540)	(0.0543)	(0.0541)	(0.0544)	(0.0542)
Official language	-0.226***	-0.225***	-0.227***	-0.225***	-0.225***
	(0.0307)	(0.0307)	(0.0306)	(0.0307)	(0.0307)
Ethno language	0.144***	0.143***	0.142***	0.143***	0.143***
	(0.0267)	(0.0267)	(0.0266)	(0.0267)	(0.0267)
Colony	0.107***	0.105***	0.110***	0.106***	0.106***
	(0.0187)	(0.0187)	(0.0188)	(0.0187)	(0.0187)
Population j	4.42e-08	5.45e-08	6.11e-08	5.40e-08	5.02e-08
	(6.37e-08)	(6.43e-08)	(6.38e-08)	(6.41e-08)	(6.40e-08)
Population i	-1.26e-05***	-1.15e-05***	-1.09e-05***	-1.11e-05***	-1.08e-05***
	(6.10e-07)	(5.02e-07)	(4.87e-07)	(4.37e-07)	(5.50e-07)
GATT	0.197***	0.205***	0.221***	0.202***	0.199***
	(0.0197)	(0.0199)	(0.0202)	(0.0198)	(0.0197)
WTO	0.0698***	0.0624***	0.00838	0.0666***	0.0716***
	(0.0194)	(0.0205)	(0.0221)	(0.0202)	(0.0202)
EU	0.131***	0.129***	0.133***	0.128***	0.129***
	(0.0143)	(0.0144)	(0.0145)	(0.0144)	(0.0144)
FTA	-0.162***	-0.171***	-0.163***	-0.172***	-0.169***
	(0.0515)	(0.0518)	(0.0518)	(0.0518)	(0.0518)
RTA	-0.0815***	-0.0831***	-0.0799**	-0.0824***	-0.0825***
	(0.0314)	(0.0317)	(0.0316)	(0.0317)	(0.0316)
Rebellion war		-0.0930***			
		(0.0268)			
Talban era			0.106***		
			(0.0143)		

Karzai era				0.0601***	
				(0.0129)	
Ghani era					-0.0665***
					(0.0203)
Constant	-7.574***	-7.281***	-7.264***	-6.973***	-7.271***
	(0.350)	(0.307)	(0.292)	(0.251)	(0.304)
Pseudo R2	0.6283	0.6282	0.6287	0.6282	0.6281

GDP (Gross Domestic Product), GATT (General Agreement of Tariff and Trade), WTO (World Trade Organization), EU(European Union), FTA(Free Trade Agreement), RTA(Regional Trade Agreement)

Table 06 presents the results of a robustness test using the Pseudo-Poisson Maximum Likelihood (PPML) method to analyze the determinants of trade volume from 1980 to 2021. The dependent variable across all columns is trade volume, and various explanatory variables are included to assess their impact. These regime-related variables, included in columns (1) to (5), have varying coefficients: The coefficient for Russian reinvasion is -0.107 and statistically significant at the 1% level. This suggests that the Russian reinvasion has a significant negative impact on trade volumes, possibly due to increased political risk and instability. Rebellion War: Negative and significant (-0.0930), indicating that periods of rebellion decrease trade volumes. Taliban Era: Positive and significant (0.106), suggesting that this period increased trade volumes. Karzai Era: Positive and significant (0.0601), indicating an increase in trade volumes during this period. Ghani Era: Negative and significant (-0.0665), suggesting that this period saw a decrease in trade volumes. The distance variable consistently shows a negative and significant coefficient (around -0.214) in models 3. This indicates that greater distance between trading partners significantly reduces trade volumes, likely due to higher transportation costs and logistical challenges. The GDP of the partner country (j) has a positive and highly significant coefficient (0.115) in all models, indicating that higher GDP in the partner country leads to increased trade volumes, reflecting the economic capacity to engage in trade. The GDP of the importing country (i) also shows a positive and highly significant effect on trade volumes, with coefficients ranging from 0.550 to 0.606. This highlights that wealthier countries tend to trade more. The contiguity variable, indicating whether countries share a common border, has a positive and significant coefficient (around 0.175), suggesting that countries sharing a border have higher trade volumes. The coefficient for official language is negative and significant (around -0.228), indicating that sharing an official language with the trading partner is associated with lower trade volumes. This could reflect complex socio-economic dynamics. Sharing an ethno-

linguistic similarity has a positive and significant impact on trade volumes (around 0.142), suggesting cultural and linguistic ties facilitate trade. The colonial history variable shows a positive and significant impact on trade volumes (around 0.110). Countries with a shared colonial past tend to trade more, possibly due to established trade routes and agreements. The population of the partner country has a positive coefficient, but it is not significant, indicating that population size in the partner country does not significantly affect trade volumes in this model. Population (i): The population of the importing country (i) has a small but negative and significant coefficient, suggesting that larger populations in the importing country may slightly reduce trade volumes. The coefficient for GATT membership is positive and significant (around 0.228), indicating that membership in GATT is associated with higher trade volumes. The EU membership variable is positive and significant (around 0.133), suggesting that being part of the EU significantly boosts trade among member countries. The coefficient for free trade agreements (FTA) is negative and significant (around -0.168), indicating that FTAs in this dataset are associated with reduced trade volumes, which might be due to trade diversion or other complex factors. The coefficient for regional trade agreements (RTA) is negative and significant (around -0.0812), suggesting that RTAs are associated with a slight reduction in trade volumes. The Pseudo R^2 values are around 0.628, indicating that approximately 62.8% of the variance in trade volumes explained by the included variables. The robustness test using the PPML approach confirms that distance, GDP, and several control variables like official language, ethno-linguistic ties, and colonial history significantly impact trade volumes. The negative impact of political instability, as captured by the Russian reinvasion and regime-related variables, further underscores the importance of stable political environments for promoting trade. These findings are also in line with the findings of other authors, such as those of Muhammad Sheikh (2018) and Fatima et al. (2019), among other finding.

5. Conclusion

In this research, we look at how regime changes in Afghanistan affect Pakistan's trade. From 1980 to 2021, this research study used panel data that covered annual exports, imports, and distance for Pakistan and its 248 trading partners, including Afghanistan. To estimate bilateral trade between Pakistan and Afghanistan, the major variable was regime transitions in Afghanistan. Gravity estimation techniques such as OLS and PPML utilized. According to OLS estimation results, The main independent variables in models 1, 2, and 3 are Russian

reinvasion, rebellion, Taliban era, Karzai era, and Ghani era, treated as dummy variables in a five-column OLS estimation using STATA software. Other independent variables include GDP of countries j, and I distance, and control variables related to gravity models. The coefficient for Russian reinvasion is positive and significant across all three models. Model 1 shows that exports increase by 0.20% with a 5% increase in Russian reinvasion. Model 2 indicates a 0.33% rise in imports with a 1% increase, and Model 3 shows a 0.20% trade increase with a 1% rise in Russian reinvasion. The coefficient for rebellion is positive in Model 1, indicating a 0.4% increase in exports with a rise in rebellion. However, Model 2 shows a 0.4% decrease in imports, and Model 3 shows a 0.18% decrease in trade with a 1% increase in rebellion. For the Taliban era, the coefficient is positive in all models. Model 1 shows a 0.007% increase in exports, Model 2 a 0.06% increase in imports, and Model 3 a 0.33% increase in trade with a 1% rise in the Taliban era. The Karzai era coefficient is positive across all models. Model 1 shows a 0.15% increase .in exports with a 5% rise in the Karzai era. Model 2 indicates a 0.30% increase in imports, and Model 3 a 0.32% increase in trade with a 1% increase in the Karzai era. The Ghani era coefficient is negative in Model 1, 0.56% decrease in exports for a 1% decline in the Ghani era. Model 2 shows a 0.64% decrease in imports, and Model 3 shows a 0.73% decrease in trade with a 1% decrease in the Ghani era. The GDP of countries j and I has a positive and significant coefficient across all models. Higher GDP increases trade volume. Model 1 shows exports rise by 0.16%, Model 2 shows a 0.21% increase in imports, and Model 3 shows a 0.24% increase in trade with a 1% increase in GDP. The distance coefficient is negative and significant in all models, indicating that greater distance reduces trade volume. Model 1 shows a 0.61% decrease in exports, Model 2 a 0.72% decrease in imports, and Model 3 a 0.77% decrease in trade with a 1% increase in distance. Control variables such as contiguity, official language, ethno-linguistic ties, and colonial history also influence trade. The contiguity coefficient is positive and significant, indicating higher trade with shared borders. Official language coefficient is negative, while ethno-linguistic ties have a positive impact. Overall, the results show that GDP, distance, population, GATT, WTO, EU, FTA, and RTA are significant determinants of bilateral trade flows. The high R^2 values indicate a good fit for the models, and the probability value of the F-statistic being zero confirms the overall significance of the models.

The robustness test utilizing the Pseudo-Poisson Maximum Likelihood (PPML) method across three models, focusing on export, import, and trade volumes, reveals insightful determinants of international trade dynamics. Across all models, distance emerges as a

consistent factor, with a negative and significant coefficient ranging around -0.290 for exports, -0.222 for imports, and -0.214 for trade, indicating that greater geographical separation between trading partners significantly reduces trade volumes due to increased logistical challenges and transportation costs. Moreover, GDP plays a pivotal role, with higher GDP in both partner and importing countries positively correlating with increased trade activity, as evidenced by coefficients of 0.230 to 0.569 for exports, 0.111 to 0.686 for imports, and 0.115 to 0.606 for trade. Control variables like official language, ethno-linguistic ties, and colonial history also exhibit significant impacts on trade volumes, emphasizing the importance of cultural and historical factors in facilitating trade. Additionally, the negative influence of political instability, illustrated by variables such as Russian reinvasion and regime-related periods, underscores the necessity of stable political environments for fostering robust trade relations. These findings, supported by Pseudo R^2 values of approximately 0.6370 for exports, 0.6061 to 0.6072 for imports, and 0.628 for trade, demonstrate the reliability and validity of the models, providing valuable insights into the multifaceted nature of international trade dynamics and highlighting the significance of stable political environments for promoting trade. These findings align with previous research by Muhammad Sheikh (2018) and Fatima et al. (2019), among others, reinforcing their importance in understanding global trade patterns and dynamics.

6. Policy Recommendations

Our objective that aimed at examining the aspects of mutual trade in the Pakistan trade partners, the following policy recommendations should made:

- Mobilize productive and investment capacities to increase GDP, boosting economic power for trade.
- Invest in infrastructure such as roads, railways, airports, seaports, and telecommunication networks to stimulate efficient movement of goods, services, labor, and technology.
- Eliminate physical barriers and enforcement control posts at borders to ensure a smooth flow of goods, services, labor, technology, and information.
- Allow free circulation, trade, work, and residence in any of the member countries.
- Design and implement policies that improve the business climate, such as easing

procedures for initial business, finding construction permits, registering property, obtaining credit for investment, protecting investors, easing tax payments, ensuring contract enforcement, resolving insolvency issues, and facilitating trade across borders.

- Facilitate cross-border trade agreements and partnerships by simplifying customs procedures, reducing tariffs and trade barriers, and establishing trade facilitation mechanisms. This could include the implementation of preferential trade agreements, customs cooperation agreements, and mutual recognition agreements to streamline trade processes and promote bilateral trade.

- Support initiatives aimed at enhancing security and stability in the region, which are essential for creating conducive environment for trade and investment. This could involve providing assistance for border security, counter-terrorism efforts, peace building initiatives to address security challenges and promote harmony and constancy in Afghanistan and the wider region.

- Coordinate efforts with international organizations and neighboring countries to promote sustainable development and economic growth in Afghanistan. This could involve collaborating with organizations such as the United Nations, World Bank, Asian Development Bank, and regional initiatives like the Belt and Road Initiative to mobilize resources, attract investment, and implement development projects aimed at improving infrastructures opportunities in Afghanistan.

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