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Assessing the Influence of Economic Growth, Inflation, Debt, Interest Rate, and Exchange Rate on Trade in Pakistan

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Abstract: *This study is carried out to examine the influence of economic growth, inflation, debt, interest rate and exchange rates on trade dynamics in Pakistan. The regression analysis of the Autoregressive Distributed Lag (ARDL) model is based on the data from 1998 to 2022. The findings confirm the mixed affectations on trade. Except for GDP and EXR, the rest of the variables possess a negative association with trade. The implications drawn from these results underscore the importance for policymakers and government officials to prioritize measures aimed at maintaining a stable exchange rate regime in Pakistan as well as GDP to foster trade while also focusing on strategies to mitigate inflationary pressures, maintain progressive interest rate, and decrease in the public debt.*

Key Words: Trade, Economic Growth, Exchange Rate, Inflation, Export, ARDL, Pakistan

Introduction

International trade plays a key role in the economic landscape of nations, influencing their growth trajectories, employment prospects, and overall welfare. In the framework of Pakistan, a country that is gifted with varied natural resources and a premeditated geographic location, trade emerges as a momentous driver of economic development (Ahmad & Shaikh, 2024). The influence of trade on Pakistan's economic progress is of dominant status, thereby dazzling the country's integration into the global economy along with the ability to harness comparative advantages and improve competitiveness (Ahmed et al., 2024; Aggarwal & Karwasra., 2024). Pakistan's participation in international trade evolves meaningfully. Over the past few decades, Pakistan has pursued numerous trade policies, such as import substitution to export promotion, to navigate the changing global economic dynamics and public debt and domestic imperatives (Baloch et al., 2024). Such policy shifts influence the direction and composition of trade flows in Pakistan, thereby affecting economic growth and ensuring economic resilience (Siddique & Selvanathan, 2016; Golo et al., 2024; Raihan et al., 2024). Understanding the relationship between trade and GDP in Pakistan requires a nuanced analysis that considers both the macroeconomic dynamics as well as the structural characteristics of the economy. Factors such as export diversification, trade openness, exchange rate fluctuations, and global demand dynamics contribute to determining the impact of trade on GDP (Hossain et al., 2024). Numerous studies have been conducted to explore the nexus between trade and Pakistan's GDP, providing treasured insights into the networks through which trade inspires economic growth. For instance, Siddique and Selvanathan (2016) highlighted the positive bearing of export expansion on Pakistan's GDP growth, accenting the role of exports as a driver of economic affluence (Luqman & Soytaş., 2023), (Ahmed & Malik., 2019), (Usman et al., 2023).

International trade is the exchange of goods and services among nations in which a minimum of two countries are involved (Nabi et al., 2023). Countries are engaged with each other to trade goods and services because nowadays, all countries are dependent on each other in all activities. Each country has a comparative advantage in goods and services due to differences in human capital, natural resources,

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▪ **To Cite:** Mehmood, K. A., Jahanzaib, Faridi, M. Z., Hussain, J., & Sehr, M. (2024). Assessing the Influence of Economic Growth, Inflation, Debt, Interest Rate, and Exchange Rate on Trade in Pakistan. *Qlantic Journal of Social Sciences and Humanities*, 5(2), 307-340. <https://doi.org/10.55737/qjssh.539397471>



financial conditions, and geographical location (Binos et al., 2023). Many countries are rich with all kinds of resources, but these countries engage with trade for export purposes and to earn profit for a better life standard (Kumari et al., 2023). The important fact of trade is that a single country cannot produce all kinds of goods and services due to different resource levels and trade barriers. In the trade activity, the country exports goods and services to earn revenue and import goods from other countries.

Every country wants to capture more and more international markets to grow its economy and develop. The objective of the rise in trade, exports, and goods and services is based on trade. Nowadays, the world has merged into globalization, and countries are being viewed as trading with foreign exchange markets (Saleem et al., 2023). Since 1982, due to the involvement of the IMF and World Bank policies, Pakistan has been experiencing fluctuating exchange rate issues, which is a cause of disruption of the financial sector. There was a fixed exchange rate policy in 1980 and before the time period. The exchange rate was fixed almost from 1940 to 1975. After that, the Pakistani currency became affiliated with the British Pound. Later, in 1980, several countries politically got attached to the USA and the US Dollar was recognized as a standardized currency (Rehman et al., 2023).

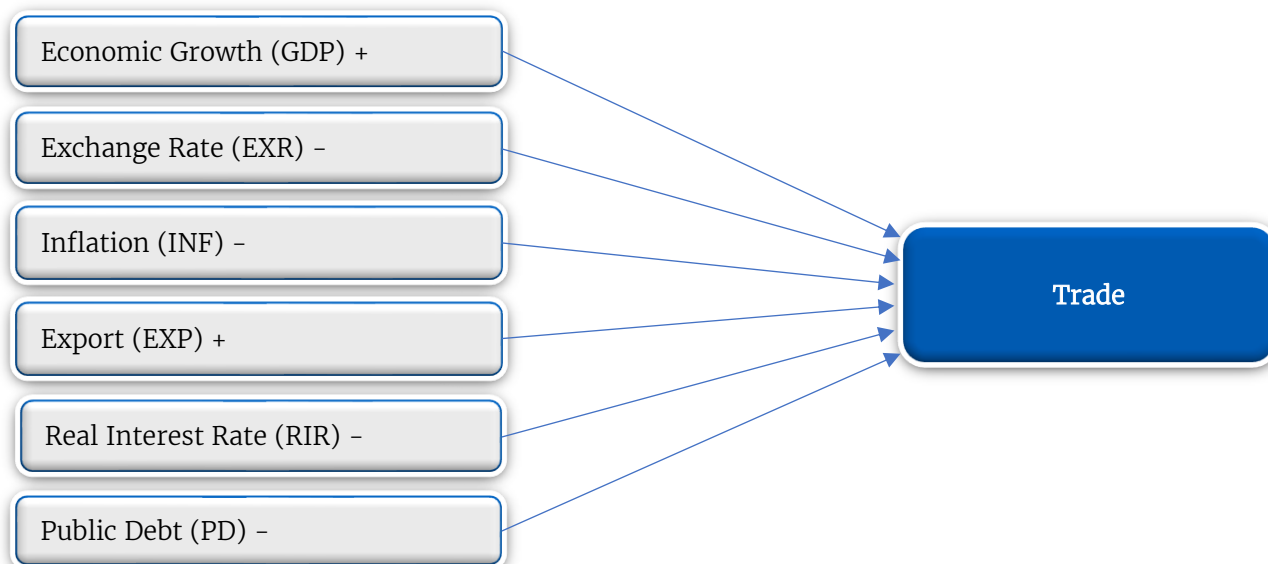
Pakistan's economic condition is not well for the past few years. However, trade is the backbone of Pakistan's economy. Sub-sectors like agriculture, manufacturing, and energy sector contributions to Pakistan's economy are not favourable, too. The findings of empirics on this issue are less focused, and it is hard to conclude in one direction. Therefore, the novelty of this study rests upon the whereabouts of the macroeconomic stance that has an impact on trade.

The empirics have elaborated the studies aiming to clarify the role of macroeconomic variables on trade. Malik (2015) assessed that money supply, GDP, and exchange rate with multiple regression models all have a positive impact on the trade balance in Pakistan. Trade openness is also a significant influencing variable on other macroeconomic variables. For example, Shah (2015) investigated the effect of trade openness on the exchange rate. Balance of trade was used as an independent variable in this study, and exchange rate was used as the dependent variable. Results indicated that there was a low and unfavourable correlation between the balance of trade and the exchange rate. GDP was used as the dependent variable, with a balance of trade and investment serving as the independent variables. In this study, the OLS Multiple Regression Model was used. The authors discovered that all debt indicators increased significantly in 1990. Zahra et al. (2023), Rahman et al. (2022), and Rehman et al. (2023) checked the relationship between the exchange rate, fiscal deficit, foreign direct investment, and economic expansion on foreign debt. Results showed that in the long run, all variables have significant and positive impacts on trade, and the exchange rate has no impact on trade. Michael et al. (2010) and Frankel and Rose (1996) analyzed the exchange rate and output growth of 45 countries and found that population growth has a negative relation with economic growth.

Maqsood et al. (2023), Rashid et al. (2023) and Murtaza et al. (2023) emphasized the symmetric impact of economic growth and trade openness. Findings suggested that the relationship between trade openness and economic growth was positive. Alam et al. (2020) examined the determinants of trade and validated that trade increases economic growth and creates economic stability in the economy. Gul et al. (2023) investigated the fact that trade and investment are crucial factors for long-term economic growth. Bhatti et al. (2023) and Ullah (2018) checked the association between free trade and the GDP (macroeconomic performance). The result of OLS revealed that trade openness has a positive impact on economic growth in Pakistan. Irshad et al. (2022) studied GDP as an important indicator for measuring the macroeconomic performance of an economy. The results showed the significant impact of GDP on trade in Pakistan. Din et al. (2020) inspected that free trade has a significant influence on economic growth in Pakistan. The outcome showed that the reduction of tariffs has a positive impact on economic growth. Bahmani-Oskooee et al. (2023) studied the impact of the exchange rate on trade in Pakistan and China and suggested that the exchange rate has an asymmetric impact on trade in these economies. Mumtaz and Ali (2022) highlighted areas of research on exchange rates, domestic consumption and trade in Pakistan and India. The results suggested that real and nominal exchange rates exhibit an insignificant impact on trade and consumption in Pakistan. In India, the exchange rate has a positive impact on consumption and trade.

Figure 1

Conceptual framework



The discussion of the literature, along with the importance of trade, makes the novelty of this study rest on analyzing the macroeconomic indicators that affect trade in Pakistan. This study is organized in a way that sections 1, 2, and 3 are allocated to the introduction, theoretical framework, and methodology. Section 4 and section 5 are rendered to elaborate on the results and discussions, as well as the conclusion and policy suggestions, respectively.

Theoretical Framework

The new classical growth theory is a macroeconomics theory that emphasizes the role of technology and capital accumulation in driving long-term economic growth. It postulates that growth is primarily driven by exogenous factors, like technological progress, instead of government policies or demand-side factors. This theory proposes that markets are well-organized and will naturally allocate resources in a rightful way over time, leading to continued economic growth (Romer, 1990). In classical growth theory, economic growth is often abstracted as being driven by exogenic factors, such as population growth, technological progress, and resource availability. Trade, on the other hand, is characteristically viewed as a dependent variable, predisposed by various economic factors, including comparative advantage, trade policies, and market demand. Within this particular framework, one could suggest a model where trade is affected by economic growth through its impact on factors such as market expansion, income levels, and specialization (Barro & Martin, 2004).

Classical growth theory, also recognized as the neoclassical growth theory, is a context within macroeconomics that clarifies long-term economic growth through the buildup of capital and technological development. This theory explains that economic growth is the mixture of physical and human capital and technology, which increases production. It is rooted in the ideas of classical economists like Adam Smith and David Ricardo, as well as in the work of neoclassical economists like Trevor Swan and Robert Solow. New Keynesian growth theory is an extension of classical growth theory, which incorporates visions from Keynesian economics, chiefly regarding the role of aggregate demand and market inadequacies. Unlike classical growth theory, which emphasizes the long-term determinants of economic growth, the new Keynesian growth theory emphasises short-to-medium-term fluctuations in economic activity and the factors swaying these variations (Romer, 1990; Blanchard & Fischer, 1989; Barro & Martin, 2004). Economic growth does not prevent trade from being affected (Barro & Martin, 2004).

Purchasing Power Parity (PPP) theory suggests that, in the long run, exchange rates should be adjusted to equalize the prices of goods and services in each country. The exchange rate is connected with trade (Malik, 2015). The idea behind this theory is that good is traded globally, and there are no transport costs



or trade fences. PPP is used to compare inflation rates and living standards across countries. Moreover, it controls whether a currency is undervalued or overvalued (Taylor & Taylor, 2004).

The Harrod-Domar Growth Model focuses on the relationship between investment, savings, and economic growth. As per the Harrod-Domar Model, GDP growth is dependent upon the savings and capital-to-output ratio. The model also suggests that the essential investment is required to sustain full employment and to attain the desired rate of economic well-being. Thereby, the model highlights the significance of investment in order to derive a better economic state and to address the issues of low employment. Such improvements in economic growth and employment transpire positive effects on the country’s trade. It proposes that policies aimed at increasing savings and investment can aid economic growth and also emphasizes the need to uphold stability in the economy to evade inflationary and deflationary pressures (Harrod, 1939; Domar., 1946).

Data and Methodology

Data Sources

The time series data is used from 1998-2022. Trade (% of GDP) is used as the dependent variable, and GDP (constant 2015 US Dollar), export (export of goods and services percentage of GDP), inflation (consumer price index 2010=100), exchange rate (rate of exchange per USD by the end of fiscal year), interest rate (real interest rates) and public debts (public debt ratio of GDP) are uses as independent variables. All the data on the variables was collected from World Development Indicators. Data on exchange rate data is gathered from SESRIC, OIC and public debt from the International Monetary Fund.

Table 1

Variables’ description

Variable	Abbreviation	Definition	Proxy	Data Source	Expected Sign
Trade	TRD	Exchange of goods and services within or out of the economies	Trade (% of GDP) Chen et al. (2022)	WDI	+
Gross Domestic Product	GDP	All goods and services produced at a specific time in a country	GDP (constant 2015 US\$) Dynan and Sheiner (2018)	WDI	+
Export	EXP	Goods produced in one country and sold in another country	Exports of goods and services (% of GDP) Sermcheep (2019)	WDI	+
Inflation	INF	A general price level increase in the economy	Consumer price index (2010 = 100) (Shaban et al., 2019)	WDI	-
Exchange Rate	EXR	A rate at which one currency exchanges with another currency	RATE OF Exchange, per USD, End of fiscal year Lee and Yue (2017)	SESRIC	+
Public Debt	PD	Total amount borrowed by the government to fulfil the domestic needs	Public debt as a ratio to GDP	IMF	-
Real Interest Rate	RIR	Adjusted for the Inflation	Real Interest Rate	WDI	-

Methodology

This study is based on time series, and unit root diagnosis is incorporated to check stationarity using the ADF and PP tests. The general equation of ADF is:

$$\Delta y_t = \gamma y_t - 1 + \sum_{i=1}^p \sigma \Delta y_{t-i} + \mu_t \quad [1]$$

The two common trend removals are the I(1) and I(0) time series. The unit root test is used to know if the trending data needs to be first differenced or regressed on the deterministic function of time in order to render the stationarity of data. If the variables exhibit a mixed state of cointegration, such as I(1) and I(0), ARDL is a suitable technique to pull out the regression estimates.

Where Δ is the difference operator, y_t is the time series at a time, p is the number of lagged difference terms, γ is the coefficient to be tested, μ and is the error term.

Phillips Perron Test equation is:

$$\Delta Y_{t-1} + \gamma Y_{t-1} + \mu_t \quad [2]$$

The ARDL approach offers a versatile method for estimating short-run and long-run elasticities simultaneously using OLS-based Wald Test F-Statistic estimation for cointegration analysis, which is particularly advantageous for small sample sizes (Mehmood et al., 2024).

Model Description

$$TRD_t = \beta_1 + \beta_2 GDP_t + \beta_3 INF_t + \beta_4 EXR_t + \beta_5 RIR_t + \beta_6 PD_t + \mu_t \quad [3]$$

ARDL Long Run Coefficient Estimates

$$\Delta TRD = \beta_1 + \beta_2 TRD + \beta_3 GDP + \beta_4 INF + \beta_5 EXR + \beta_6 RIR + \beta_7 PD + \sum_{l=0}^{P_1} TRD + \sum_{l=0}^{P_2} GDP + \sum_{l=0}^{P_3} INF + \sum_{l=0}^{P_4} EXR + \sum_{l=0}^{P_5} RIR + \sum_{l=0}^{P_6} PD + \mu_t \quad [4]$$

ARDL Short Run Coefficient Estimates

$$\Delta TRD = \beta + \sum_{l=0}^{P_1} \partial_1 TRD + \sum_{l=0}^{P_2} \partial_2 GDP + \sum_{l=0}^{P_3} \partial_3 INF + \sum_{l=0}^{P_4} \partial_4 EXR + \sum_{l=0}^{P_5} \partial_5 RIR + \sum_{l=0}^{P_6} \partial_6 PD + \partial_7 ECM + \mu_t \quad [5]$$

Results and Discussions

In this section, the results of the study are evaluated. To start with, the results of descriptive statistics are presented in Table 2, which depicts the characteristics of the variables as follows: The mean values are Trade: 28.862, Economic Growth: 260, Export: 95.682, Inflation: 110.096, and Exchange Rate: 11.312. The maximum values are Trade: 34.348, Economic Growth: 400, Export: 226.470, Inflation: 262.618, and Exchange Rate: 16.484. The minimum values are Trade: 21.459, Economic Growth: 150, Export: 45.890, Inflation: 39.9407, and Exchange Rate: 8.2216. The standard deviation values are Trade: 3.8386, Economic Growth: 760, Export: 45.207, Inflation: 63.596, and Exchange Rate: 0.019. The skewness values are Trade: -0.254, Economic Growth: 0.251, Export: 1.253, Inflation: 0.660, and Exchange Rate: 0.627. The kurtosis values are Trade: 1.802, Economic Growth: 1.918, Export: 4.069, Inflation: 2.501, and Exchange Rate: 3.343. The Jarque Bera values are Trade: 1.765, Economic Growth: 1.482, Export: 7.735, Inflation: 2.077, and Exchange Rate: 1.763. This summary provides insight into the diverse information of skewness, kurtosis, and Jarque-Bera.

Table 2

Descriptive statistics

	TRD	GDP*	EXR	INF	RIR	PD
Mean	28.862	260	95.682	110.096	2.844	74.750
Median	29.469	250	85.710	100.000	3.199	80.177



	TRD	GDP*	EXR	INF	RIR	PD
Maximum	34.348	400	226.470	262.618	7.761	81.581
Minimum	21.459	150	45.890	39.940	-1.710	56.032
Std. Dev.	3.838	760	45.207	63.596	2.494	10.297
Skewness	-0.254	0.251111	1.253	0.660	-0.213	-1.155
Kurtosis	1.802	1.918030	4.069	2.501	2.760	2.367
Jarque-Bera	1.765	1.482173	7.735	2.077	0.160	3.827
Probability	0.413	0.476596	0.020	0.353	0.922	0.147
Sum	721.567	6.49E+12	2392.070	2752.405	45.505	1196.002
Sum Sq. Dev.	353.649	1.39E+23	49048.33	97069.83	93.356	1590.648

Source: Authors own calculation and * shows a figure in Billion USD

Table 3

Correlation matrix

	TRD	GDP	EXR	INF	RIR	PD
TRD	1					
GDP	-0.426	1				
EXR	-0.360	0.968	1			
INF	-0.420	0.972	0.967	1		
RIR	-0.210	0.134	-0.042	0.087	1	
PD	0.071	-0.144	-0.107	-0.151	0.128	1

In Table 3, the results of the correlation matrix are given. The findings show the association among all independent variables. A conclusion is drawn that economic growth has a negative correlation with trade at -0.426 value. Export has a negative association with trade but weak at -0.360 and with GDP positive and strong correlation at 0.968. Inflation has a negative but weak association with trade at -0.420 and has a positive and strong correlation with GDP and exchange rate, respectively. The real interest rate has a negative correlation with trade and a weak correlation with a coefficient of -0.210. Public debt has a positive but much weaker correlation with trade at 0.071 value.

In Table 4, unit root test results show that trade, economic growth, exchange rate, inflation and export all variables are stationary at 1st difference, and real interest rates are stationary at both ADF and PP at 1st difference. Public debt is stationary at 1st difference in the ADF test and on both levels and 1st difference in the PP test. Due to the mixed order of cointegration, ARDL is incorporated.

Table 4

Unit root test results

Variable	ADF Test		PP Test	
	Level	1st Difference	Level	1st Difference
TRD	-2.335 (0.170)	-4.146 (0.004)	-2.418 (0.147)	-4.108 (0.004)
GDP	1.752 (0.999)	-3.730 (0.010)	1.789 (0.999)	-3.661 (0.012)
EXR	3.574 (1.000)	-3.961 (0.007)	4.668 (1.000)	-3.506 (0.017)
INF	2.777 (1.000)	3.526 (0.003)	3.808 (1.000)	-2.144 (0.033)
RIR	-2.383 (0.160)	-5.062 (0.0011)	-2.429 (0.1489)	-5.173 (0.0009)
PD	-1.256 (0.6180)	-11.064 (0.0000)	-3.653 (0.0139)	-8.091 (0.0000)

Bound test F-Statistics is computed with a value of 4.5, which is greater than the upper bound value of 3.52 at a 10 per cent level of significance. Thus, the conclusion is drawn that the variables have long-run correlations with one another. The results are published in Table 5

Table 5

Bound test

Linear ARDL	F-Statistic		Lower bound	Upper bound
	4.5	10%	2.45	3.52
		5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

In Table 6, the short-run results show all variables have significant effects on trade (TRD) except EXR, RIR, and PD. The coefficient of GDP is 0.982, which is significant with a positive sign. The coefficient of inflation is -0.377, which is significant with a negative sign, meaning that an increase in inflation will decrease trade. The findings validate that economic growth helps in promoting trade. Trade is also an essential ingredient in fostering economic growth. On the other side, inflation affects the sale of commodities in local and international markets. Any increase in the prices of commodities causes the confidence of foreign consumers to shatter in their purchase of that particular product. The coefficient of error correction term is -0.731, which postulates that the disequilibrium of short run to long time period is well adjusted.

Table 6

ARDL short-run results

Variables	Coefficients	Std. Errors	t-Statistics	P-values
D(GDP)	0.982	0.187	5.239	0.000
D(EXR)	0.114	0.103	1.109	0.281
D(INF)	-0.377	0.123	-3.065	0.006
D(RIR)	0.016	0.034	0.473	0.647
D(PD)	-0.006	0.100	-0.065	0.949
ECM	-0.731	0.094	-7.707	0.000
Diagnostics				
R ² value	0.902		F-Value=33.207	
Adj. R-value	0.875		D.W=1.753	
J.B Test value	0.870		(0.647)	
LM Test value	0.321		(0.729)	
Hetero Test value	0.725		(0.613)	
Ramsey Test value	2.890		(0.107)	

Note: Parenthesis values are of respective probabilities

In the long run, the results are demonstrated in Table 7. The conclusions are drawn that the GDP coefficient value is 1.343, which means that the 1% increase in GDP will increase trade by 1.343 per cent. Elasticity is positive and also greater than one, which confirms that trade is highly dependent on GDP; the less change in GDP, the more change in trade in the long run. The coefficient value of the exchange rate is insignificant. The value of the coefficient of inflation is -0.516, meaning that if there's a 1 % increase in inflation, the trade will be decreasing at the rate of 0.516 %. The findings on RIR are insignificant, too. The coefficient of public debt is -0.831, which indicates that a 1% increase in public debt decreases trade by 0.831 %. The coefficient value of the model intercept is significant, which shows a significant contribution of the omitted variables on the regressand. Akin to the short-run, long-run results on GDP and inflation are the same. GDP is found to boost trade, and inflation is found to post negative effects on trade due to loss of compatibility in the international market at the back of rising prices. An increase in public debt is also diagnosed as exhibiting negative effects on trade. The arguments are justifiable to write that any increase in public debt transpires, affecting the price of commodities and shooting up because the government has



to pay back the debt with markup, thereby putting pressure on the balance of payment. Therefore, a rise in public debt means a rise in the cost of doing business, which compels exporters to increase the price of products to cover the high cost. This rise in price reduces exports, thus bringing trade under pressure.

Table 7

ARDL long-run results

Variables	Coefficients	Std. Errors	t-Statistics	P-values
GDP	1.343	0.331	4.055	0.0007
EXR	0.156	0.148	1.052	0.3064
INF	-0.516	0.202	-2.549	0.0201
RIR	-0.032	0.113	-0.283	0.7833
PD	-0.831	0.295	-2.811	0.0111
C	-33.034	8.334	-3.963	0.0009

Conclusion and Policy Suggestions

The study was initiated to check the impact of economic growth, inflation, exchange rate, interest rate, and public debt on trade in Pakistan. The time series data was collected from 1998 to 2022. ARDL model was used to check the impact of independent variables on dependent variables. The results suggested that in the long run, GDP and exports were positive and significant in their impacts on trade. Inflation negatively affected trade in the long run, and the exchange rate was insignificant, with positive signs in both time horizons. The real interest rate was insignificant, too. Public debt had a significant but negative impact on trade over a long period of time. Policymakers and government officials are therefore needed to maintain sustainable GDP and exchange rates in Pakistan for the betterment of trade. Moreover, it is recommended that the issue of rising prices, real interest rates, and public debt be resolved since these macroeconomic factors contribute to a decrease in the volume of trade.

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