RESEARCH ARTICLE

The Impact of International Trade on Economic Performance of Pakistan

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Manuscript Info

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Abstract

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International trade has significant impact on economic development and performance of the country. It encourages employment, entrepreneurship, economic activity, uplift living standard of the population and increases the industrial productivity across all sectors. Moreover, the economic stability of the country comes with ability to conduct business globally, also it reflects the relationship of one country with rest of the nations. This study investigates the economic performance of Pakistan by analyzing the imports and exports data from the year 2000 to 2022. The Present research used time series secondary data, achieved from the World Development Indicators (WDI). With the application of ARIMA Model, the results showed that the import products of Pakistan have increased, while the export of goods and services as percentage of Gross Domestic Product (GDP) decreased. Moreover, this study also predicts the next seven years of Pakistan's economic performance by utilizing this data to provide long-term picture, enabling the researchers to further investigate the impacts of international trade of developing countries.

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1. Introduction

International trade refers to the economic transactions that occur across borders with the exchange of goods and services (Suleman, 2019). It plays a pivotal role in reshaping the country's economy, uplifts the gross domestic product (GDP), and ultimately increases the per capita income of the tenants. International trade has been and continues to be a powerful economic force that has fueled exploration and colonization, increased trade, advanced technology, and growth, dispersed cultural norms, and frequently stoked conflict (Jouini, J., 2015). Countries engage in international trade through economic transactions called imports and exports (Arif, A. and H. Ahmad, 2012). The imports refer that the goods or services that are procured from countries across the borders, and exports refer that the products, commodities, or services that are sold to other countries. Hence, the countries that possess surplus current accounts, i.e. exports higher than imports, are considered to have higher per capita income. Pakistan has an impressive geo-strategic location, bordering China to the northeast, India to the east, Iran to the west, and Afghanistan to the northwest (Alam, H., 2011), the top five export and import partners of Pakistan are the United States of America, China, the United Kingdom, Germany, and the Netherlands. The trade flow occurs east to west in Pakistan, mainly through the oceans.Any country's economy, including Pakistan's, benefits greatly from trade since it helps with economic growth and stability on a national level. One of the most significant sources of foreign exchange income, which boosts employment prospects and stabilizes the balance of payments in a nation, is international trade. Since Pakistan's independence, one of its biggest economic issues has been a trade deficit. Pakistan has made remarkable strides in recent times to improve its trade situation, but the country still has a larger import than export ratio. As a result, Pakistan has a trade deficit, which is having an increasingly negative effect on the country's economy (AAS SYED, H KIRAN, S QURESHI). The economy of Pakistan depends on the economic transactions engaged in international trade with other countries. Pakistan has the incredible opportunity to spur economic growth by engaging in east-west trade. (Aurangzeb and A.U. Haq, 2012).

As such, it is becoming more essential to understand the complex phenomenon of international trade as globalization link economies across borders. Previous empirical studies and literature have also established a relationship between trade growth and economic growth (Rodriguez, F., Rodrik, 2001). Pakistan's imports and exports have been estimated through several pieces of research. Gauri, et al., (2020). The previous studies also suggest that one dollar increase in exports resulted in twenty cents increase in economic growth. (Nabi, 2013). Hence, an upward trend is imperative in international trade for positive economic development of Pakistan (Ameer, 2013). Moreover, international trade creates new windows of opportunity and spurs economic activity within the country. It can instigate employment, entrepreneurship, skilled labor, and comparative advantage over other countries and eradicate poverty and social evils from society. There is plenty of research present on the topic, however, this study investigates the focused and specific facts and figures to support the hypothesis. The subjective aspect of the research

provides better understanding regarding impact of international trade on economic performance of Pakistan, whereas the quantitative analysis of study i.e. ARIMA Model, ANOVA, times series analysis, and the subsequent interpretations enable the policy makers and economists the way forward in the long term. In this world of globalization, the effective data with minimal margin of error is essential for policy makers for constructive economic conditions, as higher volume of international trade decides the fortune of a nation and its economic stability.

A Farooqi (2014) also forecasted the total imports and exports series for economy of Pakistan. He used the ARIMA model by applying Box and Jenkins (1976) approach. This research paper aims to investigate how recent trend of international trade affects the economic performance of Pakistan. The statistical analysis is based upon import and export data from the year 2000 to 2022. Further, based on generated results and observations, this study forecast the trade tendency for next seven years.

2. Methods

2.1. Data collection

The data of two variables i.e. exports and imports as a percentage of GDP collected from different sources including world bank data from the year 2000 to 2022. The statistical method "analysis of variance" (ANOVA) through SPSS, regression model, residuals model, and histogram graph were used to determine the historical trend of time series of imports and exports of the country.

2.2. Data analysis

In order to analyze data, ARIMA i.e. autoregressive integrated moving average model has been used to forecast the trend of exports and imports. Where time series pattern includes, the researchers mostly rely on past observations and data to formulate the future values. This model is best fit to analyze the past data from 2000 to 2022 of exports and imports to predict the current and future observations and unpredictable shocks in the economic performance of Pakistan. The researchers like Jose and Sojan (2013), Yeboah, Ohene, and Wereko (2012), Wang and Yang (2017), Manoj and Madhu (2014), Mandal (2005), and Raymond (1997), used this model for forecasting future trends. ARIMA Model has three components, Autoregressive (AR), moving average (MA) and differencing or Integrating (I). The autoregressive (AR) component takes the past observation in time series pattern containing dependent variable *(i.e. exports)* to forecast the future observations.

$$y_t = ay_{t-1} + \varepsilon_t$$

In above equation, y_t is the dependent variable i.e. exports of the country, whereas, a is a parameter, y_{t-1} is a lagged dependent variable and εt is the random or white noise, which denotes unpredictable shock or event.

Moving average (MA) is the second component of the model, which incorporate dependency between past observations and white noise i.e. residual errors. The first-order MA model (MA (1)) is represented as follows:

$$y_t = b\varepsilon_{t-1} + \varepsilon_t$$

Where b is the parameter and ε_t and ε_{t-1} are forecast error and the lagged forecast error, respectively.

The integration of autoregression (AR) and moving average (MA) creates ARMA model which predicts the future values based on past observations. ARMA Model assumes that the data is stationary, however, where the data used are nonstationary, a third component is used to change the data to achieve stationarity by differencing and integrating (I) in original time series. According to Rohrbach and Kiriwaggulu (2001) and Nau (2018), the said model is represented as;

$$y'_t = y_{t-1} - y_t$$

Where y'_t is the future predictions, y_t and y_{t-1} are original series and lagged original series, respectively. In this study, these three combinations provide model that easily make the prediction in respect of Exports and imports of Pakistan as percentage of gross domestic product (GDP) in the long run.

3. Results
3.1. Import and export trend:

The data in respect of Import and export of goods and services as percentage of Gross Domestic Product (GDP) for the past 22 years are presented in Fig. 1. Through statistical analysis, the results showed both an increasing and decreasing trend over the past twenty-two years. As per results, the maximum percentage of imports as percentage of GDP was recorded at 36 percent (36%) during the year 2009. Recently, during 2022, the data also suggested the highest trend of import goods as percentage of GDP, i.e. twenty seven percent (27%). Moreover, the graph with respect to exports showed a decreasing trend. As per the statistical data, the highest percentage of exports in terms of gross domestic product (GDP) was observed in 2003.
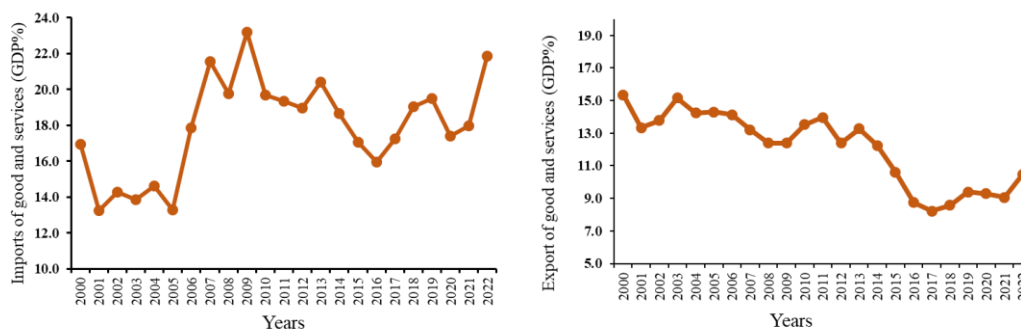

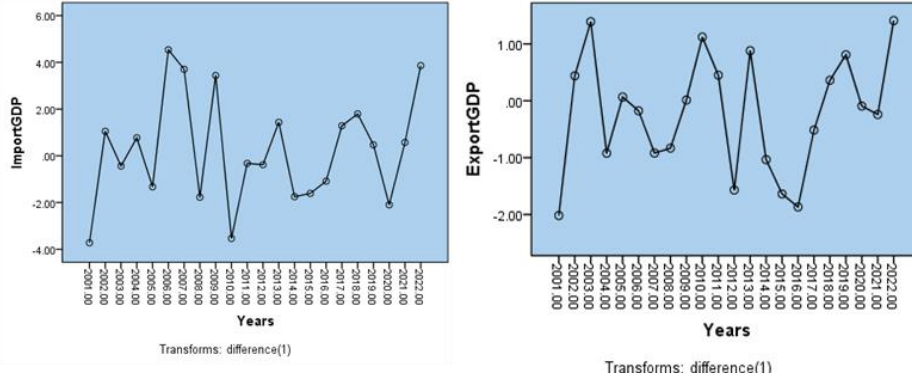*Fig 1. Original trend of Import and export GPD% from 2000 to 2022.*

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Fig 2. Original data of import and export as percentage of GDP from 2000 to 2022 at first degree variance.

3.2. Model identification for import GDP%

The data regarding imports as percentage of GDP as per autocorrelation function (ACF) and Partial autocorrelation function (PCAF) figures are shown in Fig. 3. According to the analysis of the ACF graph model, at the first-degree difference, the significant value is greater than (P> 0.05). However, without the first degree, the original series data is accepted. The plot of ACF is created from the original series of secondary data. The plotted figure showed a sign of a stationary time series (Figure 3). However, the ACF graph immediately declines to zero. One significant spike is present on lag 1 in the ACF graph, while another significant spike is on lag 1.
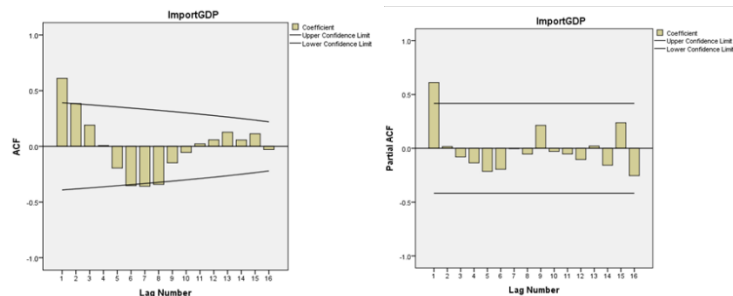

Fig 3. Present graph indicates the Autocorrelation plot (ACF) and Partial autocorrelation plot (PACF) of used for import as percentage of GPD test for stationarity.

3.3. Validation

The Ljung-Box Q test for import past trends found stationarity without degree variance order. The import GDP% is significant at the $P > 0.05\%$ level. Based on the analysis, the best fitted ARIMA model for forecasting import products in Pakistan is ARIMA (1,0,1), with a BIC of
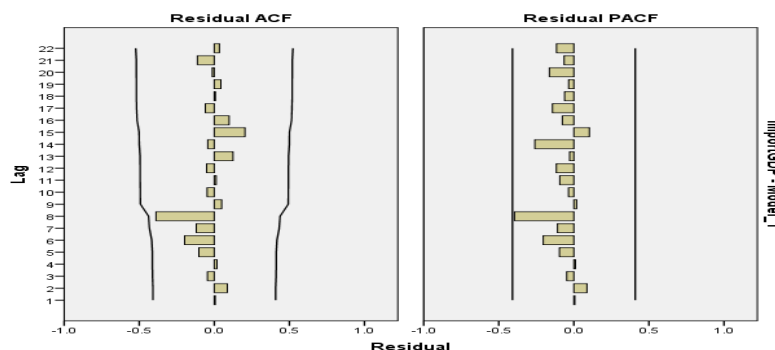
2.093, as shown in Table 1.

Fig 4. Residual plots for ACF and PACF after estimating ARIMA (1,0,1) for Import GDP% for products.

Table 1. Estimated import as percentage of GDPdata for ARIMA (0,1 0), and upper confidence level (UCL), and lower confidence level from 2023 to 2030.

Model		2023	2024	2025	2026	2027	2029	2030
Import-Model_1	Forecast	21.42	21.13	21.08	21.15	21.28	21.64	21.82
	UCL	25.95	26.35	26.46	26.57	26.71	27.08	27.26
	LCL	16.89	15.91	15.70	15.73	15.85	16.21	16.39

3.4. Model identification for export GDP%

The analysis for building an export as percentage of GDP model is presented in Fig. 5. The ACF is applied to export as GDP% data and explores a slow linear decay pattern. This is a sign of a nonstationary problem that can be modified by a first-degree order of differentiation. After applying autocorrelation, both ACF and PACF plots (Figure 5) show all spikes are inside the interval value. This implies that there is no need to add AR (p) or MA (q).
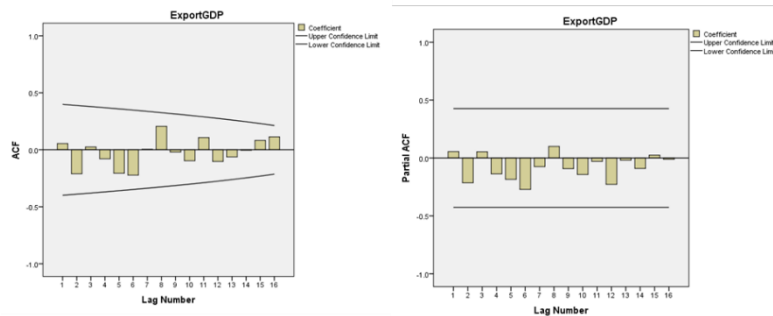

Fig 5. Present graph indicates the Autocorrelation plot (ACF) and Partial autocorrelation plot (PACF) of used for export GPD% test for stationarity.

3.5. Validation

The residual ACF and residual PACF plots of these models are shown in Figure 5. All models are within the limit, which indicates a good fit. Results from SPSS presented in Table 2 are in

favor of ARIMA (1,0,1), which has a normal, lower normal BIC and is chosen as a better
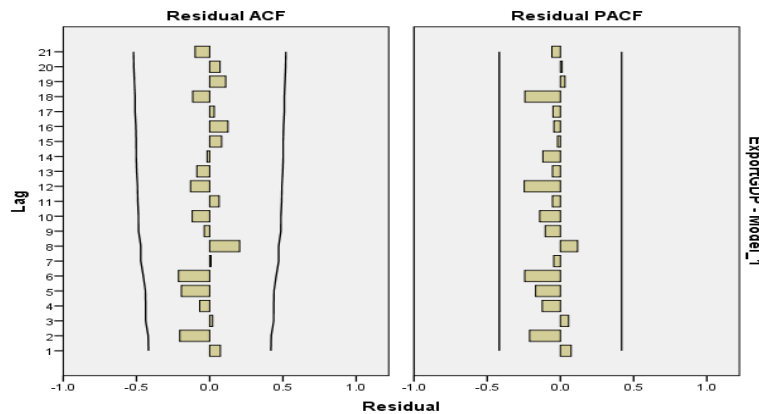
modelto forecast.

Fig 6. Residual plots for ACF and PACF after estimating ARIMA (1,0,6) for Export GDP% for products.

Table. 2: Better model estimates for import and export and export GDP% of goods and services.

Possible model	Import GDP% (1,0,1)	Export GDP % (1,0,6)
S-R-squared	.464	.887
R-squared	.464	.887
Root mean square	2.168	.962
MAPE	8.758	5.275
MAXAPE	25.957	13.094
MAE	1.539	.601
MaxAE	4.377	1.746
Normlized BIC	2.093	1.150
Estimate	-378.641	601.13
SE	260.50	89.76
t	-1.453	6.697
Sig	.162	0.000

Model		2023	2024	2025	2026	2027	2028	2029	2030
ExportGDP-Model_1	Forecast	10.49	10.54	10.60	10.69	10.80	10.93	11.08	11.25
	UCL	12.69	13.64	14.41	15.08	15.71	16.31	16.89	17.46
	LCL	8.29	7.43	6.80	6.29	5.88	5.55	5.26	5.04

Table 3. Estimated Export GDP% data for ARIMA (1,0, 1), and upper confidence level (UCL), and lower confidence level from 2023 to 2030.

3.6. Regression analysis

Statistically, regression analysis of two different variables—import and export products, annual growth%, and GDP%—is investigated in this study. The multiple coefficients of the ANOVA

results showed a *P* value of 0.000, which is less than 0.05, and a *F* value calculated of 1.290, which is significant. Table 2 shows unstandardized coefficient results, which are shown in Table 1. which indicates that the beta value is 15.65 for the dependent export variable. The R^2 value is 0.058, indicating that 58% of the total change-dependent variable, which is import as percentage of GDP, that can be described by one independent variable.

Table 4. presents the unstandardized and standardized coefficients and R squared values of two variables: import and export goods and services.

Model		Unstandardized Coefficients		Standardized Coefficients				95.0% Confidence Interval for B	
		B	**Std. Error**	**Beta**	**t**	**Sig.**		**Lower Bound**	**Upper Bound**
1	(Constant)	15.659	3.177		4.929	.000		9.052	22.267
	Imports	-.199	.175	-.241	-1.136	.269		-.564	.166
1	**Model**	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**R Square Change**		**F Change**	**Sig. F Change**
		.241ª	.058	.013	2.26562	.058	.058	1.290	.269

Dependent Variable: Exports (Constant), Predictors Imports

3.7. Histogram analysis

The histogram plot demonstrates the left-skew distribution. According to the graph, no standard distribution was seen for the export as percentage of GDP, with a mean near 12.09 and a standard deviation of 2.281. The estimates for long-term coefficients reported in Table 2 reveal that the real effective exchange rate (GDP%) has a significant but negative impact on the trade balance of Pakistan in the long term as well as in the short term. It is also evident that the money supply has a positive but insignificant impact. The histogram plot determines the normal distribution. According to the graph, a standard distribution was found for the import GDP% data, with a mean near 17.91 and a standard deviation of 2.753.
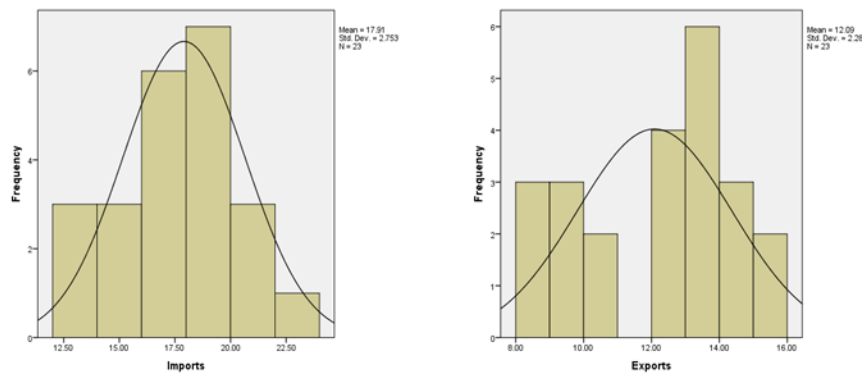

Fig 7. Showed the histogram of the time series indicates the past 22 years' data.

4. Discussion

The present study focuses on historical movement patterns of a variable such as import and export of goods and services based on the Box-Jenkins method-based ARIMA model, which was utilized to forecast future values. This study provides a forecasting value of import and export of goods and services in terms of GDP%. The past-year data from 2000 to 2022 was used to predict future trends for forecasting. Import data showed an increasing trend, while export data showed a decreasing trend. Poor Asian states' populations regularly experience increases in income as their economies grow. Consumer preferences and behavior could change because of an outcome concerning this pattern. The import numbers may not accurately reflect consumers' choices, which could fluctuate as income levels rise and they favor higher-quality imported goods or local products. Therefore, the imports as percentage of GDP could decline. Countries with rapid growth in their economies may find it necessary to expand their supply chains while decreasing the demand for a single import source. This may lower the import proportion of GDP. These findings indicate that a well-developed financial sector relates to robust economic growth with increased openness to trade through exports. The export-oriented sectors might gain more from trade industries if they had easier access to capital. Greater openness through imports is linked to slower economic growth, indicating that easier financing availability for import-oriented industries could potentially slow economic growth (Liang, Z., 2006).

5. Conclusion

As per this study and data analysis through various statistical tools, this is inferred that the exports and imports as percentage of gross domestic product (GDP) of Pakistan are declining. In order to provide a systematic picture of why there is a decreasing trend, it is necessary to take additional aspects into account, which include trade agreements, government policies, and international economic situations. It is important to recognize that improving import and export trends is a long-term endeavor as it requires a coordinated effort among government agencies, the private sector, and other stakeholders.

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