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ANALYZING THE IMPACT OF TEXTILE EXPORT PERFORMANCE ON PAKISTAN'S ECONOMIC GROWTH: A TIME SERIES APPROACH

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ABSTRACT

This study examines the relationship between textile exports and economic growth in Pakistan over the period 1994–2024 by incorporating key macroeconomic determinants, including exchange rate, foreign direct investment (FDI), and inflation. The analysis is grounded in the Export-Led Growth (ELG) hypothesis and complemented by theories of international trade and macroeconomic stability. Annual time series data obtained from the World Bank, State Bank of Pakistan (SBP), and Pakistan Bureau of Statistics (PBS) are analyzed using Augmented Dickey-Fuller (ADF) unit root testing, Johansen cointegration techniques, Vector Error Correction Model (VECM), and Granger causality analysis.

The empirical findings confirm that the variables are integrated of mixed order, I(0) and I(1), and exhibit a stable long-run equilibrium relationship. The Johansen cointegration results indicate the existence of a long-run association among GDP growth, textile exports, exchange rate, FDI, and inflation. However, the long-run coefficients of textile exports and FDI are positive but statistically insignificant, while exchange rate depreciation and inflation show negative but insignificant effects on economic growth. This suggests that although the direction of relationships aligns with economic theory, their magnitude is constrained by structural inefficiencies, macroeconomic instability, and limited absorptive capacity in the economy. In the short run, the Vector Error Correction Model reveals a significant and negative error correction term, confirming adjustment toward long-run equilibrium. Exchange rate depreciation exerts a strong negative impact on GDP growth, reflecting the high import content of production in Pakistan's textile sector. Inflation and FDI show mixed and relatively weak short-run effects, while textile exports exhibit limited short-run influence on growth. Granger causality results further indicate that the exchange rate plays a dominant role in influencing both GDP growth and textile exports, while causality from GDP growth to FDI suggests a demand-pull effect for foreign investment. Overall, the study concludes that while Pakistan's textile exports contribute to long-run growth dynamics, macroeconomic stability—particularly exchange rate and inflation management—plays a more immediate and significant role in shaping economic performance. The findings highlight the need for structural reforms, improved export competitiveness, and enhanced investment conditions to fully realize the potential of export-led growth in Pakistan.

Keywords: *Textile exports, economic growth, export-led growth hypothesis, exchange rate, foreign direct investment, inflation, Pakistan, VECM, cointegration, time series analysis.*

1. INTRODUCTION

The economy of Pakistan has been traditionally linked with the performance of its export industry, which is one of the key drivers of foreign exchange generation, industrialization, and job creation. Post-independence, policymakers have focused on export-oriented growth policies to open the economy to global markets and become competitors of all other export industries, the textile industry has always been dominant, with over 60 percent of total export earnings made throughout the decades (Akhuand & Abbas, 2023). This unremitting supremacy highlights the strategic role of the sector in maintaining the macroeconomic stability and long-term developmental path of Pakistan. Besides playing a huge role in export earnings, the textile industry also contributes a big portion of the gross domestic product (GDP) in the country, and it provides a huge percentage of the industrial labor force, which is why it is a pillar of economic as well as social development (Khan & Shah, 2019).

The theoretical framework on which the relationship between exports and economic growth is based on the export-led growth (ELG) hypothesis that economic growth is catalyzed by an increase in exports in terms of productivity, economies of scale, and efficient use of resources. Exports also allow countries to specialize based on their comparative advantage and have access to bigger markets in the international market. In Pakistan, the textile exports are vital in sustaining the economic growth because they earn the country foreign exchange to import capital goods, high-tech technology, and intermediate inputs in order to develop the industry. Moreover, the textile industry has a high backward and forward integration with other sectors of the economy, such as agriculture, chemicals, machinery, and logistics, and thus, increasing its multiplier impacts in the economy (Khan et al., 2021).

Although its performance has been central, the operation of the textile industry in Pakistan has been marked by ups and downs and structural issues that have limited its potential. The lack of proper infrastructure, energy, technological obsolescence, and uneven policy systems domestically has impacted the competitiveness of the sector in the global markets negatively. Regular power cuts and increased energy prices have added to the cost of production, and old-fashioned equipment has decreased the productivity and the quality of the products, creating difficulties in the Pakistani companies competing with other companies across the region and the world (Ahmed and Hamid, 2017). In addition to that, the absence of innovation and low value addition in the textile products has also limited the ability of the sector to ascend the global value chain (Qayyum & Zaman, 2018).

Besides the domestic shocks, external shocks have contributed to a great extent to affecting the performance of textile exports. The 2008 global financial crisis contributed to the significant drop in the level of international demand, which adversely affected the level of exports and earnings in Pakistan (Mubeen et al., 2024). Equally, the COVID-19 crisis has upset the global supply chains, decreased consumer demand, and logistical issues, which led to a temporary decline in the export of textiles (Olagunju et al., 2024). These incidents point out how the export sector in Pakistan is exposed to international economic events and the importance of adopting resilience and diversification policies (World Bank, 2023).

The textile exports performance is also significantly interdependent with the key macroeconomic factors, especially the exchange rate dynamics, the foreign direct investment (FDI), and the inflation. The movements in the exchange rates are very important in ascertaining the competitiveness of exports. Weakness of the domestic currency tends to make exports cheaper in foreign markets, which stimulates the demand for domestic products, whereas strengthening the currency weakens the competitiveness of exports (Islam et al., 2025). Exchange rate volatility has also been a persistent problem in Pakistan, and it has influenced the stability and predictability of export earnings (State Bank of Pakistan, 2022).

Another significant factor that determines export performance and economic growth is foreign direct investment. FDI inflows, it is through them that technology is transferred, that managerial skills are enhanced, and this leads to capital formation, which raises the level of productivity

and competitiveness in export-based industries (Borensztein et al., 1998). Empirical research indicates that nations that have a high FDI are more likely to have a higher export performance and economic development because of the high efficiency and innovation (Imran et al., 2023). In Pakistan, the inflows of FDI have not been very steady, and this has curtailed the effect it could have on the textile industry and the economy in general (UNCTAD, 2023).

Inflation is also another macroeconomic factor that affects export performance and economic growth. High inflation makes production costly, decreases the profit margin of firms, and also lowers international competitiveness. It also generates uncertainty in the business environment, which is not encouraging investment and long-term planning (Fischer, 1993). The existence of constant inflationary pressures in Pakistan has also added to the increase in the cost of inputs, such as energy, raw materials, and labor, and thus the profitability and sustainability of the textile exports (State Bank of Pakistan, 2022).

At the company level, the differences in financial performance, operational efficiencies, and managerial skills also affect export performance. Companies that have high liquidity rates, are more profitable, and have the best leverage are in a better position to invest in new technologies, enhance the quality of their products, and enter new markets (Akhtar, 2025). Conversely, companies with limited financial capacity are not able to compete favorably in the global markets, and therefore, they are restricted in their export opportunities (Bernard and Jensen, 1999). Firm-level dynamics are crucial, but they do not exist in isolation because they are part of the overall macroeconomic context and so should be analysed holistically with both dimensions taken into account.

Although it is noted that textile exports have been highly significant to the Pakistani economy, the determinants of exports and economic growth have been studied in isolation in the existing literature. Most research has concentrated on macroeconomic variables or on firm-specific factors, without taking a sufficient effort to combine these two points of view into a common analytical framework. Moreover, the past studies have tended to be short-term or have been based on limited sets of variables, which restricts the possibility of finding the long-term associations and dynamic adaptations (Wadho & Chaudhry, 2018). The literature gap is that there are no detailed time series studies that investigate long-run equilibrium relationships and short-run causal dynamics.

The 1994-2024 period gives a good background for analyzing these relationships since it includes important economic changes, reforms in policies, and shocks. In this time frame, the GDP growth, exchange rates, inflation, and FDI inflows in Pakistan were changing, as well as the changes in world trade and the local policies on industry (World Bank, 2023). The observation of this long period enables one to gain a more insightful insight into the interplay of textile exports with macroeconomic factors to impact on economic growth over a long-term period.

It is against this background that the current study seeks to examine how the performance of the textile export to the economy of Pakistan has affected the economic growth of Pakistan; it is in this context that the study will employ a time series model to carry out the analysis. In the analysis of long-run and short-run relations between textile exports, the exchange rate, FDI, inflation, and GDP growth, the study utilizes advanced econometric models, which are unit root tests, cointegration analysis, vector error correction modeling (VECM), and Granger causality tests (Engle and Granger, 1987; Johansen, 1991). In so doing, the study aims at offering a holistic empirical evaluation of the export-growth nexus in Pakistan.

The research study makes a contribution to the literature because it incorporates several macroeconomic factors in one analysis model and uses a thirty-year time series dataset. The results are reliable and robust, and the use of strict econometric methods increases the validity of the results, as well as provides policy-related implications on how to enhance export competitiveness and sustainable economic development (Pesaran et al., 2001).

2. LITERATURE REVIEW

2.1.1 Export-Led Growth Hypothesis

The main theoretical foundation of studying the relations between export performance and economic growth is the export-led growth (ELG) hypothesis. It also assumes that export growth leads to economic growth by enhancing the allocation of resources, economies of scale, and technological spillovers (Adelakun, 2025; Hussain, 2025). This model especially applies to developing economies like Pakistan, where exports are one of the main avenues of industrialization and integration into the world (Sein & Sah, 2025). Basing on the theory of comparative advantage, the ELG hypothesis postulates that nations gain by specializing in areas that they are relatively efficient in. Such specialization can be observed in Pakistan, where the textile industry relies on the availability of cotton, as well as relatively inexpensive labor (Kumar and Nargis, 2024). New trade theory extensions also emphasize the importance of scale economies and learning effect in improving productivity by participating in exports (Kashif et al., 2025).

Nonetheless, the empirical evidence of ELG is not always the same. Although a positive export-growth relationship is backed by numerous studies, the magnitude and direction of the relationship frequently varies based on the structural conditions, sectoral maturity, and the policy environments. As an example, Hussain et al. (2020) show that in Asian economies, the growth of exports is non-linearly related, which suggests that the growth rates might decrease in the late stages of sectoral development. This implies that ELG does not work in any context and that it should have complementary domestic policies to maintain its performance.

2.1.2 Macroeconomic Determinants of Export Performance

The macroeconomic factors have a substantial impact on the exports performance since they determine the cost structure, competitiveness, and investment incentive (Bahmani-Oskooee and Hegerty, 2010). Of particular significance among them are exchange rates, inflation and foreign direct investment (FDI).

Export competitiveness is influenced by the exchange rate movements and the effects are based on price mechanisms. Depreciation is likely to boost exports by reducing the foreign prices, yet the impact in developing economies such as Pakistan is quite often muted because of the use of imported inputs (Auboin and Ruta, 2013). Additionally, uncertainty is brought about by exchange rate volatility, which could deter export-oriented investment (Handoyo et al., 2023). This implies that stability of the exchange rates can be as significant as its level which is not a major factor in the literature.

Inflation affects exports in terms of increasing the cost of production and macroeconomic instability. Though the majority of the studies reveal a negative association (Gylfason, 1999; Islam et al., 2025), they usually presuppose the linear impact. As a matter of fact, moderate inflation might not have much effect, but high and fluctuating inflation can greatly interfere with the competitiveness of exports. This difference is not always covered in the literature which is a conceptual limitation.

FDI has been known to aid export performance in terms of transfer of technology, development of skills, and global value chain integration (Alfaro et al., 2004; Hassan et al., 2024). Nonetheless, it has an effect that varies with the kind of investment. Vertical FDI is more likely to encourage exports compared to horizontal FDI (Farid et al., 2023). The comparatively low and sectorially concentrated FDI in the case of Pakistan restricts its overall efficiency, which indicates that merely increasing the volume of FDI inflows might not be effective without enhancing and refocusing the quality of the inflows.

2.1.3 Determinants of Export Performance at the Firm Level

The resource-based view highlights the importance of firm-level characteristics in the success of exports (Melitz, 2003). Companies that have higher levels of financial strength, technological aptitude, and managerial experience are more likely to compete in the global market (Imran et al., 2023).

Liquidity, profitability, and leverage are some of the financial aspects that determine the capacity of a firm to participate in export activities. Although liquidity and profitability justify investment and growth, excessive leverage may augment the risk in financing and limit the ability to compete in the long term (Javeed, 2018; Baghdadi and Glick, 2024).

Another influential factor is firm size, where larger firms tend to have a higher export intensity owing to economies of scale and easier access to finance (Bernard and Jensen, 2021). Nevertheless, this is not a definite rule, and smaller companies can excel by specialization and adaptability. Other existing literature tends to focus more on size but pays relatively less attention to innovation-based competitiveness of small enterprises, which suggests a possible bias in empirical research.

On the whole, firm-level research is rather insightful, but it is usually examined without any references to macroeconomic factors. Such a division restricts the possibility of a holistic view of export performance, because the actions of firms are inevitably determined by the larger economic contexts.

2.2 Empirical Literature

2.2.1 Performance and Economic Growth of the Textile Sector in Pakistan

The textile industry has always been described as a significant source of the economic growth and export earnings of Pakistan as evidenced by empirical evidence. According to Javed et al. (2016), productivity, technological capability, and policy support are the main determinants of competitiveness, with the efficiency of the firm at the firm level and macroeconomic stability.

Hussain et al. (2020) further elaborate the analysis by finding a non-linear correlation between development of textile sector and economic growth implying that the higher the sectoral growth, the less returns. This observation questions the notion of the positive contribution of textile exports being always positive and signifies the necessity to diversify and add value to the sector.

Although researchers like Baglioni (2022) highlight the role that the sector plays in foreign exchange earnings, they usually concentrate on aggregate effects without looking at structural weaknesses that underlie these numbers, including low value addition and reliance on simple textile products. This restricts the policy insights that can be obtained through these analyses.

2.2.2 Macroeconomic Determinants of Exports

The empirical evidence of macroeconomic determinants of exports in Pakistan is inconclusive. According to Islam et al. (2025), the exchange rates and inflation have significant impacts on export performance, which is consistent with theoretical expectations. The magnitude and direction of these effects however differ in studies as they vary based on model specifications and the time periods.

The relationship between exchange rate and export is complicated especially in the textile industry because of reliance on imports as the source of inputs (Antràs, 2023). Numerous studies recognize this but fail to directly measure the net impact, and thus have inconclusive results.

Most studies have found inflation in general to have detrimental effects on exports, but it has assumed it to be a homogenous constraint without considering both short-term variations and long-term trends. Likewise, the FDI evidence is still inconclusive, in part because of the low inflows and ineffective integration into the export activities.

The empirical literature, in general, is not consistent and does not reflect the interactive effects of macroeconomic variables, which emphasize the necessity of more integrated approaches to analysis.

2.2.3 Firm-Level Studies

Empirical studies at firm level emphasize the significance of financial structure and operational features in determining the export performance. Imran et al. (2023) demonstrate the effects of profitability, size, and asset structure on financial decisions of firms, which impact export capacity.

Javeed (2018) discovers that the best leverage is helpful in supporting the performance of the firm, and too much debt results in financial constraint.

These results highlight the significance of financial management in maintaining competitiveness of exports.

Nevertheless, firm-level research can usually be based on small samples and industry-specific information, decreasing its external validity. Moreover, they seldom use macroeconomic variables, which restricts their capacity to answer the question of how external conditions affect the actions of firms. This fragmentation implies the necessity to have more holistic frameworks incorporating micro- and macro-level determinants.

2.3 Methodological Approaches of the Past Research

The past researches have used diverse methodology such as regression analysis, panel data models and time series. Time series techniques, especially cointegration and error correction models are extensively employed in testing both the long and short run relationships between macroeconomic variables (Engle and Granger, 1987).

Although panel data techniques are useful in addressing the heterogeneity of the firm-level research (Imran et al., 2023; Javeed, 2018), most studies are constrained by limited time periods or methodological differences. The current study overcomes these shortcomings by using a more detailed time series model during a longer duration (19942024), which can be more robustly analyzed with long-term dynamics.

2.4 Research Gap

Although there has been a lot of research, there are still gaps. First, the current literature mainly analyzes macro and firm-level determinants independently, which do not allow a comprehensive picture of export performance. Second, numerous studies have limited the ability to examine long-term relationships and structural changes due to the short data periods (Younas and Rehman, 2021).

Third, most studies use a small number of variables, and they fail to include some significant interactions between exchange rate, inflation, FDI, and exports. Fourth, the methodological weaknesses include the inability to cope with non-stationarity, which limits reliability of the findings (Pesaran et al., 2001).

Lastly, little focus has been placed on the translation of empirical evidence into policy implications. This paper fills these gaps using a unified framework, large dataset, and a strong econometric approach.

2.5 Conceptual Framework

The research hypothesizes that exchange rate, inflation and FDI have a significant impact on the textile exports, thereby impacting economic growth. It also takes into consideration the economic growth in terms of feedback effects to export performance and macroeconomic conditions (Grossman and Helpman, 1991).

In contrast to most prior literature, this framework clearly separates long-run equilibrium associations and short-run dynamics, which is also in line with cointegration theory (Engle and Granger, 1987; Johansen, 1991). It also recognizes the possibility of the effect of structural breaks and external shocks, which are usually neglected but are very essential in the circumstances of developing economies.

3. RESEARCH METHODOLOGY

3.1 Research Design

This paper follows the quantitative research design approach based on time series econometric models to examine the linkage between textile exports and macroeconomic variables on the growth of the economy of Pakistan between 1994 and 2024. The quantitative method is suitable since it allows estimating interdependencies between variables, testing hypotheses, and determining the strength of effects (Creswell, 2014). Time series analysis is especially appropriate to study time series macroeconomic relations because it would allow dynamic behavior and structural transformation of economic variables (Gujarati and Porter, 2009).

The research design used is a longitudinal time series design in which the data is measured on an annual basis over the thirty years. This long-run time horizon makes it possible to study the equilibrium relationship across a long-run as well

as the fluctuation over a short-run, enhancing the strength and applicability of findings (Enders, 2015). Moreover, the chosen time frame consists of significant economic events like financial crises and policy reforms, which play a crucial role in explaining dynamic economic relationships (World Bank, 2023).

The analytical model is set in a well-organized sequence, including descriptive analysis, test of stationarity, cointegration analysis, and model of vector error correction (VECM), as well as the Granger causality test. The step-by-step methodology has guaranteed the rigor of methods and is common in empirical macroeconomic studies (Engle and Granger, 1987; Johansen, 1991).

3.2 Data Sources and Variable Description

3.2.1 Data Sources

The study uses secondary annual time series data from 1994 to 2024, obtained from reliable and internationally recognized sources. These include the Pakistan Bureau of Statistics (PBS), State Bank of Pakistan (SBP), Ministry of Finance, World Bank, and International Monetary Fund (IMF). The use of multiple data sources enhances data reliability and allows for cross-validation of variables (World Bank, 2023; IMF, 2022).

The dataset consists of 31 observations for each variable, which is sufficient for time series econometric analysis, particularly when focusing on long-run relationships (Gujarati & Porter, 2009).

3.2.2 Variable Description

The study includes one dependent variable and four independent variables:

Dependent Variable:

- **GDP Growth Rate (GDP):** Measured as the annual percentage change in real GDP, representing economic growth (World Bank, 2023).

Independent Variables:

- **Textile Exports (TEX):** Measured in USD billions, representing export performance of the textile sector (Maitlo & Sheikh, 2025).
- **Exchange Rate (ER):** Measured as PKR per USD, indicating international price competitiveness (Islam et al., 2025).
- **Foreign Direct Investment (FDI):** Measured as a percentage of GDP, capturing foreign capital inflows (Borensztein et al., 1998).
- **Inflation Rate (INF):** Measured as annual CPI percentage change, reflecting macroeconomic stability (Fischer, 1993).

These variables are widely used in empirical literature examining export-growth relationships (Pesaran et al., 2001).

3.2.3 Data Preparation and Transformation

Before analysis, the dataset is prepared to ensure consistency and reliability. Data cleaning includes checking for missing values, ensuring consistent measurement units, and verifying data accuracy across sources (Gujarati & Porter, 2009). Since the dataset is complete, no imputation is required.

Logarithmic transformation may be applied to variables such as textile exports to stabilize variance and interpret coefficients as elasticities (Wooldridge, 2016). Outliers are examined to distinguish between data errors and genuine economic shocks. These preprocessing steps are essential for ensuring valid econometric results (Enders, 2015).

3.3 Econometric Methodology

3.3.1 Stationarity Testing

Stationarity testing is conducted to determine whether the time series variables are stable over time. Non-stationary data can lead to spurious regression results, making statistical inference unreliable (Granger & Newbold, 1974). The **Augmented Dickey-Fuller (ADF) test** is used to test for unit roots (Dickey & Fuller, 1979).

The ADF model is expressed as:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \Sigma \delta_i \Delta Y_{t-i} + \varepsilon_t$$

The null hypothesis of a unit root is tested against stationarity. If variables are non-stationary at levels but stationary at first differences, they are integrated of order one, I(1) (Enders, 2015.

3.3.2 Cointegration Analysis

To examine long-run relationships, the study employs the Johansen cointegration test, which is

suitable for multivariate systems (Johansen, 1991). Cointegration indicates that variables share a stable long-term equilibrium relationship despite being individually non-stationary (Engle & Granger, 1987).

The Johansen approach uses two tests:

- Trace Test
- Maximum Eigenvalue Test

Lag length selection is based on information criteria such as AIC and SBC (Lütkepohl, 2005). Identification of cointegration relationships confirms the existence of a long-run equilibrium among variables.

3.3.3 Vector Error Correction Model (VECM)

If cointegration exists, a Vector Error Correction Model (VECM) is estimated to capture both long-run and short-run dynamics. The VECM integrates equilibrium relationships with short-term adjustments (Johansen, 1995).

The model is expressed as:

$$\Delta X_t = \alpha\beta' X_{t-1} + \Sigma\Gamma_i \Delta X_{t-i} + \varepsilon_t$$

The error correction term (ECT) measures the speed at which variables return to equilibrium after a shock. A significant and negative coefficient confirms convergence toward the long-run equilibrium (Enders, 2015).

3.3.4 Granger Causality Testing

Granger causality tests are used to determine the direction of relationships among variables. A variable is said to Granger-cause another if past values improve its prediction (Granger, 1969).

Within the VECM framework:

- Short-run causality is tested using lagged differenced terms
- Long-run causality is tested using the error correction term

This approach provides a comprehensive understanding of dynamic relationships among variables (Engle & Granger, 1987).

3.3.5 Diagnostic Testing

Diagnostic tests are conducted to ensure model validity:

- **Serial Correlation:** Breusch-Godfrey LM test (Breusch, 1978)
- **Heteroskedasticity:** White test (White, 1980)

These tests ensure that model assumptions are satisfied and results are reliable (Gujarati & Porter, 2009).

3.3.6 Lag Length Select

A key consideration in time series econometric modelling is that the lag length must be chosen appropriately and the data converted properly because both can have a direct impact on the soundness and accuracy of the estimated output. The choice of lag length in this study is done before cointegration and estimation of the VECM with the usual information criteria such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) and Hannan-Quinn Criterion (HQ). These criteria assist in ascertaining the best number of lags in a model that balances model fit and parsimony, that is, the model is neither over-fitted nor exhibits dynamic effects which have been omitted (Lutzkepohl, 2005). When criteria offer alternative lag proposals, the model which minimizes AIC and still renders economically significant outcomes is prioritized, as suggested in the empirical macroeconomic literature (Enders, 2015). To prevent the autocorrelation of the residual, proper lag selection is required, as well as proper specification of the cointegration test, and the Vector Error Correction Model.

3.3.7 Data Transform Process

Moreover, data transformation is also performed to enhance the statistical characteristics of the variables, as well as to create comparability across various scales of measurement. When the variables are measured in absolute form like textile exports, the logarithmic form is used where necessary to help decimate the heteroskedasticity and stabilized the variance through the years. The interpretation of the coefficients is also possible in a more meaningful form of elasticity, which is enabled by this transformation and is more suitable in economic analysis (Wooldridge, 2016). Variables that are already in percentage form like GDP growth, inflation and FDI as a percentage of GDP are not converted to a percentage to maintain interpretability. Moreover, structural consistency and smoothness of all series are verified prior to

estimation so that any extreme changes are due to effects of real economic shocks, and not irregularities in the data (Gujarati and Porter, 2009). These preprocesses increase the accuracy of the econometric findings and the fact that the dynamic relationships obtained in the subsequent phases are not skewed by the scale discrepancies or unstable variance.

3.4 Model Specification

3.4.1 Long-Run Model

This model captures the long-run relationship between economic growth and explanatory variables (Pesaran et al., 2001).

$GDP_t = \beta_0 + \beta_1 TEX_t + \beta_2 ER_t + \beta_3 FDI_t + \beta_4 INF_t + \varepsilon_t$

3.4.2 Short-Run Model

The short-run dynamics are modeled using the error correction framework:

$\Delta GDP_t = \alpha + \Sigma\beta \Delta X_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$

Where ECT represents deviations from long-run equilibrium (Enders, 2015).

3.5 Software and Implementation

The analysis is conducted using econometric software such as EViews, Stata, or R, which provide robust tools for time series analysis (Lütkepohl, 2005). These platforms ensure accuracy, reproducibility, and efficient handling of econometric procedures.

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

Table 1 shows the descriptive statistics of the variables in the years 1994-2024. This shows that the rate of growth is moderate with an average rate of 3.885 percent, but the existence of both negative and positive values with high values indicates cyclical fluctuations which are characteristic of the developing economies (Barro, 1991). The marginal difference between the mean and the median implies gentle skewness indicating some economic recessions. The central tendency of textile exports is comparatively constant but has a great dispersion, meaning it is susceptible to the national restrictions as well as external demand factors (Hussain et al., 2020). Its exchange rate is highly volatile with a consistent depreciation and macroeconomic instability effect that could affect the competitiveness of its exports (Bahmani-Oskooee and Hegerty, 2010). FDI has been low on average, implying that it is contributing little to productive capacity and export growth (Alfaro et al., 2004), whereas inflation is showing to be volatile, indicating that its macroeconomic environment is not very stable, and this can have negative impact on the growth (Fischer, 1993). In general, the variability in the variables justifies the application of innovative time series methods to be able to capture both the short-run dynamics and the long-run dynamics.

Table 1: Descriptive Analysis

Statistic	GDP Growth Rate (%)	Textile Exports (USD Billion)	Exchange Rate (PKR/USD)	FDI (% of GDP)	Inflation Rate (%)
Mean	3.885	10.638	99.636	0.959	9.500
Median	4.120	11.200	80.957	0.740	9.060
Maximum	7.830	19.330	281.000	3.040	30.770
Minimum	-1.270	4.000	31.052	0.310	2.530
Std. Dev.	2.041	4.113	66.325	0.682	6.001
Observations	31	31	31	31	31

4.2 Augmented Dickey-Fuller (ADF) Unit Root Test Results

The results of the Augmented Dickey-Fuller indicate that GDP growth becomes stationary at the level, and textile export, exchange rate, FDI and inflation become stationary after first difference. Such a combination of I(0) and I(1) variables is typical of macroeconomic time series behaviour (Nelson & Plosser, 1982) and justifies the use of Johansen cointegration methods since none of the variables are integrated of rank two.

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	Level t-Statistic	Prob.	1st Diff t-Statistic	Prob.
GDP Growth Rate	-4.160	0.003	-6.835	0.000
Textile Exports (USD Billion)	-1.313	0.610	-5.858	0.000
Exchange Rate (PKR/USD)	2.954	1.000	-3.121	0.009
FDI (% of GDP)	-2.858	0.063	-3.722	0.009
Inflation Rate	-2.702	0.085	-4.963	0.000

4.3 Johansen Cointegration Test

Both the Johansen Trace test and the Maximum Eigenvalue test prove that there is only one cointegrating relationship between the variables, therefore, a stable equilibrium in the long run. This observation indicates that GDP growth, textile exports, exchange rate, FDI and inflation are correlated in the long-run amid fluctuations in the short-run. Cointegration is however an indication of joint movement in the long-term and not the strength of individual effects, meaning that not all variables may be statistically significant in direct effect, despite being a member of the equilibrium system.

Table 3: Johansen Cointegration Test (Trace Test)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Prob.
None *	0.810	93.330	69.819	0.000
At most 1	0.590	45.149	47.856	0.088
At most 2	0.367	19.313	29.797	0.471
At most 3	0.140	6.049	15.495	0.690
At most 4	0.057	1.691	3.841	0.194

Note: Trace test indicates **1 cointegrating equation** at 5% level.

Table 4: Johansen Cointegration Test (Maximum Eigenvalue Test)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5% Critical Value	Prob.
None *	0.810	48.181	33.877	0.001
At most 1	0.590	25.837	27.584	0.082
At most 2	0.367	13.264	21.132	0.428
At most 3	0.140	4.358	14.265	0.820
At most 4	0.057	1.691	3.841	0.194

Note: Max-Eigen test also indicates **1 cointegrating equation** at 5% level.

4.5 Long Run Cointegrating Equation Results

The long-run estimates indicate that the textile exports and FDI are positively correlated with the GDP growth whereas the exchange rate depreciation and inflation are negatively correlated. These theoretically consistent signs, however, have statistically insignificant coefficients. This could be attributed to structural features of the Pakistani economy. Textile sector despite its leading export position in the country has been heavily concentrated in low value-added products which constrain its contribution to the overall economic growth (Hussain et al., 2020). Equally, the adverse effects of depreciation of the exchange rate depict the dependency of the economy on imported inputs whereby the increased cost of production offsets the increased competitiveness in exports (Bahmani-Oskooee and Hegerty, 2010). The weak impact of FDI can be explained by its low volume as well as diversification towards the export-promoting industries which limits the impact of the same on the transfer of technology and improvement of productivity (Alfaro et al., 2004). Although inflation is negatively correlated with growth, it does not seem to be a major concern in the long term implying that its impacts can be partly countered by policy measures and economic

adaptations (Gylfason, 1999). These results suggest that there are long-run relations, but their immediate influences are undermined by the structural inefficiencies and indirect transmission channels.

Table 5: Long-Run Cointegrating Equation Results

Variable	Coefficient	Std. Error	t-Statistic
GDP Growth Rate (-1)	1.000	—	—
Textile Exports (-1)	0.022	0.049	0.448
Exchange Rate (-1)	-0.006	0.007	-0.843
FDI (% of GDP) (-1)	0.083	0.162	0.510
Inflation Rate (-1)	-0.039	0.027	-1.425
Constant	-3.292	—	—

4.6 Short-Run Model of Error Correction (VECM Results)

The confirmation of the existence of the short-run dynamics and the long-run equilibrium can be attributed to the results of the Vector Error Correction Model. The error correction term is not only negative but also statistically significant and it implies that deviations of long-run equilibrium are corrected in the long run and the rate of change is relatively high (Engle and Granger, 1987). Terms of lagged GDP growth are also positive and significant indicating that there is a persistence in economic performance (Barro, 1991). Textile exports have a negative impact on growth in the short run, possibly because of the adjustment costs, supply-side limitations, and delayed export-benefits (Ali et al., 2022). The effect of exchange rate depreciation is quite adverse, which confirms the thesis that high costs of imports prevail over short-term competitiveness benefits (Krugman and Obstfeld, 2018). The effect of FDI is weakly positive, which means that there is limited contribution in the short-term, which could be because of lagged spillover effects. Inflation has both positive and negative short-run impacts with a moderate growth improving activity in the short run but long-term inflation is harmful (Gylfason, 1999). The findings underscore the short-run adjustment and long-run relationship differences, especially in the economies that are structurally constrained.

Table 6: Short-Run Error Correction Model (GDP Growth Equation)

Variable	Coefficient	Std. Error	t-Statistic
CointEq1 (ECT)	-1.826	0.505	-3.615
D(GDP(-1))	0.877	0.392	2.240
D(GDP(-2))	0.605	0.288	2.104
D(Textile Exports(-1))	-0.095	0.268	-0.354
D(Textile Exports(-2))	-0.575	0.281	-2.048
D(Exchange Rate(-1))	-0.154	0.040	-3.864
D(Exchange Rate(-2))	-0.055	0.065	-0.839
D(FDI(-1))	2.408	1.283	1.876
D(FDI(-2))	0.508	0.980	0.518
D(Inflation(-1))	0.135	0.101	1.333
D(Inflation(-2))	0.308	0.134	2.292
Constant	1.983	0.704	2.816
R-squared	**0.783**		
Adjusted R-squared	**0.633**		
F-statistic	**5.240**		

S.E. of Regression	**1.605**

4.7 Diagnostic Tests

The tests of diagnosis establish the soundness of the model. The lack of serial correlation and heteroskedasticity means that the model is well specified and the estimated coefficients can be used to make inferences (Gujarati and Porter, 2009; Wooldridge, 2016).

Table 7: Breusch–Godfrey Serial Correlation LM Test

Test Statistic	Value	Prob.
F-statistic	1.823	0.183
Obs*R-squared	4.089	0.129

Table 8: Breusch–Pagan–Godfrey Heteroskedasticity Test

Test Statistic	Value	Prob.
F-statistic	0.078	0.988
Obs*R-squared	0.366	0.985
Scaled Explained SS	0.251	0.993

4.8 Granger Causality Tests

The result of the Granger causality indicates asymmetry of the relationships between the variables. Exchange rate fluctuations also have a considerable impact on the growth of GDP and the export of textiles, which is why they are at the heart of macroeconomic performance (Bahmani-Oskooee and Hegerty, 2010). These results indicate that FDI inflows can be attributed to GDP growth, which leads to the conclusion that an improved economic performance can entice investment (Alfaro et al., 2004). Conversely, short-run growth of GDP is not a major result of textile exports, which implies that the latter can be indirect or that it would be achieved over an extended period, which is also in line with the literature on export-led growth (Adelakun, 2025). On the whole, the results serve to highlight the fact that the macroeconomic stability, especially the exchange rate regime, has a more direct effect on the growth, as compared to the expansion of exports, in isolation.

Table 9: Pairwise Granger Causality Test Results

Null Hypothesis	F-Statistic	Prob.
Textile Exports → GDP Growth	1.252	0.304
GDP Growth → Textile Exports	3.081	0.064
Exchange Rate → GDP Growth	9.347	0.001
GDP Growth → Exchange Rate	3.024	0.067
FDI → GDP Growth	1.303	0.290
GDP Growth → FDI	5.078	0.015
Inflation → GDP Growth	1.599	0.223
GDP Growth → Inflation	2.569	0.098
Exchange Rate → Textile Exports	6.399	0.006
Textile Exports → Exchange Rate	1.198	0.319
FDI → Textile Exports	0.277	0.761
Textile Exports → FDI	0.057	0.944
Inflation → Textile Exports	0.500	0.613
Textile Exports → Inflation	1.688	0.206
FDI → Exchange Rate	0.946	0.402

Exchange Rate → FDI	0.751	0.483
Inflation → Exchange Rate	0.589	0.563
Exchange Rate → Inflation	0.533	0.594
Inflation → FDI	0.814	0.455
FDI → Inflation	0.749	0.483

5. POLICY RECOMMENDATIONS AND CONCLUSION

5.1 Conclusion

The present research analytically tested the hypothesis of the relationship between textile exports and economic growth in Pakistan during the 19941924 period through advanced time series econometric models, i.e., Augmented Dickey-Fuller (ADF), Johansen cointegration, Vector Error Correction Model (VECM), and Granger causality test. The results are partly affirmative of the Export-Led Growth (ELG) hypothesis, according to which export growth is a source of economic growth, especially in developing economies (Adelakun, 2025; David Ricardo).

The descriptive analysis showed that there was a significant volatility of key macroeconomic variables, especially the exchange rate and inflation, indicating macroeconomic instability in Pakistan. The overall trend of textile exports was broadly positive, and the company is continuing to be the leader in the export structure of the country, whereas the foreign direct investment (FDI) was not high and continued to fluctuate. These results can be related to the previous research that emphasizes structural vulnerabilities and external risks of the Pakistan economy (Hussain et al., 2020).

The unit root findings were in agreement with mixed integration orders among the variables, with GDP growth being stationary at level I(0), textile exports, exchange rate, FDI, and inflation being stationary at first difference I(1). This was enough to use the method of Johansen cointegration that revealed a long-run equilibrium relationship between the variables. These results can be compared to the theoretical predictions of macroeconomic variables and export movements over time, even in the presence of fluctuations in the short-run (Johansen, 1988; Engle and Granger, 1987).

Although the long-run relationships existed, the estimated cointegrating equation revealed that textile exports and FDI had a positive but nonsignificant effect on the GDP growth, whereas exchange rate depreciation and inflation had a negative but nonsignificant effect. This implies that the tendency of relationships is in line with the economic theory, but the strength of the effects is low, perhaps because of structural inefficiency, policy inconsistency, and external shocks (Alfaro et al., 2004; Gylfason, 1999).

Conversely, the short-run dynamics as indicated by the VECM showed more refined information. The term of error correction was negative and statistically significant, which showed the presence of a strong and fast-adjustment mechanism to the long-run equilibrium. The exchange rate depreciation recorded a strong negative effect on the GDP growth in the short run, indicating the dependence of Pakistan on imported inputs, which raises the cost of production during currency depreciation (Bahmani-Oskooee and Hegerty, 2010). The export of textiles showed both positive and negative results, as in the short run, the negative effects were due to the adjustment cost and structural bottleneck, whereas FDI had weak but positive effects on growth.

The Granger causality findings also underscored the relevance of macroeconomic variables, especially the exchange rate, which portrayed strong unidirectional causality to both GDP growth and textile exports. Besides, the growth of GDP was determined to Granger-cause FDI, which signifies that economic growth is attracting foreign investment instead of being attracted by it. These conclusions are in line with empirical data indicating that macroeconomic stability and investment inflows prospects are some of the most vital determinants of investment inflows (Hassan et al., 2024).

Generally speaking, the analysis shows that the effect of textile exports on economic growth is

positive in the long term but insignificant in the short term and indirect. Macroeconomic stability, which mainly involves the management of exchange rates and inflation, is more significant in the determination of the performance of the economy. The transmission of the export to the growth is further curtailed by structural constraints, low FDI inflows, and economic volatility, which do not allow the full realization of the potential of export-led growth in Pakistan (Adelakun, 2025).

The results challenge the simplistic application of the ELG hypothesis and instead suggest that export-led growth in Pakistan is context-dependent and requires supportive economic conditions to be effective.

This study makes an important contribution by providing an integrated and long-term analysis of the export-growth relationship using a comprehensive macroeconomic framework over an extended period (1994–2024). Unlike previous studies that rely on limited variables or shorter time spans, this research captures both long-run equilibrium and short-run dynamics, offering a more nuanced understanding of the mechanisms through which exports influence growth.

5.2 Policy Recommendations

Some of the policy recommendations are given based on the empirical findings in order to reinforce the role of textile exports in the economic growth of Pakistan.

Firstly, the policymakers ought to increase the competitiveness of the textile industry by modernizing the technological advancements, infrastructure, and productivity. Export performance may be greatly enhanced through investment in sophisticated machinery, energy efficiency, and optimization of the supply chain. Industrial upgrading can also be promoted by means of government aid through the application of subsidies, tax incentives, and by granting access to low-cost financing (Arshad, 2025).

Second, exchange rate stability must be selected as one of the macroeconomic objectives. The outcomes indicate that exchange rate volatility has adverse impacts on economic growth and exports. A controlled exchange rate regime, which is facilitated by sound monetary policy and sufficient foreign exchange reserves, may be used to support competitiveness and reduce uncertainty (Bahmani-Oskooee and Hegerty, 2010).

Third, there should be enhanced policies to attract FDI. A better environment to invest in can be achieved by improving institutional quality, political and economic stability, and lessening bureaucracy. Export-oriented foreign investment, especially in the textile sector, can be increased by the development of Special Economic Zones (SEZs) and export processing zones, thus increasing technology transfer and productivity (Alfaro et al., 2004; Hassan et al., 2024).

Fourth, sustainable economic growth requires price stability. High inflation is volatile and makes production, purchasing power, and competitiveness of exports expensive. Fiscal and monetary policies ought to be coordinated to curb inflation and maintain macroeconomic stability (Gylfason, 1999).

Fifth, there is a need to reform the structures to enhance the short-run performance of textile exports. The solution to the energy shortages, better logistics infrastructure, and efficiency of the supply chains would help in lowering the cost of production and raising the responsiveness of exports. Human capital, skills training, and innovation are also essential in enhancing productivity and competitiveness (Bilal & Tanveer, 2023).

Sixth, the country should encourage the diversification of exports in order to minimize dependence on the textile industry. Although the textiles continue to be the bedrock of the Pakistan export economy, the over-reliance leaves the country prone to external shocks. The diversification into information technology, agricultural-oriented export, and manufacturing can improve the economic resilience and stability (Adelakun, 2025).

Seventh, economic growth in itself is a magnet to FDI and, therefore, the policy makers ought to be oriented towards growth-promoting policies like infrastructure, governance, and business-friendly policies. A virtuous cycle is formed by a stable and growing economy because the growth will

encourage investment, and the investment will further encourage growth (Hassan et al., 2024).

Lastly, there should be consistency in policy and strategic planning on a long-term basis. The high turnover of policies and political instability will destroy investor confidence and interfere with economic operations. Pakistan requires a consistent and rational system of industrial and trade policies, which will help the country to maintain the export-led growth and secure long-term economic growth (Nazeer & Rasiah, 2025).

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