

NON-LINEAR EXPORT INSTABILITY AND ECONOMIC GROWTH: A CASE OF PAKISTAN

Instabilidade não linear de exportação e crescimento econômico: um caso do Paquistão

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ABSTRACT

Exports are considered the driver of economic growth by making the balance of payments favorable through foreign exchange earnings. Export instability refers to the uncertainty about export earnings in the economy. These uncertainties bring a significant impact on the economic behavior, investment ability and, in turn, hurt economic growth. The focus of the study is to probe the impact of export instability on economic growth in Pakistan. Time series data is used from 1980-2019. Non-linear ARDL technique is applied for short run and long run results. It concludes that economic growth in Pakistan is positively related to gross fixed capital formation and labor force, whereas it is negatively related to the consumer price index. While export instability follows an inverted U shape. Hence policymakers need to form a threshold within which the export instability is favorable. This study is instrumental in exploring the nonlinear effect of export instability on economic growth which is helpful in determining the upper and lower limit of export volume deviations beyond which growth may hamper.

Keywords: Variable Effects Model; Volatility; Cointegration.

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INSTABILIDADE NÃO LINEAR DE EXPORTAÇÃO E CRESCIMENTO ECONÔMICO: UM CASO DO PAQUISTÃO

Non-linear export instability and economic growth: a case of Pakistan

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RESUMO

As exportações são consideradas o motor do crescimento econômico ao tornar o balanço de pagamentos favorável por meio das receitas cambiais. A instabilidade das exportações refere-se à incerteza sobre as receitas de exportação na economia. Essas incertezas trazem um impacto significativo no comportamento econômico, na capacidade de investimento e, por sua vez, prejudicam o crescimento econômico. O foco do estudo é investigar o impacto da instabilidade das exportações no crescimento econômico do Paquistão. Os dados de séries temporais são usados de 1980 a 2019. A técnica ARDL não linear é aplicada para resultados de curto e longo prazo. Conclui que o crescimento econômico no Paquistão está positivamente relacionado à formação bruta de capital fixo e à força de trabalho, enquanto está negativamente relacionado ao índice de preços ao consumidor. Enquanto a instabilidade de exportação segue uma forma de U invertido. Portanto, os formuladores de políticas precisam estabelecer um limite dentro do qual a instabilidade das exportações seja favorável. Este estudo é fundamental para explorar o efeito não linear da instabilidade das exportações no crescimento econômico, o que é útil para determinar o limite superior e inferior dos desvios do volume de exportação além dos quais o crescimento pode dificultar.

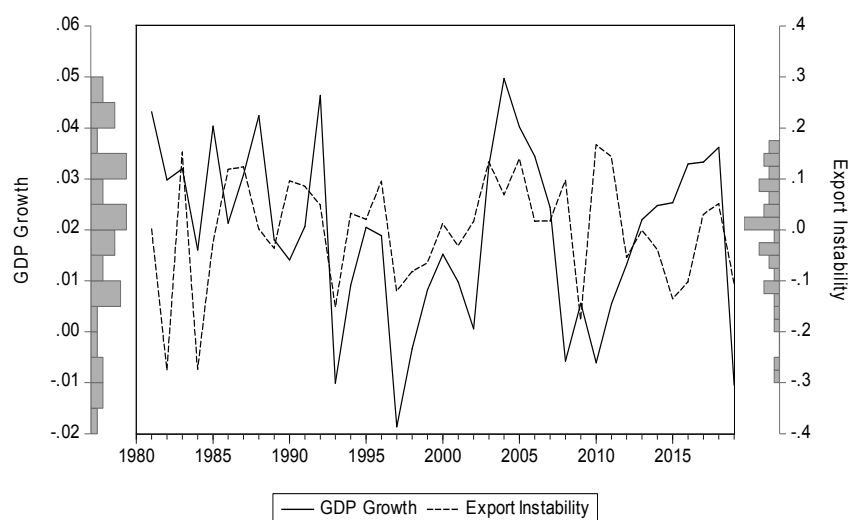
Palavras-chave: Modelo de efeitos variáveis; Volatilidade; Cointegração.

INTRODUCTION

Exports are the movement of local goods and services to another country, earning foreign exchange contributing to economic growth. Nations plan their balanced trade policy and import capital goods like machinery for development based on exports and their receipts. Exports represent the business competitiveness in the world market and regulate the balance of payments. Less developed countries are commonly exporters of primary goods, whereas developed countries typically export manufactured goods. There is strong evidence in the economic literature that explains the importance of exports for sustainable economic development. Weiss (2005) analyzed 4 South Asian economies in general. The neo-classical prescription for export development will require LDCs to specialize in the manufacture and export of those commodities whose production "they" have a competitive cost advantage (Jacob Viner 1937, p. 348, cited in Soutar 1977 p.279).

The major challenge of the developing economies is the instability of their exports and trade balance. Short-term or annual variations in export revenues around the growing trend of exports are referred to as export instability. As pointed by (Sundrum, 1967, p. 4), such instability has three features. The extent of actual divergences from trend values, whether positive or negative, is noted as instability. The trend in fluctuations, i.e., changes in the direction of times- series for several times in original form or after removing the trend factor.

Figure 1-Comparison between GDP Growth and Export Instability
 GDP Growth and Export Instability of Pakistan



Pakistan is considered an emerging economy that is highly reliant on imports for its economic stability. About 50% of the population is directly engaged in farming or agro-based activities Pakistan's export base has grown significantly from \$7.7 billion in the year 1999 to \$17.9 billion in 2008 and in 2010 \$22 billion. The Pakistan economy is heavily dependent on textiles and cotton for its export's revenue. Exports were expected to reach \$ 24.8 billion, increasing 4.2 percent from the year 2012-2013. In the fiscal year 2012 -2013 (July-March), exports were \$21 billion, up 4.4 percent from \$18 billion the previous year (Pakistan Economic Survey, 2012-13). In terms of current export markets, Pakistan's export partners expanded from 190 to 198 between 2003 and 2015, yet exports to most of these nations remain negligible. In the case of Pakistan, Figure 1 contrasts export instability and GDP growth.

Terrorist activities, political instability and global financial crisis, caused Pakistan's exports to drop considerably. The industrialization process in Pakistan has come to a halt due to a visible breakdown in foreign direct inflows, which has increased the balance of payment deficit. Pakistan's economy has the potential to exceed its existing export goal. However, some hurdles, such as currency rates, fluctuation in interest rates and higher inflation rates, may stymie the export growth process. Furthermore, rapid changes in monetary and fiscal policies, high demand for imported products, less demand for local goods, low literacy rate, and outdated technology are the factors that compel an economy to derail from achieving the export objectives. Exploring the non-linear impact of instability of export on the economic growth of Pakistan is the main objective of the present

paper while labor resource, physical capital and consumer prices are taken as control variables. This paper also attempts to suggest policy recommendations to overcome economic fluctuations in Pakistan.

Following the introduction, section 2 consists of literature review. Section 3 is a theoretical framework that built the relationship between export instability and control variables. Section 4 is dedicated to the data description and specification of the model. Section 5 is reserved for results and conclusions.

1.LITERATURE REVIEW

Development economists, particularly those who think that economic growth should be sustained and maintained, have been attracted by the relationship between performance and economic growth. Chenery and Strout (1994) argued that there is hardly any nation that showed a sustainable growth rate higher than its growth of exports for a long period of time. Exports are likely to boost economic growth in many nations, according to several studies. It fosters investment and increases factor productivity, resulting in a high rate of national income growth. Nevertheless, unstable earnings from exports may become an obstacle to economic growth. However, a lot of variation has been observed while examining the effects of export volatility on economic development (Chaudhary & Qaisrani, 2002). In developed and developing countries, the connection between export instability and economic growth has been proven in several research studies. Different types of data, time periods, and methodologies build the relationship between the two. Mentioned below is an overview of theoretical and empirical studies on the relationship between export instability and economic growth.

Trade is an international phenomenon related to export and import of a country (Ghafoor & Hanif, 2000). They highlighted the importance of exports in earning foreign exchange, economic prosperity, and economies of scale. The majority of developed countries rely on export revenues to keep their economies functioning. Exports are seen to be a source of economic growth. The link between economic performance and exports may be traced back to the forefathers of modern economic theory. The need for foreign trade for economic development was espoused by classical economists Adam Smith and David Ricardo. They highlighted the importance of specialization in a certain product and export it to nations that lack this good (Smith, 1776; Ricardo, 1817). Export growth, in particular, encourages investment into regions where the country has a competitive advantage, resulting in the adoption of new technology, higher national production, and a faster pace of economic growth. Zaidi (2005) defined the pattern of trade based upon comparative advantage in commodity production and trade for maximum possible benefits from international trade.

Exports promote economic growth through investment and productivity. Exports, according to Keynesian theory, drive growth since they are a necessary component of national income. Exports effectively utilize resources, enhance labor force, develop technology, industry innovation, and global market competitiveness (Awokuse, 2003). Exports also boost foreign exchange profits, which are used to fund the import of raw materials, capital, and technology for domestic industries crucial for economic growth (Anwar, 1985; Boltho, 1996).

Stable exports are blessings for a country, whereas unstable exports become an obstacle to economic growth and capital formation. Berrill (1960) postulated that in developing countries, expansion in export might impede economic growth. However, Myrdal (1957) argued that the gap between economic growth and capital formation could be widened by the commercial exchanges between developed and developing. Myrdal (1957) found that export consists of chiefly primary products with low market prices in developing nations. As a result of the inelastic market forces of demand and supply for exports, LDCs face higher export volatility than developed countries (Bakar, 2010). In addition, exchange rate volatility might influence economic development. Furthermore, export revenues are used to boost primary product production and expand the gap between developed and developing countries.

Depending on the volume of trade, the effects of export instability may vary from country to country (MacBean, 1966). There is also evidence that export instability, in general, is not harmful to LDCs' stable and long-term growth (MacBean, 1976). Export instability is more prevalent in developing nations than in developed countries (Glazakoz, 1973). Export instability has a statistically significant and positive influence on LDCs' real GDP per capita growth in the short run (Savidos, 1984). On the other hand, a strong positive link between export instability and economic growth were discovered (Lam, 1980). According to (Savidos, 1984), government

development plans are being affected by export earnings instability, and the reason behind that is the raising revenue are formed largely by export taxes to finance the plans from export taxes.

2. DATA AND METHODOLOGY

Notable macroeconomic objectives of a country is sustained economic growth accompanied by social development, and in this regard, exports are deemed a fundamental ingredient. Due to a lack of priority and budget allocation to export-potential industries, Pakistan's government has failed to gain the greatest benefits from natural resources. Since, 20th century, there is an almost threefold rise in public sector expenditure, government spending on the mining sector and research for natural resources have remained low. But with time, the improvement in imports and concentration on final manufactured goods and the size of the market that was low has been observed during the past few years, overall, it ranked poorly in this context.

2.1 Data description

The present study is an effort to investigate how variables (export value index, rate of consumer price index, growth rate of fixed capital formation, and rate of total labor force) affect the economic growth of Pakistan from 1980 to 2019. World Development Indicators is the source of the data. Following are the variables and their specifications.

- LNGDPPC** = Natural log of real gross domestic product per capita
- LNEVI** = Natural log of Export Value index
- LNCPI** = Natural log of Consumer Price Index
- LNGFCF** = Natural log of Gross Fixed Capital Formation % of GDP
- LNLFT** = Natural log of Total Labor Force

2.2 Theoretical model

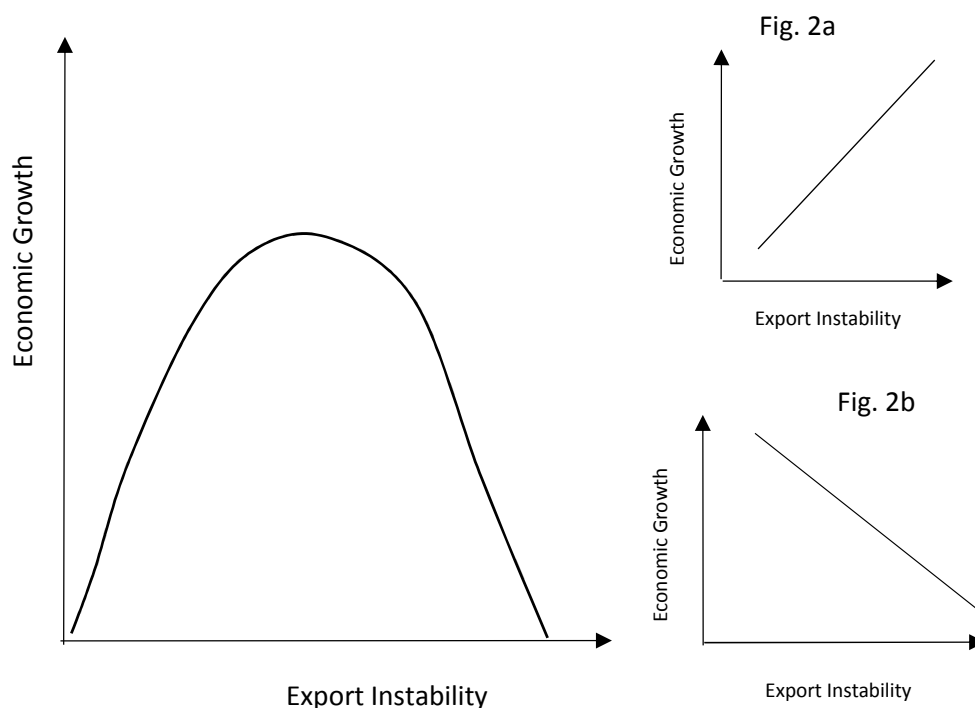
Most empirical studies tend to assume that the effect of independent variables follows constant returns to scale. This study purposes that the effect of export instability follows variable returns to scale, whereby its effect depends on its incidence. Haans et al. (2016) provided the framework of theoretically justifying variable returns to scale model, especially quadratic specification. Arshed, Munir and Iqbal (2021) applied this methodology in the field of economics.

According to this methodology figure 2 is developed. Figure 2a shows that when there is export instability, the sellers may perceive that the demand is shifting, so they tend to innovate their product accordingly, leading to an increase in economic growth. Further, figure 2b depicts that increase in export instability will hamper national economic plans for industrialization and households' plans related to consumption, which will reduce economic growth. Both positive and negative effects could co-exist, but this study hypothesizes that the positive effect is dominant at low levels of export volatility and negative effect is dominant at high levels. Thus, integrating these two behaviors form a hypothesized inverted U shaped relationship.

2.3. Estimation approach

In the first step this study had transformed the export value index (LNEVI) into its instability form. For this study, the data of LNEVI has been transformed into the instability of exports by taking the AR(1) specification based residuals. These residuals are then squared to convert the negative deviation and positive deviation towards one side and giving higher weightage to bigger deviations. This variable is named LEVIINST.

Figure 2 – Theoretical Foundation of Non-linear effects of Export instability



Further, since the data is varying across long time periods, it is expected that past values determine the present values. This property will violate the simple ordinary least square assumptions. So, this study firstly avails the unit root tests (like ADF (Dickey & Fuller, 1979) and PP (Phillips & Perron, 1988)) to ensure if the variables are stationary or not. If any one of them is confirmed to be non-stationary, this study will use the ARDL with a cointegrating bounds model (Pesaran, Shin & Smith, 2001). This model ensures that the results are not spurious and provides long-term and short-term estimates.

3.RESULTS AND DISCUSSION

Descriptive statistics of the variables are presented in table 1. Other than export instability, all the variables have a mean value higher than the standard deviation making them under dispersed. Further, all the variables are normally distributed.

Table 1- Descriptive Statistics

	LNGDPPC	LNCPI	LNEVI	LEVIINST	LNLFT
Mean	10.68	3.74	4.67	0.00	17.56
Median	10.65	3.77	4.62	0.02	17.56
Maximum	11.03	5.20	5.63	0.17	18.12
Minimum	10.30	2.33	3.27	-0.27	17.00
Std. Dev.	0.19	0.90	0.75	0.11	0.34
Skewness	-0.09	0.03	-0.33	-0.67	0.06
Kurtosis	2.14	1.76	1.91	3.07	1.72
JB Test	1.25	2.49	2.67	2.96	2.68
Prob.	0.53	0.28	0.26	0.23	0.26

Table 2- Unit Root Test

Variables	Augmented Dickey Fuller Test		Phillips Perron Test	
	I(0)	I(1)	I(0)	I(1)
LNCPI	-5.42*	-2.93*	-0.16	-3.13*
LEVIINST	-1.34	-6.65*	-1.34	-6.64*
LNGDPPC	-0.98	-4.05*	-1.35	-4.04*
LNGFCF	-5.45*	-5.21*	-1.01	-5.00*
LNLFT	0.07	-5.84*	0.05	-5.87*

*Note: * shows stationary at 1% level of significance.*

Table 2 provides the estimates of ADF and PP unit root tests. The tests show that variables like LEVIINST, LNGDPPC, and LNLFT are non-stationary at a level according to ADF test, while all the variables are non-stationary at a level. So, to continue, there is a need to estimate the cointegration test. The existence of cointegration among the variables under study can be confirmed from the bound testing (Pesaran et al., 2001). In table 3, the calculated value of the F-statistic is greater than the upper bound at a 10% level of significance, i.e., $3.89 \geq 3.35$; hence long-run relationship has been confirmed among the variables so, we can apply the ARDL approach.

Table 3 - Table: Bound Test Results

Test Statistic	Value	K
F-statistic	3.89	5
Level of Significance	Lower Critical Bound	Upper Critical Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Since the cointegration is confirmed between the selected variables before estimating the long run model, this study will ensure the presence of validity of the estimates. Table 4 provides the post regression diagnostics. Since all four types of tests are insignificant, this confirms that the model has no autocorrelation, no heteroscedasticity, no misspecification and is normally distributed.

Table 4: Diagnostic Statistics

Post Regression Diagnostics		
Breusch Godfrey – Serial Correlation LM test	Obs*R-squared = 0.56	Prob. = 0.75
Breusch Pagan Godfrey – Heteroskedasticity Test	Obs*R-squared = 8.13	Prob. = 0.83
Ramey RESET Test	F Stat. = 1.72	Prob. = 0.20
Jarque Bera Normality Test	Chi2 = 1.70	Prob. = 0.43

Further, in figures 3 and 4, the plots of both the CUSUM and the CUSUMSQ are within the boundaries, confirming the stability of mean and variance of the coefficients of the model against random shocks (Brown, Durbin & Evans, 1975).

Figure 3 - CUSUM graph

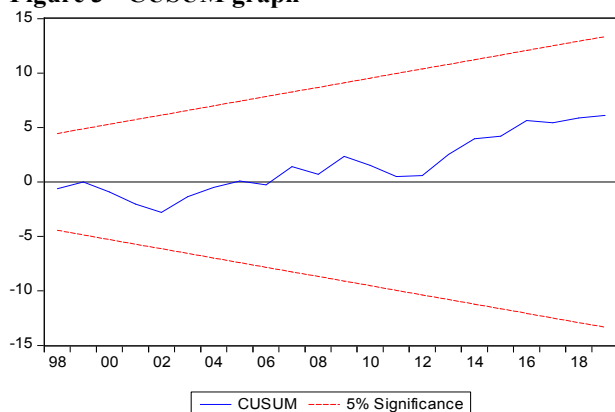


Figure 4 - CUSUM-sq graph

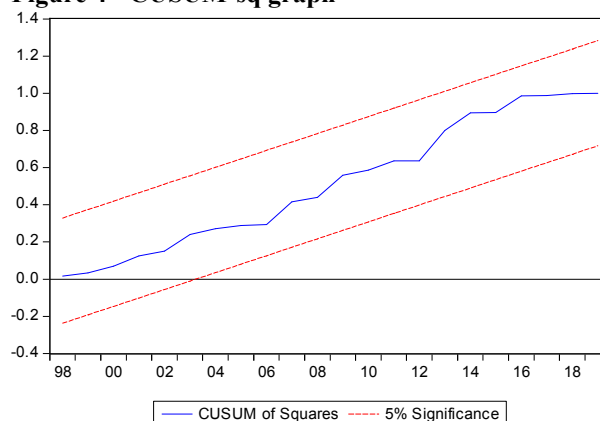


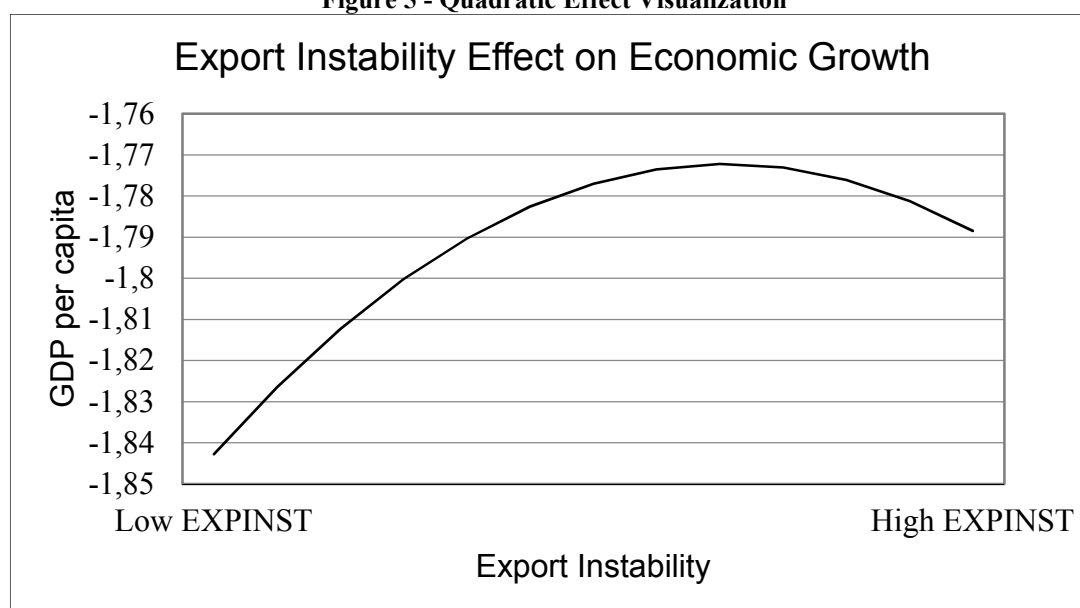
Table 5- Long Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCPI	-0.022139	0.086250	-0.256687	0.7998
LNGFCF	0.214560	0.102063	2.102228	0.0472*
LNLFT	0.686813	0.214574	3.200813	0.0041*
LEVIINST	0.163719	0.086516	1.892353	0.0717*
LEVIINST ²	-1.405617	0.557455	-2.521487	0.0194*
C	-1.777418	3.416209	-0.520290	0.6081

* significant at 10%

The long-run estimates of the non-linear ARDL model are provided in table 5. Starting with the export instability, the estimates of LEVIINST are positive, and LEVIINST2 is negative, confirming an inverted U-shaped effect of export instability on the economic growth for the case of Pakistan. These results are complying with the hypothesis developed in the theoretical model. Figure 5 plots estimates of GDP per capita against the Export Instability. This plot is developed using the mean, standard deviation, and coefficients of Export Instability. Here it can be confirmed that there is an inverted U-shaped effect of Export Instability on Economic Growth.

Figure 5 - Quadratic Effect Visualization



The coefficient of the consumer price index is negative and insignificant. The negative sign could be explained as the inflationary pressures reduce the competitiveness in the economy as higher input prices will reduce the gross domestic product per capita in Pakistan.

The coefficient of gross fixed capital formation is positive and significant that explains the availability of more capital enhances the GDP growth in the economy, which is evident from Solow's and Harrod-Domer growth models. An increase in capital formation by 1% will increase gross domestic product per capita by 0.21% in the economy. Finally, the coefficient of total labor force is positive and significant, which means that increase in the number of workers will increase the number of earners in the economy. With an increase in the labor force by one individual, there will be an increase in gross domestic product per capita by 0.68% in the economy. Furthermore, an increase in labor promotes the establishment of new markets to generate high demand, increasing the national income in Pakistan.

Table 6- Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNEVIINST	0.0266	0.0140	1.8960	0.067*
DLNEVIINST ²	-0.4816	0.2000	-2.4083	0.024*
DLNEVIINST ² (-1)	0.0975	0.1655	0.5894	0.562
DLNEVIINST ² (-2)	0.3065	0.1651	1.9635	0.062*
DLNCPI	-0.0100	0.0330	-0.2772	0.784
DLNGFCF	0.1770	0.0545	3.2470	0.003*
DLNLFT	-0.2120	0.3107	-0.6824	0.502
DLNLFT(-1)	-0.5921	0.3084	-1.9190	0.068*
ECM (t - 1)	-0.4145	0.1659	-2.4979	0.020*

* shows rejection of null hypothesis at 10% level of significance

Table 6 provides the short run estimates. The coefficient of ECM-1 is negative and significant, showing that if any shock is provided to the model using the independent variables, then the dependent variable will respond affirmatively as per the long run coefficients. Further, for 1% shock, there is a 0.41% adjustment by the dependent variable in the corresponding time period. It also represents the convergence towards an equilibrium state. In short run, variables like export instability, export instability squared, physical capital, and labor force were significant.

CONCLUSION AND POLICY RECOMMENDATION

The major determinant of the economic growth of Pakistan is the capital accumulation arriving from the approach. Thus, Pakistan is one of the import dependent economies. Most of the import receipts are financed using the export returns. The major challenge is to stabilize the export performance, mainly based on primary and agricultural goods. Our study's findings reveal a non-linear effect of export instability on the economic growth of Pakistan. Specifically, there is an inverted U-shaped relationship between export instability and economic growth, whereby a high rate of instability will deter the economic growth of the country.

Considering the estimates, policymakers need to draw a boundary line to curtail the variation in the export volume. Reducing the instability in exports will reduce its detrimental effect on economic growth. The government should enhance the competitiveness of the sector, which has potential in earning export receipts that may stabilize the export performance and further engage indigenous knowledge to achieve self-reliance against imported goods, reducing the harmful effects of export instability.

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