

# Contribution of Agricultural Exports to Economic Growth in Pakistan

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**Abstract.** The main objective of this analysis is to explore and quantify the contribution of agricultural exports to economic growth in Pakistan. We estimated the relationship between gross domestic product (GDP) and agricultural and non-agricultural exports for Pakistan using the Johansen co-integration technique for the period. The results of the study show that agricultural exports have a significant and negative effect on economic growth, while the elasticity of agricultural exports is 0.58. Furthermore, there is a bi-directional causality in agricultural exports and in real GDP. It is suggested to promote non-agricultural exports.

**Keywords:** Pakistan, agricultural exports, non-agricultural exports, Johansen co-integration, labor force

## 1 Introduction

The most important and crucial aim of the underdeveloped countries rapid growth and economic development are the most important and crucial target of underdeveloped countries and exports are generally perceived as an engine for economic growth. The desire for rapid economic growth in underdeveloped countries is achieved through increased trade. There is no shortage of empirical and theoretical studies on the role of exports in increasing economic growth and development. Classical economists such as Adam Smith and David Ricardo have argued that international trade is the main source of economic growth and that a greater economic gain is attained from specialization. According to the hypothesis of export-led growth, exports are the main source of economic growth, it has many theoretical justifications. First, in Keynesian theory, more exports generate higher income growth through the foreign exchange multiplier short run. Second, exports increase as more foreign exchange is used to purchase manufacturing goods, capital goods and technology. These things contribute to economic growth. Third, exports indirectly promote growth through increased competition, economies of scale, technological development and greater use of capacity. Fourth, many positive externalities, such as more efficient management or reduction of organizational inefficiencies, better production techniques, positive learning from foreign rivals and technical experience in product design due to higher exports, leading to economic growth. Pakistan is considered the 27th largest economy in the world because of its greater purchasing power, even if it is an underdeveloped country. The mainstay of the Pakistani economy is the agricultural sector. The main Pakistani exports include agricultural products such as wheat, rice, cotton and other important crops.

According to the Pakistan Economic Survey (2009-2010), there exhibits a mixed picture of a comparative analysis of products wise share in world and Pakistani exports is shown. The main categories of Pakistani exports remained as textile products, other products and food shares of 51 percent, 24 percent and 15 percent respectively, during 2009, while world exports in 2008 were concentrated in production, machinery, vehicles. of transport, fuels and mineral products with a participation of 67 percent, 34 percent, 23 percent and 18 percent respectively. There is a significant difference between the world's demand pattern and the items exported from Pakistan. This divergent trend indicates the presence of structural rigidities in the country's export huge of the country. The general trend in agricultural export performance remained positive in the year 2010-11. The textile sector and the food group contributed 61.8 percent and 18.1 percent respectively to overall export growth in 2010-11. The main objective of this research is to examine the contribution of agricultural exports to economic growth in Pakistan; the rest of the paper is organized as follows. Part 2 provides

the literature review. Part 3 discusses the theoretical framework, methodological questions and data analysis; the data sources and the description of the variables are reported in part 4. The results and discussion are reported in part 5, the concluding observations are offered in section 6.

## 2 Literature Review

A huge body of literature is available on the role of exports in economic growth. Over the past two decades, much empirical research has been conducted to explore the effects of exports on economic growth or the assumptions of export-led growth. These studies used time series data or cross section data with divergent conclusions. Previous studies analyzed the relationship between economic growth and exports using a simple correlation coefficient technique and concluded that export growth and economic growth were highly correlated. The second group of studies used regression techniques to examine the relationship between export growth and economic growth, considering the accounting equation of neoclassical growth. They found a positive and very significant value of the growth coefficient of the export variable. The third group of researchers such as Jung and Marshall examined the causal relationship between export growth and economic growth using Granger's causality test. Studies concluded that there was evidence of a causal relationship between export and growth. Finally, recent studies<sup>1</sup> conducted to study the impact of exports on growth by applying the co-integration technique and error correction models

We have observed that the literature focused mainly on total exports as the only source of growth, but the share of agriculture on total exports is generally substantial in underdeveloped economies. It is very astonishing that empirical research on the contribution of agricultural exports to economic growth has been largely ignored in the literature despite, its role in the development process has long been recognized. But several economists argue that rising agricultural exports play a crucial role in economic growth. Johnston and Mellor (1961) discussed the role of the agricultural sector in the economic development process in many ways. They pointed out that the expansion of agricultural exports was the main source of rising income and rising exchange rates. Levin and Raut (1997) explored the impact of exports of primary & manufacturing commodity on economic development. Commodity exports included both agricultural products and oil products. The study discuss that manufacturing exports were the main source of economic growth and that exports of primary products had a negligible effect.

Ekanayake analyzed relationship among economic and export development using error correction and co-integration models. The author had used time series data from eight developing countries. The results of the study concluded that there was a two-way causality between export growth and economic growth in all countries in development included in the analysis. Except Malaysia There has been existed strong evidence of the long-term causality of Granger in all countries.

Dawson (2005) studied the contribution of agricultural exports to economic growth in less developed countries. The author used in the two techniques. The first was based on the agricultural production function, including agricultural and non-agricultural exports. The second was the dual economy, for example agricultural and non-agricultural, in which each sector was divided into export and non-export sectors. Fixed and random effects were estimated in each model using a data panel from sixty-two least developed countries. The study provided evidence from less developed countries to support export-led growth theory. The results of the study highlighted the role of agricultural exports in economic growth. The study suggested that export promotion policies should be balanced.

Aurangzeb (2006) studied the relationship among economic growth and exports to Pakistan depend on the analytical framework. Authors tested the applicability of the hypothesis that economic growth improved with the expansion of exports by the usage time series data. The results of the study showed that the export sector had significantly more marginal social productivity high. Therefore, the study concluded that an export-oriented and outward looking approach was needed to achieve high economic growth rates in Pakistan.

Kwa and Bassoume (2007) examined the link among agricultural exports and sustainable development. The study discussed that several countries participated in agricultural exports Nadeem (2007) indicated that an empirical analysis of the dynamic influences of economic reforms and the liberalization of trade policy on the performance of agricultural exports to Pakistan. The author examined the effect of factors on domestic supply and on the external demand side on the trend of agricultural exports. The main

finding of the study was that the diversification of exports and the trade opening contributed more performance of agricultural exports. The results of the study suggested that the trend in agricultural exports is more elastic to the change in domestic factors.

Dawson investigated the contribution of agricultural exports to economic development in less developed nations. They estimate the relationship among GDP & agricultural and non-agricultural exports. The panel co-integration method was used to analyze the data set from 42 less developed nations. The results of the study indicated that there was a long-term relationship and that the elasticity of agricultural exports to GDP was 0.07. The GDP elasticity of non-agricultural exports was 0.13. The study suggested that poor nations should adopt balanced export promotion policies but rich nations could gain high economic development from non-agricultural exports.

### 3 Theoretical Framework and Methodology

The theoretical framework in order to discuss that the contribution of agricultural exports to economic growth the neoclassical and Solow discuss in the model. The neoclassical production function is specified in terms of traditional inputs such as labor and capital.

$$Y_t = f(L_t, K_t)$$

The purpose of the study is to explore how agricultural exports impact on economic growth. We extend Solow's aggregate production by incorporating both agricultural and non-agricultural exports

$$Y_t = f(L_t, K_t, X_t)$$

The following econometric model based on the equation for selected variables used in the study is presented as follows:

$$LGDP = \beta_0 + \beta_1 LLAB + \beta_2 LCAP + \beta_3 LCPI + \beta_4 LAGX + \beta_5 LNAX + \mu_t$$

To explore the short and long term relationships among agricultural exports, non-agricultural exports and economic growth, we need econometric time series such as co integration analysis, error correction models and Granger causality analysis. The problem of spurious regression arises when the variables included in the model are not stationary and the OLS estimates become inefficient. Therefore, an examination of the stationary of variables in time series data is of great importance for better results. The root of the unit is the basic test to examine the stationary properties of variables. A variable is said to be stationary of its mean, variance and automatic covariance, it remains constant regardless of where we measure them. In the literature, there is much evidence to examine the existence of the problem at the root of unity. Dickey and Fuller (1979, 1981) built a method for formal proof of non-stationarity. Dickey - Fuller (DF) is suitable if the error term ( $\mu_t$ ) is unrelated and becomes inapplicable if the error terms ( $\mu_t$ ) are related. Akaike Information Criterion (AI) or Schwartz Bayesian Criteria (SBC) are used to determine the length of the delay in the additional terms. If it turns out that the economic series are not stationary at the level and have the same order of integration based on the ADF test, the cointegration technique is used for econometric analysis. Granger (1981) introduced the concept of cointegration. Joint integration is the statistical implication of the existence of a long-term relationship between variables. Co-integration into multiple equations can only be examined with the Johansen (1981) and Johansen - Juselius (1990) approach. Johansen's co integration procedure provides two statistics. These are the LR test value based on the maximum Eigen value and the stochastic matrix trace value. To examine the model's short-term relationships, the error correction model is used. The error correction included in the model explains the long-term equilibrium adjustment rate. Furthermore, in the present study, we applied the Granger causality test to examine the causality of the variables

### 4 Data Sources and Description of Variables

The study is depend on the secondary data source and usage six variables: the GDP in millions of rupees at market prices is used as an indicator of economic growth. The present survey included two explanatory variables such as the total workforce in millions of people and the formation of fixed assets in millions of rupees as the basic variables of growth accounting. The expected effect of labor and

capital is assumed to be positive. Similarly, agricultural exports and non-agricultural exports are considered central variables of the study. The impact of agricultural and non-agricultural exports can be positive. Consumer price index, the inflation proxy is used as control variables in the present study.

## 5 Empirical Results and Discussion

Before providing a detailed but complete econometric analysis, we provide a brief interpretation of the statistical analysis. Table 1 reports descriptive statistics and interprets the average GDP at market prices of Rs 1882.152 million with a standard deviation of Rs 1888429. Average fixed capital formation is Rs 432,737 million. The median value of the workforce is 33.67 million people with a standard deviation of 9.84. On average, agricultural exports are 42001.61 and non-agricultural exports are 264460.8 million rupees.

**Table 1.** Descriptive statistics

	<b>GDP</b>	<b>CAP</b>	<b>LAB</b>	<b>CPI</b>	<b>AGX</b>	<b>NAX</b>
<b>Mean</b>	1882152	432737	33.67	67.59	42001.61	264460.8
<b>Median</b>	1030600	178646	31.6	47.3	26820	113462
<b>Maximum</b>	5867536	2310921	54.53	224.4	238324	1167394
<b>Minimum</b>	67492	8747	19.78	8.1	3366	5185
<b>Std. Dev.</b>	1888429	584630.2	9.84	54.82	49730.06	338326.6
<b>Skewness</b>	0.83	1.82	0.64	1.21	2.14	1.39
<b>Kurtosis</b>	2.38	5.56	2.19	3.5	7.78	3.65
<b>Jarque-Bera</b>	5.05	33.36	2.44	8.24	61.80	10.87
<b>Probability</b>	0.08	0.00	0.28	0.02	0.00	0.00
<b>Observations</b>	36	36	36	36	36	36

The results of the regression equation showed that the value of the determination of the coefficient  $R^2$  exceeds the value of the statistics of Durbin Watson  $d$ , or  $R^2 > d$  ( $0.99 > 0.94$ ) which creates the problem of spurious regression. Furthermore, the high  $R^2$  ratio and the significant  $t$  relationships justify the application of time series econometrics. Once the problem of spurious regression has been identified, the next step in the econometrics of time series is to examine the stationarity of variables to determine the order of integration. For this point of view, we used the augmented Dickey Fuller test built by Dickey and Fuller (1981) to estimate the unit root in all-time series variables, both at the level and in the first difference of each series with interception

**Table 2.** Results of augmented Dickey – Fuller test (ADF) for unit root

	<b>Results of Unit root test with intercept</b>			<b>Results of unit root test with trend and Intercept</b>		
	<b>Variables</b>	<b>Level</b>	<b>1<sup>st</sup> Differ conclusion</b>	<b>Level</b>	<b>1<sup>st</sup> conclusion differ</b>	
<b>LGDP</b>	-1.454	-2.897	I(1)	-1.373	-3.445	I(1)
<b>LCAP</b>	-0.987	-3.91	I(1)	-3.236	-3.739	I(1)
<b>LLAB</b>	0.325	-3.88	I(1)	-1.907	1.7904	I(1)
<b>LCPI</b>	-0.452	-4.38	I(1)	-2.402	-4.661	I(1)
<b>LAGX</b>	0.0833	-6.168	I(1)	-3.533	-7.31	I(1)
<b>LNAX</b>	-0.7869	-3.9180	I(1)	-1.2647	4.2488	I(1)

Table 2 provides the results of the ADF test which explicitly indicates that all-time series are not stationary at the level, even at a significance level of 10 percent, but the logarithmic transformations of the series are stationary for the first time. The difference and the null hypothesis of non-stationary is rejected at the 5 percent significance level. In the second step, we determine the optimal duration of the delay. We chose an optimal delay length using the automatic vector regression test based on the value of the Akaike Information Criterion and the Schwarz Criterion. In our analysis, the selected optimal delay length is 2.

**Table 3.** Unrestricted co-integration Rank test (Maximum Eigen value)

<b>Eigen Value</b>	<b>Likelihood ratio</b>	<b>5% critical value</b>	<b>1% critical value</b>	<b>Hypothesized No. of CE(S)</b>
0.5861	114.329	93.25	104.18	None *
0.4899	84.775	69.62	75.07	At most 1**
0.5184	53.577	48.31	55.46	At most 2*
0.4438	26.654	28.58	36.65	At most 3
0.4115	14.386	14.31	21.04	At most 4
0.1324	0.928	3.86	6.75	At most 5

After selecting the appropriate delay length, we applied the eigen values of the stochastic matrix of the stochastic matrix procedure of the Johansen procedure (1991) to explore the number of co-integrating vectors. Table 3 interprets the results for the co integration tests. Using the likelihood ratio test (LR), we found 3 co integrating vectors with a significance level of 5 percent. The null hypothesis of the integrated zero vector is rejected with respect to the alternative of an integrated vector. Similarly, the null hypothesis of At most 1 and At most 2 co integrating vectors is also rejected against the alternative hypothesis. The analysis concludes that there are three co integrating vectors specified in the model.

**Table 4.** Normalized co-integrating coefficients: 1 co-integrating equation (s).

<b>Variables</b>	<b>Coefficients</b>	<b>Standard Errors</b>	<b>t-statistics</b>
<b>Constant</b>	1.4098*	0.5821	2.62
<b>LCAP</b>	0.3192*	0.0485	3.59
<b>LLAB</b>	1.8080*	0.7297	2.66
<b>LCPI</b>	-0.4215	0.3779	-1.30
<b>LAGX</b>	-0.2422**	0.0859	-2.04
<b>LNAX</b>	0.6807*	0.0782	8.43

The results on the coefficients of the  $\beta$  matrices in terms of normalized integrative coefficients of the first equation are presented in Table 4. The long-term relationship between the variables is observed in the present analysis. All variables are highly significant, except for inflation. The coefficients of all variables, except participation in the workforce, are less elastic. We have found that the capital has the right sign and has a direct influence on economic growth. More specifically, a 1 percent increase in the Fixed capital formation leads to an increase of 0.22 percent of gross domestic product and is less elastic. The result is according to the economic theory of the investment multiplier. Furthermore, we have observed that the workforce directly affects economic growth. The elasticity of GDP with respect to work is not only positive but more elastic. The result of the workforce indicates that economic growth is increasing by about 1.71% due to the addition of 1% to the workforce. The results of capital and labor (the central factors in the production of growth) come to an interesting conclusion. The study reports the lower share of capital in economic growth than the share of labor in growth. The reason could be that Pakistan is a densely populated country and the workforce is constantly growing. As a result, the human capital stock is growing due to the expansion of education, skills and training facilities and the provision of better health facilities, including in rural or backward areas of the country.

In addition to these, investment in education and health has increased in the private sector with the cooperation of industrially advanced countries. Human capital is considered to be the main source of economic growth. We have found an inverse relationship between growth and inflation. The LCPI coefficient is negative (-0.32) and insignificant. The main focus of this study is on agricultural exports. Agricultural export elasticity is negative and less elastic. Gross domestic product decreased by about 0.14 percent due to a 1 percent increase in agricultural exports. The agricultural export ratio has a statistically significant impact on economic growth. The reason may be that Pakistan's agricultural exports are based on primary products rather than finished products. Therefore, the share of income in the total balance of payments of agricultural exports is very low and has no significant impact on

economic growth. Our results correspond to Levin and Raut (1997) according to which agricultural exports have an insignificant effect on growth. The study concludes that non-agricultural exports have a very significant and positive influence on economic growth. Non-agricultural exports contribute around 0.58 percent of GDP. The reason could be that non-agricultural exports mainly depend on manufactured or final products whose prices are very high in world markets. This is why the share of non-agricultural exports in foreign exchange earnings is considerable.

**Table 5.** Results of Error correction model for short run dynamics

<b>Dependent Variable = <math>\Delta</math> LGDP</b>		
<b>Independent Variable</b>	<b>Coefficient</b>	<b>t – Statistics</b>
<b>Constant</b>	0.132*	3.45
<b>D (LGDP(-1))</b>	-0.459	-1.38
<b>D (LCAP(-1))</b>	0.079	0.74
<b>D (LLAB(-1))</b>	-0.400	-0.72
<b>D (LCPI(-1))</b>	0.469	1.07
<b>D (LNAGX(-1))</b>	0.091	0.91
<b>D (LAGX(-1))</b>	-0.054	-1.32
<b>Speed of Adj ECT(1)</b>	-0.201*	-2.56
<b>R – Squared 0.58</b>	<b>Adj. R Squared 0.67</b>	<b>F - Statistics 5.96</b>

We have found long-term relationships between these variables, the possibility of a short-term association can be explored using an error correction model (ECM). The error correction model allows the introduction of the previous imbalance as independent variables in the dynamic behavior of existing variables and, therefore, it is useful for capturing the short and long term relationships between the variables. Table 5 provides the short-term dynamic relationship and the set of short-term coefficients in the vector error correction model. The error correction model associates changes in the gross domestic product record with changes in other variables and the disturbance period of the delay periods. The ECT-1 coefficient is negative and highly significant. ECT-1 shows the adjustment speed. We observed a 10 percent adjustment rate in the present analysis. This means that the 10 percentage point adjustment would take place over the long term each year.

## 6 Conclusion

The present study is an attempt to empirically examine the contribution of agricultural exports to economic growth. The empirical analysis is based on the econometrics of the historical series. It has been found in the current study that all variables are non-stationary at their level and become stationary at their first difference. The Johansen co-integration test results indicate that there is a long-term relationship between economic growth, labor force participation, agricultural exports, non-agricultural exports and the formation of fixed capital in Pakistan. The present investigation concludes that agricultural exports have no effect on economic growth. Economic growth slows as agricultural exports increase. Furthermore, we have found that non-agricultural exports have a significant and positive influence on economic growth. It is suggested that the Pakistani government make structural changes to agricultural exports by converting its agricultural exports into value added products. Pakistan is expected to export textiles instead of raw cotton. To compete in international commercial markets, the local producer must improve the quality of his products. In addition, the government should establish agriculture-based industries.

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