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Testing Export-Led Growth Paradigm for Pakistan's Agriculture Sector

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Abstract

The rationale behind this analysis is to analyze the role of agricultural exports in the economic growth of Pakistan using annual data for the period 1980 to 2010. We have estimated simultaneous equation model using Generalized Method of Moments (GMM). Empirical results of this study validate the paradigm of export led growth in Pakistan showing positive contribution of agricultural exports in achieving economic growth. The study advocates foreign income and relative export price variables as critical determinants of export demand. It is also suggestive of the fact that domestic production capacity and export prices relative to domestic wholesale prices also have a positive effect on export supply to the world market.

Key Words: Agricultural exports, Simultaneous Equation Model, GMM, GDP, Pakistan.

1. Introduction

Underdeveloped nations have adopted the export oriented policies instead of import substitution strategies over time for achieving faster and sustainable economic growth. Numerous studies in the economic literature identify exports as complementary to economic growth as it deeply helps to underpin the growth momentum and escort to more capacity utilization, perfect resource allocation, economies of scale, improve hi-tech innovations as a result of soaring rivalry in the international market. Exports of every sector represent its own importance irrespective of its linkage with industrial

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or agricultural sector.

The agriculture sector has an important role in the process of economic growth of an economy particularly with relevance to less developed nations who largely depend on their agriculture sector (Johnston and Mellor, 1961; Fie and Ranis, 1961). Many economists have unanimity of view that the overall economic growth prospect of an economy is truly subject to concrete foundation laid to its agricultural sector (Schultz, 1964). Agricultural sector always provides impetus to growth via increasing incomes of the poor people and provision of necessary resources for transformation into an industrial economy (Dowrick and Gemmel, 1991; Datt and Ravallion, 1998). Therefore, one can safely contend that investment in agriculture sector and its supporting institutions is a pre-requisite for overall economic growth (Timmer, 1995, 2002). Pakistan's industrial sector will greatly benefit from the development of its agriculture sector (Henneberry, et al. 2000). Empirical analysis reveals this fact that the most evident and distressing dilemma for less developed economies is their fruitless endeavor of making the transition to the industrialized setup without meeting prerequisites of a strongly built agricultural sector (Bhagwati and Srinivasan, 1975).

Agriculture is the main economic activity in developing countries which constitutes the main source of income for the bulk of population and is also an important source of export earnings due to high percentage share in total GDP which sets the course and success of the overall process of economic growth. Agriculture sector holds immense significance in Pakistan's economy, contributing 21.4 percent (GOP) to total GDP and employs nearly 45 percent (GOP) of the labor force. Pakistan’s agriculture exports mainly consist of rice, cotton, cotton based products, fish, fruits and wheat (FAO, 2012) that accounts for almost 65 percent of Pakistan's total earnings. Therefore, keeping in mind the importance of agriculture exports for Pakistan's economy, this study at hand analyses the role of agricultural exports in economic growth and its main determinants.

The trend of agricultural exports of Pakistan shows a certain increase in

the level of growth of almost 9.5 percent over the years.

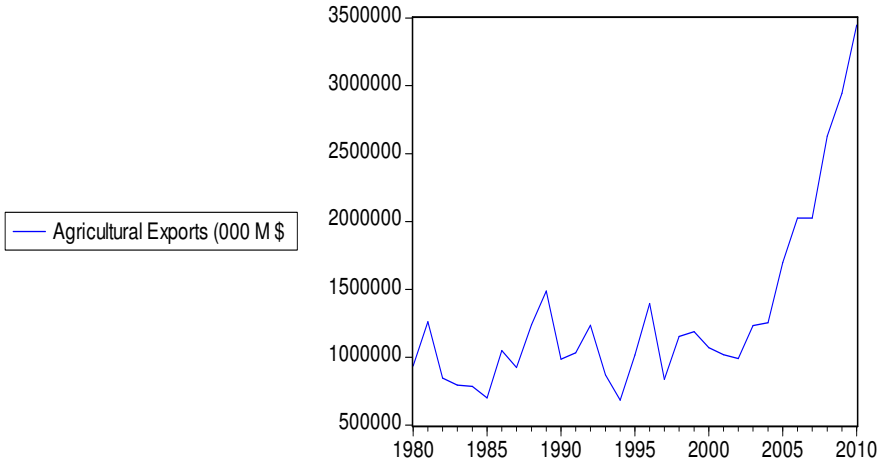

Fig. 1 Trend of Agricultural Exports of Pakistan
Source: FAO

The situation does not appear to be encouraging, especially during the interval of 1980 to 1997, where the export level shuffled across and marginal increments are followed by certain declines. The only prominent lift and consistent/smooth pattern are observed after 2002. However, the ups and downs in the agricultural exports show the presence of structural rigidities in the export sector. In this study, therefore, we attempt to analyze economic growth through agricultural exports in Pakistan.

Section 2 presents relevant literature revealing the importance of exports, Section 3 discusses analytical framework, the estimation technique and sources of data. Estimation of results is shown in Section 4. While, section 5 offers conclusion and recommendations.

2. Literature Review

The connection of exports and economic growth has widely been discussed in the economic literature and most of the researchers agree on

export led growth hypothesis. The researchers have adopted different methodologies to identify the functional relationship between exports and economic growth. The pioneer studies by Chennery and Strout (1966), Balassa (1978), Kormendi and Mequire (1985), Gonclaves, et al. (1986) use the simple correlation co-efficient technique to inspect the ELG paradigm and come to the conclusion that exports play a momentous role in uplifting economic growth. Numerous other studies using time series techniques also heed into this relational prospect including studies of Darrat, (1986); Nandi, (1991); Kunst and Marin (1989); Serletis (1992); Khan and Saqib (1993); Dorado, (1993); Ekanayake, (1999); Abdulai, et al. (2002); Shirazi, et al. (2004); Hiranya, et al. (2005); Saima, et al.(2008).

Growth in exports will lead to better utilization of available resources, creation of opportunities to enjoy the benefits of economies of scale and usage of advance technology in the production process due to higher foreign competition in the international market (Balassa, 1978). Growth in exports will help to transfer the available resources to the most appropriate sectors of the economy. Among these logical and factual benefits yielded by export growth, the economies of scale are the most appreciated one. The economies with small markets can expand their market size through exports and take advantage of economies of scale. Whereas, the element of competition would coerce the nations to filter and rectify inefficiencies in their production setup and improve the quality of products offered by them. An increase in exports is not only helpful in earning foreign exchange for the developing countries, but also creates employment opportunities for the people (Khan, 1991; Rehman, et al. 2006).

The significance of exports as an important determinant of economic growth invokes us to analyze the main determinants of exports. The study by Goldstien and Khan (1978) suggests that price and quantity should be determined simultaneously by specifying export demand (foreign income and relative export prices) and export supply equations (domestic output and prices). The foreign income, domestic output and export prices relative to wholesale prices do affect exports positively (Anwar, 1985; Roy, 1991).

Whereas, the relative export prices affect export demand negatively as the exports become costlier due to appreciation of the currency (Muscatelli, et al.1995: Sinhadji and Montenegro, 1999; Sharma, 2001).

3. Analytical Framework & Methodology

Following Balassa (1978), we have used the following export augmented Cobb-Douglas production function:

$$Y = AL^{\alpha 1} K^{\alpha 2} X^{\alpha 3} e^{u} \qquad (1)$$

where "Y" stands for Agricultural Output, "L" is an Agricultural Labor Force employed , "K" represents capital (Agricultural Gross fixed Capital Formation), "X" signifies Agricultural Exports of Pakistan and "A" is the efficiency parameter. The subscriptions α1, α2 and α3 in the presented function reflect elasticities of output with respect to L, K and X.

Taking log transformation of equation (1) to linearize it.

$$ln\ Y = ln\ A + \alpha_1 lnL + \alpha_2 lnK + \alpha_3 lnX + U \qquad (2)$$

Goldstein and Khan (1978) explicate that price and quantities should be determined by specifying export demand and export supply functions as followed:

Export Demand Equation: $X^d = \beta_0 + \beta_1 Y_w + \beta_2 P_x/P_w + \beta_3 X(-1) + U \qquad (3)$

Export Supply Equation: $X^s = \gamma_0 + \gamma_1 Y_d + \gamma_2 P_x/P + \gamma_3 X(-1) + V \qquad (4)$

Taking log transformation to linearize equations (3) and (4);

$$ln\ X^d = ln\ \beta_0 + \beta_1 ln\ Y_w + \beta_2 ln\ P_x/P_w + \beta_3 ln\ X(-1) + U \qquad (3')$$

$$ln\ X^s = ln\ \gamma_0 + \gamma_1 ln\ Y_d + \gamma_2 ln\ P_x/P + \gamma_3 ln\ X(-1) + V \qquad (4')$$

where, Xd and Xs are the export demand and export supply, Yw is the world income, Px/Pw is the relative export prices where Px stands for export price of Pakistan while Pw shows world export price. Yd is domestic capacity to produce proxied by gross domestic product. Whereas, Px/P is the relative export price of Pakistan to domestic wholesale price. The Px symbolize export price of Pakistan and P indicate the domestic wholesale price index.

3.1 Econometric Model and Estimation Technique

$$ln\ Y = ln\ A + \alpha_1\ lnL + \alpha_2\ lnK + \alpha_3\ lnX + U \qquad (2)$$

$$ln\ X^d = ln\ \beta_0 + \beta_1\ ln\ Y_w + \beta_2\ ln\ P_x/P_w + \beta_3\ ln\ X(-1) + U \qquad (3')$$

$$ln\ X^s = ln\ \gamma_0 + \gamma_1\ ln\ Y_d + \gamma_2\ ln\ P_x/P + \gamma_3\ ln\ X(-1) + V \qquad (4')$$

Generalized Method of Moments (GMM) technique is applied to estimate the above simultaneous equation model. The GMM technique is widely used in econometric estimation to assist researchers in handling the problems pertaining to serial correlation, hetroskedasticity and endogeneity of explanatory variables (Lietao, 2012). The advantage of GMM technique is to produce unbiased estimators even in the presence of lagged dependent variables as its instruments. This technique is capable of avoiding biased results due to correlation among the lagged dependent variables and error term. Augmented Dickey Fuller Test is applied to check the stationarity of related variables[1].

3.2 Data Sources

Annual time series data have been used for the analysis over the period of 1980 to 2010 for Pakistan. The data regarding total agriculture exports are taken from the Food and Agricultural Organization (FAO) in thousand dollars. The authors have obtained data on capital (Agricultural gross fixed

[1] The results are available with the author.

capital formation) and wholesale price index from the State Bank of Pakistan. The data pertaining to variables such as world GDP, dollar export prices of the world and dollar export prices of Pakistan are obtained from the source of International Financial Statistics (IFS) Year Book. All the series used have been converted into a common base year of 2000. The corresponding data of agricultural gross domestic product are obtained from the Review of Pakistan large scale manufacturing, Federation of Pakistan Chamber of Commerce (in million rupees converted into thousand dollars).

4. Empirical Results

Results of the simultaneous equation model for Pakistan advocate the positive and significant role of exports in the agricultural growth directly as a component of the increase in aggregate output and indirectly in terms of more capacity utilization, better resource allocation and economies of scale (Balassa, 1978, Awokuse, 2008). However, contradictory results have been found in studies around the world. The increase in exports will earn important foreign exchange for the developing countries to be used for import of more advanced and trendy technology for further progress in output (Chennery and Strout, 1966). As a result of any improvement in a sector or commodity export will help a nation to specialize in that agricultural commodity or sector, which will improve the productivity of the sector through internal and external economies of scale and finally this would lead to overall growth of the economy (Giles and Williams, 2000a, 2000b; Asian Development Bank, 2005).

Capital (K) has the respective positive sign showing the importance of investment in agriculture growth (Hamid, et al. 2009). The contribution of labor is having a negative sign. The poor farmers do not have enough skills and education to use modern methods and techniques still depending on those old age methods and techniques of farming not contributing enough to agricultural growth.

The reported results of export demand and export supply equations in

Table No 1
The Relationship between Agricultural Exports and Output

Production Function
*Equation 1: LnY = 10.93 + 0.17lnK** - 0.97lnL** + 0.14lnX*** + 0.91lnY (-1)*
(3.87) (6.90) (-4.02) (2.06) (24.45)
R-2 = 0.86 J-Stat (p) = 0.86
Export Demand Function
*Equation 2: LnXd = 0.74 + 0.40lnYW** - 0.76lnPx/Pw** + 0.81lnX (-1)*
(0.46) (1.95) (-2.06) (7.44)
R-2 = 0.65, J-Stat (p) = 0.71
Export Supply Function
*Equation 3: LnXs = -11.08 + 0.73lnY** + 0.53lnPx/P** + 0.91lnX (-1)*
(-1.92) (2.09) (3.33) (14.26)
R-2 = 0.63, J-Stat (p) = 0.78

the simultaneous equations model confirm the positive and momentous role of domestic and foreign income elasticities presenting agricultural exports are highly receptive to movements in domestic income. In our case, the reason for low foreign income elasticity might be our stumpy share in the international market to push relative prices of agricultural commodities down to encourage their demand. Moreover, we are inept to attain competitive edge which could help us in offering a low price for our products relative to the world. The coefficients of both the export prices of Pakistan relative to world and export prices relative to wholesale prices of Pakistan carries respective signs with significant role in export demand and supply. The negative sign of relative export prices suggests that export prices do have an impact on export demand as the commodities become expensive in the world market relative to other competitors (Goldstein and Khan, 1978; Khan and Khanum, 1993) turning out exchange rate to be an important factor in determining export demand. Whereas, there is an opportunity for the investors to export and earn more due to increase in export prices relative to domestic wholesale prices.

5. Conclusion

There are limited studies on hand in the economic literature about the crucial role of agriculture exports in Pakistan's economic development and its main determinants. Therefore, the motivation at the back of this analysis is to

analyze the export led growth (ELG) paradigm for Pakistan's agriculture sector and also highlight the main determinants of agriculture exports using annual data for the period 1980 to 2010 through Goldstein and Khan (1978) methodology by estimating the demand and supply equations simultaneously for Pakistan.

The major findings of this analysis are that it supports the export led growth in Pakistan's agriculture sector and proclaims that exports have a positive and significant role in promoting output and thus economic growth. Any increase in exports will not only earn foreign exchange but also increase the living standard of the poor people depending on agriculture sector. Furthermore, the estimated results of the determinants of exports in the model also exhibit the same outcome as was described in theory and studies conducted in this dimension. The positive role of both domestic and foreign income shows the importance of domestic production capacity in promoting export supply to the international market, provoking the role of government to utilize all the available domestic resources and constantly monitor the world economic activity so as to improve the share of agricultural exports in the world market.

The relative export price variable shows the negative effect on export demand, suggesting that any increase in Pakistan's export prices will make export commodities more expensive for the importers and thus will shrink export demand. Whereas, any increase in export prices relative to domestic wholesale prices will make it more profitable for the exporters to export more and earn higher profits. Therefore, the exchange rate plays a key role in improving export price competitiveness.

6. Recommendations

Agriculture sector plays a crucial role directly or indirectly in promoting economic growth especially in developing countries. This sector not only meets the food demand and industrial raw material it also serves as an important source of foreign exchange earnings. Having such an importance,

the agriculture sector is totally ignored at each point of time. In order to increase the incomes and living standard of the poor people living in rural areas via exports, the government needs to pay special attention to formulate such policies so as to increase agricultural exports through improvement in total factor productivity (TFP) and allot enough funds for Research and Development (R&D) purposes.

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