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The Impacts of Economic Reforms and Trade Liberalisation on Agricultural Export Performance in Pakistan

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1. INTRODUCTION

Economic reforms and trade liberalisation policies have been widely adopted in developing countries in recent years. Pakistan is no exception. This paper focuses on the effects of economic reform policies on the agricultural export performance. A number of studies have investigated the effects of trade liberalisation on export growth in developing countries, and have reached inconclusive results. Some studies have identified positive effects of trade liberalisation on export performance [Krueger (1997); Bleaney (1999); and Ahmed (2002)], others confirmed an insignificant or even a negative relationship [Greenaway, *et al*. (1994); Jenkins (1996) and Greenaway, *et al.* (2002)]. There are number of reasons for conflicting conclusions including different researchers have used different indicators for liberalisation and different methods to analyse the effect; difference in the extent of liberalisation studies; most studies have analysed scenarios rather than evaluating the effects, and so on.

The present study analyses agricultural trade policy of Pakistan and accesses the impact of trade liberalisation on agricultural export performance, especially diversification, competitiveness, and openness. The relative importance of domestic supply related factors such as tariffs, quotas, etc. compared with external demand factors in affecting agricultural export expansion is analysed with respect to (i) relative agricultural export growth, (ii) changes in market shares of (traditional) agricultural exports, and (iii) changes in the export commodity composition.

The paper discusses a model based on the framework of Authukorala (1991) and Al-Marhubi (2000). The resultant model is estimated by applying a cointegration—vector error correction mechanism (VECM) to analyse the impact of trade liberalisation on agricultural export performance, both in the short run and long run in Pakistan.

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The present study differs from earlier one in four ways. First, in this analysis we have used four indicator variables, to capture the effects of both domestic supply-side policy reforms and international market potential. Second, we have analysed the effects of trade liberalisation both in the short-run and long run rather than merely static relationship/effects. Third, unlike most previous studies our analysis evaluates the effects of trade liberalisation rather than simply describing the situation. Fourth, the main focus of analysis is to examine the effects of trade liberalisation on agricultural export performance, rather than considering the exports only from the industrial sector. Our results suggest that there is a significant contribution of the indicative variables to the agricultural export performance of Pakistan.

2. EMPIRICAL REVIEW OF THE IMPLEMENTATION OF TRADE POLICY REFORMS IN PAKISTAN

The pace of trade liberalisation in Pakistan has been patchy compared with other developing countries [Guisinger and Scully (1991)]. The first attempt to liberalise trade was made in the 1960s. Until the mid-1980s, import and export restrictions were quite harsh. The present phase of trade liberalisation was initiated in 1989. During 1995, the tariff reduced from 150 percent to zero percent and only about 70 out of 5464 goods were left on the import restricted list. All export duties have been removed, with a few exceptions (251 items in which Pakistan has a comparative advantage in the international markets).

There are three interrelated aspects that hinder trade liberalisation: a country's dependence on tariffs as a source of government revenue; the incidence of illegal trade; and dependence on imports of intermediate goods. Through the 1970s Pakistan pursued a policy of import substitution that relied heavily on high tariffs and other import restrictions. However, during the 1980s efforts were made to remove import restrictions, whereas efforts to reduce tariffs were less successful for various reasons including a high dependence on tariffs as a source of revenue. The incidence of illegal trade further undermined these efforts. This is related to the expected returns and costs; returns vary directly with the tariff structure in home country while costs vary directly with the cost of border patrol and the tariff differential in the neighbouring country.

It is well documented that Pakistan and India have not been able to reconcile their trade policy let alone pursue a common or regional trade policy. Such difficulties, along with others, have undermined full trade liberalisation in Pakistan though considerable progress has been made over time.

It is commonly believed in Pakistan that further reductions in tariffs are politically and financially hard pills to swallow: politically because of the protection of special interest groups, and financially because of its effect on revenue. For example, due to a broad reduction of all tariffs on all final and intermediate goods from 70 percent to 60 percent (1994-1995 statutory rate), the estimated loss of tariff revenue is rupees 4.8 billion or about 2 percent of total tax revenue for the aforesaid period [Lahiri, *et al*. (2000)]. While these estimates may be true, the point is that a reduction in tariffs on intermediate inputs would improve the country's export competitiveness and promote diversification and is therefore likely to more than offset the revenue loss. In fact, Ingco and Winter (1996) show that potential annual gains to Pakistan from the Uruguay Round are to the extent of US$ 538 millions to US$ 3.593 billions (at 1992 prices). These gains would result mostly from a lowering of trade restrictions from Pakistan's major trading partners rather than Pakistan's own commitment to trade liberalisation [Lahiri, *et al.* (2000)].

Apart from revenue apprehensions about liberalisation, illegal cross-border trade has been a more serious concern for Pakistan. It is pertinent to note that a high incidence of illegal trade stems directly from a high tariff structure. Illegal trade, both imports and exports, constitute a substantial proportion of total trade. For example, during 1993 estimated illegal imports were rupees 100 billion compared to legal imports of rupees 259 billions. Interestingly, in some items legal trade is virtually zero while foreign smuggled goods dominate the domestic market. For example, import of cotton products is banned, though smuggled Russian cotton and other products are freely available in Peshawar, Pakistan at much lower prices than domestic producers. Afghanistan, and to a lesser extent India, has been the traditional route of illegal cross-border trade as the cost of border protection is very high and high tariff differentials offer incentives for individuals to indulge in illicit trade.

Whatever the concerns about tariff revenue loss or border protection, the point is that intermediate imports constitute a major proportion (about 50 percent) of Pakistan's total imports. Trade restrictions or high tariffs on intermediate inputs result in higher production costs, higher mark-up prices, reduced export competitiveness, lost market share and an increase in illegal imports. Lahiri, *et al*. (2000), with an example of sheet steel, argue that the tariff on steel imports into Pakistan is very high despite recent reductions and their further reductions are desirable on both efficiency and equity grounds.

We observe that even if these quantitative results are taken to be suggestive, they support the argument that reduction of tariffs on intermediate inputs would have a significant negative impact on government revenue.

Food imports constitute the second biggest category of Pakistan's imports. Food imports are necessary for achieving national food security and making food available to Pakistan's poor at reasonable prices. Imposing tariffs or quota restrictions on food imports would not achieve these objectives.

Among the food products, milk and milk product imports constitute a major proportion of Pakistan's food import bill (next to vegetable oils and wheat). Milk imports are mainly in the form of milk products including baby formula milk, condensed and evaporated milk, and other similar formulations.[1] High fertility and population growth rates, structural changes in dietary patterns, competition from cash crops and ensuring economic development are placing increasing pressure on existing milk production systems in the Asian regions including Pakistan. This has significant implications for self-sufficiency goals in milk and meat products as well as for inter- and intra-regional trade opportunities for Pakistan.

In the past, intensification and commercialisation of milk and meat production have served to increase their production, though at a net cost to grain self-sufficiency. In Pakistan, domestic milk production contributed 89.9 percent to domestic consumption during 1992 while its production inched-up by 2.3 percent during the decade preceding this period [FAO (1994)]. Recently, structural changes have occurred in livestock production systems in Pakistan; backyard production systems have been replaced by intensification and commercialisation and Pakistan is nearly self-sufficient in milk production. Continued improvements in milk production and commercialisation of the dairy industry may see Pakistan as an exporter of milk to regional countries such as the Philippines, Malaysia, and Thailand. At present most regional countries are net importers of milk, and most of the dry and fresh milk imports are from countries such as Australia, New Zealand, and the European Union. Given these trends the impacts of trade liberalisation on inter- and intra-regional trade in milk and milk products is likely to be significant. This indicates a potential for increased reliance on imports to satisfy domestic demand.

The above-mentioned forecasts should, however, be interpreted with caution as global trade reforms and structural transformations are likely to alter regional production and trade patterns. For example, changes in relative prices of ruminant and non-ruminant meat may result in resource re-allocation and even influence the consumption preferences.

Wheat, a major staple food, occasionally constitutes the biggest food import item for Pakistan.[2] High population growth rates, stagnating productivity of irrigated agriculture, periodic droughts, changes in climatic patterns, and high illegal exports are some of the key factors responsible for Pakistan's present wheat woes. Wheat self-sufficiency has efficiency, equity, and national security implications for Pakistan. Pakistan has to improve its resource allocation and water use efficiency, along with diversification of its production systems and a change in consumption patterns if it is to address its wheat shortages in the long run.

[1]Sales of imported fresh milk in Pakistan are virtually none probably because of the need for refrigerated transport and consumption-production pattern. (Consumption is very high in hot summer while production is at its lowest ebb; supply is very high in winter due to calving season while consumption is very low.)

[2]Surprisingly, Pakistan has recently been a net exporter of wheat.

3. MODELLING THE EFFECTS OF AGRICULTURAL TRADE POLICY REFORMS ON AGRICULTURAL TRADE

In this section we analyse the effects of agricultural trade policy reforms on agricultural trade in terms of:

- export diversification,
- export competitiveness,
- openness of agricultural trade.

The relative export performance of a country depends on domestic supply and external demand conditions. The domestic supplies conditions affect export performance by upholding a country's ability to maintain its competitiveness in traditional products and by diversifying exports. In a given composition of traditional exports and its market shares, the export performance can be evaluated by analysing:

- relative export growth,
- the change in market shares of (traditional) agricultural exports, and
- the change in the commodity composition, [Authukorala (1991)].

4. SPECIFICATION OF VARIABLES

The principal variables comprising our model are: external demand conditions; competitiveness; export diversification; and openness to trade. The hypothesis is that a world demand variable will capture the net effects of external demand conditions or world market potential, while the other three variables (namely competitiveness, export diversification, and openness of agricultural trade) will pick-up the net effect of domestic supply-side factors on agricultural export performance. Thus four time series have been generated: world demand for (traditional) agricultural exports or international market potential (DW_t); competitiveness in traditional agricultural exports (CM_t); agricultural export diversification (DV_t); and openness of agricultural trade (OP_t). Let us consider the derivation of each of these four series as such.

First, world demand or export market potential for a set of traditional export commodities DW_t is measured in terms of a weighted-average index of constant price world exports of related commodities at time:

$$DW_t = \sum_{i=1}^{n} \alpha_{it} Wx_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (1)$$

where α_{it} is the share of the commodity i in the country's total agricultural exports, Wx_{it} is constant price index of world exports for commodity i, and n is the number of commodities exported.

Second, competitiveness in traditional exports, or an index of competitiveness in traditional agricultural exports, is the ratio of total real agricultural exports to total 'hypothetical' agricultural exports. Hypothetical agricultural exports are estimated by assuming that the country has maintained its initial market share in the agricultural exports of these commodities. It can be given by:

CM_t = Observed agricultural exports/initial period agricultural exports or

$$CM_t = 100\left[\frac{\sum_{i=1}^{n} X_{it}}{\sum \beta_i Xw_{it}}\right] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

For each ith main commodity, X_{it} is the agricultural export earnings of the given country; Xw_{it} indicates value of world agricultural export, where β_i is the initial-period world market share (1961–1965), where i = food, rice, fruits and vegetables, agricultural raw material, and cotton, etc. The competitiveness describes the performance of export growth as compared with other countries by improving upon it export shares in the world markets. A high values for competitiveness indicates an increase in the export shares in the world market.

Third, export diversification, DV_t, is estimated by using Gini-Hirschman formula following Athukorala (1991) and Al-Marhubi (2000):

$$DV_t = 100\sqrt{\sum_{i=1}^{n}\left(\frac{X_{it}}{\sum_{j=1}^{n} X_{jt}}\right)^2} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

where X_{it} is the value of exports of commodity I at time t. (I = food (0), rice (042), fruits and vegetables (05), sugar (061), agricultural raw material (2) and cotton (263)). The resulting values are normalised to make values range from 0 to 100. DV_t is an inverse measure of diversification (i.e., concentration). The highest likely value is 100, which indicates that the total agricultural exports are comprised of only one commodity. When the number of goods exported increases, then the value of DV_t is lower. This means when the value of DV_t is lower, it indicates that export diversification has increased.

Finally, openness of agricultural trade is measured by the ratio of agricultural exports to agricultural sector GDP. It represents the average share of agricultural exports to the agricultural sector GDP (during 1961 and 2000).

$$OP_t = \text{total agricultural exports/agricultural sector GDP} \quad \ldots \quad \ldots \quad (4)$$

5. MODEL STRUCTURE AND HYPOTHESES

Above generated four variables are used in the following model due to Kravis (1970), to explain the change in real agricultural exports (XV_t):

$$XV_t = f(DW_t , CM_t , DV_t , OP_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

In the analysis, the marginal effects of DW_t, CM_t and OP_t are expected to be positive. As DV_t is an inverse measure of diversification, we expect a negative sign for its coefficient.

If the international market conditions have an overriding effect in controlling agricultural export performance, the world-export market potential should have a strong influence in explaining changes in real agricultural exports XV_t . On the other hand, if the local supply-side conditions have a strong influence, then the volume of real agricultural exports should be mainly explained by CM_t, DV_t and OP_t .

It is to be noted that CM_t and DV_t, supply-side policy variables used in the analysis can depict the influence of non-policy factors along with domestic policy. These non-policy aspects include: resource shifting from the agricultural sector due to industrialisation, failure to extend cultivation, and limitations on diversification due to lack of new product lines. Nevertheless, the studies such as by Al-Marhubi (2000); de Pineres and Ferrantino (1997); Edwards (1993); Papageogiou, *et al*. (1991); and Chenery and Kessing (1981) have shown that domestic policies have a strong influence in gaining market share in traditional agricultural exports and export diversification as compared to the influence of non-policy factors. Based on the findings from the above-mentioned studies, it is expected that CM_t , DV_t , and OP_t would capture the effects of domestic policy on agricultural export performance.

For mapping the impact of domestic policies, however, we cannot use alternative representative variables for domestic policies due to conceptual and data difficulties as, generally, many aspects of the incentive to export can not be evaluated directly [Riedel, *et al*. (1984)]. Moreover, other incentives such as infrastructure developments, research and development in agriculture and related areas play a significant role in determining export performance. As a consequence demand effects in the model could be overestimated. However, given the constraints, the present approach seems to be more appropriate to detect the effect of supply-side factors in terms of CM_t and DV_t on the agricultural export performance.

6. MODEL ESTIMATION APPROACH

To examine the dynamic relation between the variables namely, the volume of agricultural exports, world demand or market potential for agricultural exports, export competitiveness, export diversification and openness, a cointegration vector-error-correction model (VECM) has been used. Co-integration techniques are used to establish valid long-run relationships between variables. An equilibrium relationship exists when non-stationary variables in the model are cointegrated. In simple cases, two conditions must be satisfied for variables to be cointegrated. First, the data series for each variable involved should exhibit similar statistical properties, that is, be integrated to the same order, and second, there must exist a stationary linear combination. For a time series to be stationary, its mean, variance, and covariance (autocovariance) at various lags stay the same over time.

Several studies have suggested a number of cointegration test methodologies including Hendry (1986); Engle and Granger (1987); Johansen (1988); Johansen and Juselius (1990) and Goodwin and Schroeder (1991). For our present analysis Johansen's method based on vector error correction model (VECM) has been used. It permits the testing for multiple cointegrating vectors and the estimation of them. Another advantage of this approach is that an error from one step is not carried into the rest. In addition, it does not require the prior assumption of endogeneity or exogeneity of the variables. To estimate the VECM model the following steps are followed:

Step-I: Test for Stationarity and Unit Roots

The stationarity properties and the exhibition of unit roots in the time series are substantiated by performing the Augmented Dickey-Fuller (ADF) test. This test is conducted on the variables in level and differences until the order of integration is determined. The variables that are integrated of the same order may be cointegrated.

Step-II: Model Specification

The VECM modelling procedure begins by defining an unrestricted vector autoregression (VAR) involving up to k-lags of Z_t

$$Z_t = C + A_1 Z_{t-1} + ... + A_k Z_{t-k} + e_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (6)$$

where C is an $(nx1)$ vector of constants, $Z_t = [XV_t\,,\ DW_t\,,\ CM_t\,,\ DV_t\,,\ OP_t\,]^{/}$ is $(n\times1)$ and each of the A_i is a $(n\times n)$ matrix of parameters. Now by reparameterisation Equation (5.6) can be written in the form of vector autoregressive in difference and error correction components as follow

$$\Delta Z_t = C + \Gamma_1 \Delta Z_{t-1} + ... + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-1} + e_t \quad \ldots \quad \ldots \qquad (7)$$

where as $\Delta Z_t = [\Delta XV_t, \Delta DW_t, \Delta CM_t, \Delta DV_t, \Delta OP_t]^{/}$. While $\Gamma_j \Delta Z_{t-j}$ and ΠZ_{t-1} are the vector autoregressive (VAR) component in first difference and error-correction components respectively: E_t is an $(n \times 1)$ vector of white noise error terms. Γ_j is an $(n \times n)$ matrix that includes the short term adjustment coefficients among differenced variables with k–1 number of lags, while Π is an $(n \times n)$ matrix of the long-run and speed of adjustment coefficients, which can decomposed as $\Pi = \alpha\beta^{/}$. The fist matrix α is an $(n \times r)$ matrix which contains the speed of adjustment coefficients of the error correction mechanism, while β is an ($n \times r$) matrix of cointegrating vectors such that the term $\beta^{/} Z_{t-1}$ in Equation (7) represents up to r cointegrating relationships in the multivariate model which represent long-run steady state solutions.

The model is estimated by the Johansen method of reduced rank regression. To determine the number of cointegration vectors the rank of $\Pi = \alpha\beta^{/}$ needs to be found. The number of cointegration vectors is determined by the rank of Π (denoted by r). The rank of Π can be determined by using λ_{trace} or λ_{max} test statistic. The trace statistic λ_{trace}, is given by

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \ln(1-\hat{\lambda}_i), \quad \text{for } r = 0, 1, \ldots, n-1 \qquad \ldots \qquad \ldots \qquad \ldots \qquad (8)$$

where $\hat{\lambda}_i$'s are the eigenvalues representing the strength of the correlation between the first difference part and the error-correction part in (5.7). The λ_i's are arranged as;

$\lambda_1 > \lambda_2 \ldots > \lambda_n$.

Then following hypothesis can be tested

H_0 : rank of $\Pi = r$,
H_1 : rank of $\Pi > r$.

Hence, the λ_{trace} test is designed to test the null hypothesis of r cointegrating vectors against the alternative that there are more than r cointegrating vectors.

On the other hand, the λ_{max} statistic is designed to test the null hypothesis of r cointegrating vectors against the alternative of $r + 1$ cointegrating vectors. The statistic is defined by:

$$\lambda_{max} = -\mathrm{T} \ln(1- \hat{\lambda}_{\mathrm{r+1}}), \qquad \text{for } \mathrm{r} = 0, 1, 2, \ldots, \mathrm{n}-1 \qquad \ldots \qquad \ldots \qquad (9)$$

Here the following hypothesis can be tested;

H_0 : rank of $\Pi = r$,
H_1 : rank of $\Pi = r + 1$.

Now if Π has full rank then the cointegrating-VECM approach is not appropriate as in this situation all the elements in Z_t are stationary (or trend stationary) and has no unit root, and then the error correction mechanism does not exist in the relationship. In more interesting cases where Π has a reduced rank, we estimate the model to find long-run and short-run relationships. Suppose Π does not have full rank and there is more than one cointegrating vectors. Then, we would be most interested in the cointegrating vector that is associated with the largest eigenvalue.

7. DATA SET AND SOURCES

For this analysis the annual time series covers the period from 1961 to 2000. The data sources consist of *Economic Survey of Pakistan*, *Agricultural Statistics of Pakistan, Fifty Years of Statistics in Pakistan, 1999*; and other source including *FAO Trade Yearbook* and *World Bank Yearbook of Trade Statistics*. The data for exports of major agricultural commodities from Pakistan have been collected according to the Standard International Trade Classification (SITC) as follows.

The commodities are food (0), rice (042), fruit and vegetables (05), sugar (061), agricultural raw material (2) and cotton (263). Time series for world exports are comprised of food (0), rice (042), fruit and vegetables (05), sugar (061), coffee (071), tea (074), agricultural raw material (2) and cotton (263). The quantity of exports is in terms of metric tonne, where as value of exports is in 1000 US$. In order to convert current price data into constant price time series, financial year 1980-81 has been used as the base year.

8. TEST RESULTS

Cointegration requires the variables to be integrated of the same order. So, we test the variables for unit roots to verify their order of integration. We do this through the Augmented Dicky-Fuller (ADF) test. For this test, we included intercept terms in the test regression. For all variables in log form, the null hypothesis that each series is I (1) cannot be rejected as the ADF statistics are above the critical value at 5 percent level of significance.

From Table 1, we may deduce that upon differencing, all variables become stationary at 5 percent level of significance. In order to find out the co-integration relationship among the time series the Johansen co-integration test has been applied.

Table 1

Results of Unit Root Tests

Variables	Augmented Dicky-Fuller Test	
	Variables in Level	Variables in 1st Difference
$\ln XV_t$	–1.450	–8.692
$\ln DW_t$	–1.592	–4.504
$\ln CM_t$	–2.318	–7.512
$\ln DV_t$	–2.275	–6.750
$\ln OP_t$	–0.977	–6.777

Critical values at 1 percent, 5 percent and 10 percent level of significance, the critical values for ADF test statistics are –3.58, –2.93, and –2.60 respectively when T=50. [Fuller (1976)].

For more meaningful results, the possibility of long-run equilibrium relationships among the variables in both the country models should be investigated using the Johansen procedure. In applying the procedure, a VAR lag length of 3 was included.

The cointegration test results are given in Table 2 along with the critical values of λ_{trace} and λ_{max} with k=3. The first row in the upper table tests the hypothesis of no cointegration, the second row tests the hypothesis of one cointegration relation, the third row tests the hypotheses of two cointegrating relations, and so on, all against alternative hypotheses that there are more than r cointegrating vectors ($r = 0,1,\ldots,4$) .

The 2nd column shows the eigenvalues of the Π matrix, $\hat{\lambda}$ in the descending order. The 3rd column shows λ_{trace} test statistics, while 4th and 5th column give critical values at 5 percent and 1 percent level of significance respectively. The null and alternative hypotheses, λ_{max} test statistics, and critical values at 5 percent and 1 percent level of significance are given in the last columns of the table.

Based on Johansen cointegration procedure there is one cointegration equation at 5 percent level of significance, or $r = 1$. From this analysis, we may conclude that the model variables have a long-run equilibrium relationship.

As mentioned earlier, when there is more than one cointegrating vector, the first eigenvector, which is based on the largest eigenvalue, is considered the most useful. Thus, there are non-spurious long-run relationships between the variables and VECM is a valid representation.

9. ANALYTICAL RESULTS

Using the variables such as $lnXV_t$, $lnDW_t$, $lnCM_t$ $lnDV_t$ and $lnOP_t$ an VECM is estimated. Normalising with respect to the coefficient $lnXV_t$, the cointegrating vectors associated with the largest eigenvalues yield the following cointegrating relationships;

$$
\begin{array}{lllll}
ln\hat{X}Vt = 22.64 & -0.30\ln DW_t & -0.53\ln CM_t & -1.04\ln DV_t & +0.72\ln OP_t \\
\chi^2_{(1)} & (5.795)^{**} & (22.447)^{***} & (3.762)^{*} & (27.535)^{***} \\
p\text{-value} & [0.016] & [0.00002] & [0.052] & [0.0000]
\end{array}
$$

***, ** and * indicate that the coefficient is significant at 1 percent, 5 percent, and 10 percent respectively.

Since all variables used are in the logarithmic form, the estimated coefficients can be directly interpreted as long-term elasticities. To find out whether variables $lnDW_t$, $lnCM_t$, $lnDV_t$, and $lnOP_t$ have any significant impact on the agricultural export performance in the long run, we test each of the variables individually for significance by using LR-test. The relevant values for $\chi^2_{(1)}$ statistic and p-values are given in ( ) and [ ] respectively.

Table 2

Johansen Cointegration Test

Hypotheses H_0: r	H_1: $(n-r)$	$\hat{\lambda}$ Eigenvalue	λ_{trace}	Critical Value $_{(trace, 5\%)}$	Critical Value $_{(trace, 1\%)}$	Hypotheses H_0: r	H_1: $(r+1)$	λ_{max}	Critical Value $_{(max, 5\%)}$	Critical Value $_{(max, 1\%)}$
0	5	0.764	96.29*	68.52	76.07	0	1	52.03*	33.46	38.77
1	4	0.471	44.25	47.21	54.46	1	2	22.93	27.07	32.24
2	3	0.385	21.32	29.68	35.65	2	3	17.54	20.97	25.52
3	2	0.081	3.77	15.41	20.04	3	4	3.05	14.07	18.63
4	1	0.019	0.72	3.76	6.65	4	5	0.72	3.76	6.65

* denotes rejection of the H_0 hypothesis at 5 percent 1 percent level of significance. Both λ_{trace} and λ_{max} tests indicate 1 cointegrating equation at 5 percent level of significance, when T=50.

The coefficient of the world demand ($lnDW_t$) variable is statistically significant at 5 percent, but again with a negative sign. The result suggests that the world demand variable is not playing a helpful role in the agricultural export performance of Pakistan. Coefficients on the variable; competitiveness ($lnCM_t$) at 1 percent, diversification ($lnDV_t$) at 10 percent, and openness ($lnOP_t$) at 1 percent, are statistically significant and all variables, except competitiveness ($lnCM_t$) have expected signs. This suggests diversification ($lnDV_t$) and openness ($lnOP_t$), are contributing significantly in agricultural export performance. The long-run elasticity of agricultural exports (XV_t) with respect to (DV_t) and (OP_t) is –1.04 and 0.72 respectively. The results indicate that agricultural export performance is most sensitive to diversification ($lnDV_t$), followed by openness ($lnOP_t$). The highest responsiveness of agricultural export performance to the diversification may be as a result of Pakistan's having moved away from her traditional exports to new commodities. As the new commodities meet the international standards such as sanitary and phyto sanitary, it may increase the export volume of agricultural products, which results an increase in export earnings. These results have important policy implications to improve agricultural export performance by improving her diversification, and competitiveness by exporting new products such as processed and semi-processed products and other horticultural commodities.

Table 3 gives short-run dynamic relationships and the full set of short-run speed of adjustment coefficients in the VECM, which relates the change in $lnXV_t$ to the changes in the variables such as $lnDW_t$, $lnCM_t$, $lnDV_t$, $lnOP_t$ and the error term in the lagged periods. Here the lagged difference terms for $\Delta lnDW_t$, $\Delta lnCM_t$, $\Delta lnDV_t$, and $\Delta lnOP_t$ capture the short-run changes in the corresponding level variables.

The statistics in Table 3 indicate that the short-run dynamic relationship for variables are significant for $\Delta lnCM_t$ (–1), $\Delta lnCM_t$(–2), $\Delta lnDV_t$(–3) and $\Delta lnOP_t$(–2). In absolute terms, $\Delta lnXV_t$ is most sensitive with respect to $\Delta lnDW_t$ in lagged period 3, followed by 2 and 1, with respect to $\Delta lnCM_t$ in period 2, followed by period 3 and 1, with respect to $\Delta lnDV_t$ in period 3 followed by lagged period 2 and 1, with respect to $\Delta lnOP_t$, it sensitive in period 2 followed by 1 and 3.

The results suggest in the short-run the agricultural export performance is sensitive with respect to variables DV_t, CM_t, OP_t and DW_t. The speeds of adjustment coefficients are significant at 5 percent in the equations for $\Delta lnXV_t$, $\Delta lnCM_t$ and $\Delta lnOP_t$.

These results have strong implications for Pakistan to design agricultural trade policy reforms aimed at improving agricultural export performance. In the short run the domestic policy reforms should emphasise on diversifying her exports towards new products and increasing competitiveness of agricultural products to compete in the world markets by reducing cost of production, reducing taxes on associated products, with strong governmental support for innovative research and extension, incentives and enabling policies for farmers to capitalise from diversification, incentives for private sector investment and effective market analysis.

Table 3

Results of Error Correction Estimates

	Short-run Adjustment Coefficient Γ				
	$\Delta lnXV_t$	$\Delta lnDW_t$	$\Delta lnCM_t$	$\Delta lnDV_t$	$\Delta lnOP_t$
$\Delta lnXV_t(-1)$	–0.160	0.044	–0.003	0.095	–0.190
	[–0.607]	[0.342]	[–0.008]	[0.825]	[–0.349]
$\Delta lnXV_t(-2)$	–0.136	0.074	0.430	0.024	0.500
	[–0.657]	[0.728]	[1.281]	[0.270]	[1.164]
$\Delta lnXV_t(-3)$	0.134	0.042	0.535**	0.055	0.849*
	[0.757]	[0.483]	[1.861]	[0.710]	[2.313]
$\Delta lnDW_t(-1)$	–0.268	0.169	0.131	0.077	–0.606
	[–0.513]	[0.660]	[0.155]	[0.340]	[–0.561]
$\Delta lnDW_t(-2)$	0.461	–0.009	–0.0513	–0.353	–0.296
	[0.865]	[–0.036]	[–0.059]	[–1.512]	[–0.269]
$\Delta lnDW_t(-3)$	–0.486	0.134	0.7388	0.173	1.824**
	[–1.038]	[0.585]	[0.972]	[0.844]	[1.880]
$\Delta lnCM_t(-1)$	–0.638**	–0.512**	–0.6680	0.092	–1.535
	[–1.794]	[–2.936]	[–1.159]	[0.591]	[–2.086]
$\Delta lnCM_t(-2)$	0.773**	–0.129	–0.4882	–0.126	–1.693**
	[1.997]	[–0.681]	[–0.778]	[–0.745]	[–2.113]
$\Delta lnCM_t(-3)$	0.338	0.216	–0.6664	0.082	–0.104
	[0.843]	[1.097]	[–1.023]	[0.466]	[–0.126]
$\Delta lnDV_t(-1)$	–0.409	–0.461	–0.1698	–0.501**	–1.108
	[–0.709]	[–1.628]	[–0.181]	[–1.984]	[–0.928]
$\Delta lnDV_t(-2)$	1.013	–0.268	–0.0934	–0.185	–1.987
	[1.505]	[–0.813]	[–0.085]	[–0.629]	[–1.427]
$\Delta lnDV_t(-3)$	1.254**	0.045	–0.6320	0.120	–0.514
	[2.090]	[0.152]	[–0.650]	[0.457]	[–0.414]
$\Delta lnOP_t(-1)$	0.463	0.380**	0.1531	–0.084	0.834
	[1.622]	[2.713]	[0.330]	[–0.673]	[1.411]
$\Delta lnOP_t(-2)$	–0.736*	0.087	–0.0903	0.114	0.605
	[–2.345]	[0.567]	[–0.177]	[0.832]	[0.932]
$\Delta lnOP_t(-3)$	–0.110**	–0.247	0.5248	–0.068	–0.107
	[–0.324]	[–1.4860]	[0.953]	[–0.458]	[–0.153]
C	0.110**	–0.013	–0.1296	–0.003	–0.125
	[2.281]	[–0.587]	[–1.659]	[–0.169]	[–1.254]
	Long-run Adjustment Terms				
	$lnXV_t$	$lnDW_t$	$lnCM_t$	$lnDV_t$	$lnOP_t$
	–0.676**	0.004	1.131**	–0.132	1.541**
	(–1.947)	(0.026)	(2.012)	(–0.873)	(2.145)

Figures in parenthesis are *t*-statistics. The tabulated values for *t*-stat at 5 percent ** and 10 percent *** level are 2.0421 and 1.697 respectively.

10. POLICY IMPLICATIONS

The above findings suggest that domestic policies affecting supply-side performances can have a positive influence on export performance, as these can enable developing countries to achieve a better export performance even if world demand influences fail to translate into higher export demand. This leads one to lean towards the hypothesis that developing countries can attain considerable success in boosting their agricultural exports through pursuing front-end and pro-active supply-side policies. These findings are supported by Athukorala (1991); Kravis (1970); Diaz-Alejandro (1975), and Bhagwati and Srinivasan (1979). As Kravis (1970) mentioned, restricted policies such as high tariffs, non-tariff barriers (NTB), overvalued/multiple exchange rates etc., hindered the expansion of traditional exports. The findings of studies like Balassa, *et al.* (1971) and Little, *et al.* (1970) found that the relaxation of trade restrictions has improved the export performance of both traditional and non-traditional commodities in developing countries in the 1960s.

The present analysis corroborates the above findings that economic reform/trade liberalisation; competitiveness, diversification and openness have significant effects on the agricultural export performance of Pakistan.

The analytical results suggest significant policy implications for policy-makers. The evidence supports the conclusion that reforms in domestic policies are crucial to stimulate agricultural export performance in Pakistan. For a rapid expansion of agricultural exports, the agriculture policy should incorporate trade policy as one component to promote agricultural trade both in the domestic and world markets by improving terms of trade for primary commodities to the extent that government can influence agriculture's terms of trade in this context and by shifting production possibility frontiers through the introduction of new export crops that are like product innovations. The agricultural policy would be focused on fostering diversification into high value added crops such as fruit and vegetables etc. The farmers could be given incentives to improve the quality and standard of produce, for example by providing refrigerated containers and efficient transportation system, by establishing agro-processing industries to increase shelf-life of the products and by providing market supports, according to international criteria and requirements, to enhance products' competitiveness in the world markets. Attaining the objective of agricultural export diversification needs reorientation of government and private expenditures on R&D and extension services, re-organisation of these institutions and handing over to farmers both embodied and disembodied components of modern technologies and to encourage adoption of new crops and diversify agricultural systems.

11. CONCLUSION

This paper has analysed the dynamic effects of economic reforms/trade liberalisation on agricultural export performance of Pakistan. In this analysis, we have examined the impact of both domestic supply-side factors and external demand on the agricultural exports performance. Our results suggest that agricultural export performance is more sensitive to the domestic factors, which change due to economic reforms. This supports the importance of domestic policies designed to improve domestic supply conditions aimed at promoting agricultural export performance.

The results indicate that the effects of economic reforms/trade liberalisation policies on agricultural exports performance seem to be lagged in the case of Pakistan and relatively modest. This is due to the fact that the degree and extent of implementing economic reforms/trade liberalisation policies is an ongoing phenomenon and cannot have immediate effect to shift to free trade. The main empirical finding of our analysis is that export diversification and openness play a key role in agricultural export performance.

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