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Export Diversification and the Structural Dynamics in the Growth Process: The Case of Pakistan

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1. INTRODUCTION

In the present paper we have tried to examine Pakistan's experience with exports and growth by constructing several measures of diversification and structural change in Pakistan's exports from a dis-aggregated data over a period of 27 years (1972-73 to 1997-98). Then using these measures we have tested a number of relationships among the structure of exports, export growth, aggregate growth, and world growth. By looking at the evolution and structural change of exports by sectors over the long run, we find a number of interesting results. First, the degree of export diversification increased sharply from 1979 and continued till 1985. After 1985, and with the return of the democracy in the country. There was a marked reduction in the export diversification and it went back to pre-1979 level. Secondly, a crude association of 'traditionality' with primary products and 'non-traditionality' with manufactured exports fails to represent Pakistan's experience. As Pakistan emerged from an import substitution period into a period of structural change and free trade, its true comparative advantage was more visibly expressed, thus some manufactured exports declined while some primary products grew. Third, the short-run dynamics of diversification and structural change show a marked pattern. Most change in the composition of exports has taken place during periods of boom in the domestic economy but when the world economy was experiencing a relatively recessionary period.

The analysis of export-growth relationship rejects the hypothesis of export-led growth. Instead our results reveal that growth leads exports in case of Pakistan. The

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Authors' Note: The views expressed in this paper are of the authors and not of the organisations where they are employed.

other interesting finding of the analysis is that, contrary to what is generally believed in Pakistan and what is also shown in some of the studies, imports do not play any significant role in explaining the export-growth relationship.[1]

The plan of the paper is as follow. Section II presents the review of literature. In Section III we have discussed the issue of traditionality and diversification. Section IV presents the methodology and results of the export-growth relationship and the role of export structure in the growth process. Section V concludes the paper.

2. REVIEW OF LITERATURE

The debate between import substitution and export promotion as strategies for fostering industrialisation and hence economic growth/development is long-standing and still far from resolved. The notion of export promotion entails a neutral strategy with no bias against exports. Neo-classical economists and the international financial institutions like the World Bank have long being arguing that export-led growth or a policy of getting the prices right represents the best option for less developed countries. Out-ward orientation is said to lead to higher total factor productivity (TFP) growth through (a) fostering greater horizontal specialisation as each firm concentrates on a narrow range of products; (b) offering greater economies of scale due to an enlargement of the effective market size; (c) affording greater capacity utilisation in industries in which minimum efficient size of plant is larger relative to the domestic market; and (d) increasing the rate of capital formation and technical change [Yaghmaian (1994); Ram (1987); Bhagwati (1988) and Krueger (1978)]. The pressure of competition in the world market may lead to better product quality and force domestic production to reduce inefficiencies.

On the other hand there are many studies which have challenged the results of the empirical literature in support of the neo-classical theory of export-led growth [Yaghmanain (1994); Pack (988, 1992) and Dodaro (1991, 1993)] in recent years. In these studies it has been demonstrated that in most countries, now known for their outward orientation, the process of industrialisation and capital development was initiated with the adoption of import substitution and inward looking policies. In many cases import substitution has been a prelude to export promotion. For example, South Korea, Turkey, Chile, Israel, and all most all the other countries labelled by the World Bank as outward-oriented in their trade policy, have experienced a long period of import substitution prior to entering the export markets.

The theory of export-led growth has also been challenged for its formulation of causality between exports and economic growth. The new classical contention that causality runs from export to growth, has been subject to theoretical and

[1]Reizman and Whiteman (1996) shows that imports play an important role in the export-growth relationship in many countries that are analysed.

empirical scrutiny in recent years. Using the tests developed by Granger (1969); Jung, Peyton and Marshall (1985) have investigated the direction of causality between exports and economic growth for 37 countries and have found statistical support for export-led growth hypothesis in only four countries. These four countries[2] are not included in any of the groups of newly industrialised countries known for their fabulous export performance. Similar results were found in more recent paper by Dodaro (1993).

In the present paper, besides constructing various measures to capture structural change and diversification in Pakistani exports, we have examined export-growth relationship by performing Granger causality tests. Our work is different from all the earlier work (especially on Pakistan) in that we carry this analysis beyond the standard (two-variable) methods of detecting export-led growth hypothesis. The idea is to take into account other important and relevant variable that might have a bearing on the export growth relationship. Other studies have typically focused on the bi-variate relationship.[3] Moreover, we have made use of the measures of diversification in both export and growth equations. The idea is to test whether export diversification plays any significant role in the growth process in Pakistan.

3. TRADITIONALITY AND DIVERSIFICATION

We analyse two-digit export data for the period 1973-1998. The purpose of this section is to derive empirical measures of the degree of traditionality of the specific export industry as well as measures of the extent of export diversification and structural change in Pakistan's export. Let e_{it} represent exports by industry i in year t, expressed in constant (1981=100) US $. To begin with we have calculated a cumulative export experience function for each commodity. This is obtained by the following formula

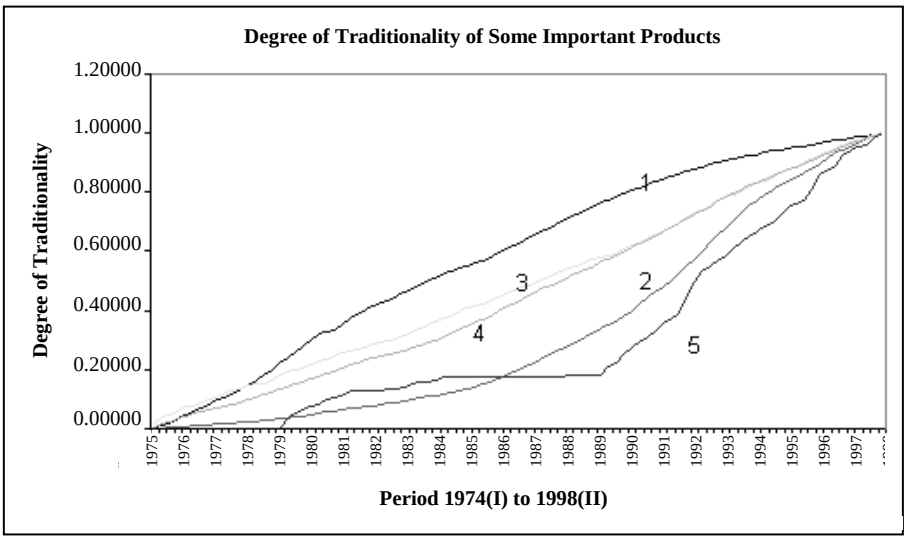
$$C_{it} = \sum_{i=to}^{t} e_{it} \Big/ \sum_{i=to}^{t1} e_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where t_0 and t_1 represents the initial and terminal period of the sample.

The index C_{it} has properties similar to that of a cumulative distribution function; it takes on values at or close to 0 at the beginning of the period and rises to 1 in the final year. We have plotted values of C_{it} for different industries together (Fig.1). An industry whose export experience is concentrated earlier in the period could be differentiated from an industry whose export experience was concentrated later in the period.

[2] Indonesia, Egypt, Costa Rica, and Ecuador.

[3] Exceptions are Serletis (1992), who includes imports; Ghartey (1993), who includes the terms of trade and the capital stock; and Marin (1992), who study the causal relationship between productivity, export growth, terms of trade and OECD output.



1. Carpets, 2. Leather, 3. Footwear, 4..Medical Instruments, 5. Fruit and Vegetables.

Fig. 1.

It is common to call an industry traditional (non-traditional) if its export experience is skewed to left (right). There are several ways to test the null hypothesis that the two industries have identical cumulative export experience functions against the alternative that one of the industries is more traditional [Gutierez *et al.* (1997)]. Among these, the most straightforward method of ranking exports by traditionality is to construct the mean of the cumulative export experience index for each industry in the following manner

$$T_i = \sum_{i=t0}^{t1} Cit \Big/ (t_1 - t_0 - 1 \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (2)$$

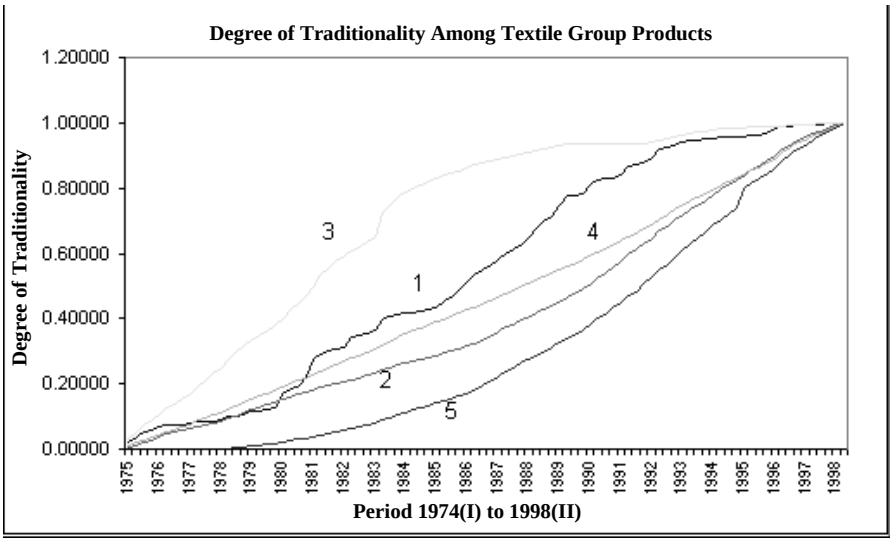
More traditional industry will have a higher score for T_i. We have calculated traditionality scores T_i for 28 two-digit exporting industries. These scores are presented in Table 1. It is easy to reject the null hypothesis that all exports followed the same pattern of historical growth. For example, Fruit and Vegetable, the 12th least traditional industry is less traditional than Petroleum Products, the 24th least traditional industry. An important point to note about these traditionality indices in Pakistan is that it is a mistake to identify primary products with 'traditionality' and manufacturing with 'non-traditionality' as defined above. In Pakistan primary product industries including Fruit and Vegetables, Leather, and Fish are among the newest successful exports, while Carpets, Footwear, and Medical Instruments are relatively 'traditional'. This may well be due to technological change in processing and transport of perishables. Anecdotal evidence suggests that improvement in refrigeration and storage technology in recent years have made feasible the transport of fruit and vegetable and fish over longer distances.

Table 1

Ranking of Exporting Industries According to Their Level of Traditionality

Rank	Product	Ti	Var (Ti)	Cum. T Exp.
1	F and V Prep.	0.3020	0.0898	44
2	Clothing	0.3276	0.1057	5437
3	L. Manu.	0.3365	0.1076	1611
4	Text. Fabrics	0.3531	0.1042	2357
5	Sports goods	0.3941	0.0783	1147
6	C. Yarn	0.4236	0.0915	7378
7	Medical Ins.	0.4647	0.0936	729
8	C. Fabric	0.4719	0.0853	6694
9	Chemicals	0.4848	0.1189	354
10	Molasses	0.4874	0.0956	465
11	Footwear	0.4920	0.0834	313
12	F. and Veg.	0.4920	0.1203	504
13	F. and F. Prep.	0.5164	0.0971	1300
14	Guar Prep.	0.5298	0.1196	360
15	Leather T.	0.5315	0.1015	2568
16	Spices	0.5528	0.1208	172
17	R. Cotton	0.5561	0.1180	4976
18	Mach. and Transp Eqp	0.5616	0.1234	306
19	Carpets	0.5908	0.0975	2722
20	Fish Prep.	0.5911	0.1082	63
21	Guar Prod.	0.5920	0.1563	12
22	R. Wool	0.6011	0.1009	221
23	Rice	0.6286	0.0863	6291
24	Pet. Products	0.6606	0.1422	731
25	Tob. Manf.	0.6607	0.0984	138
26	C. Thread	0.7174	0.0946	105
27	Hide and Skin	0.8377	0.0614	29
28	Tobacco Raw	0.8578	0.0398	82

Another important aspect of the Pakistani exports is that they were concentrated mostly in primary or semi-manufactured categories of products for most of the period. Results of the export-experience analysis reveal that even within textile group, which is the largest industry in Pakistan, the emphasis in the early period was on low value and labour intensive products (such as cotton and cotton yarn).



1. Raw Cotton; 2. Cotton Yarn; 3. Cotton Thread; 4. Cotton Fabric; 5. Readymade Garments.

Fig. 2.

As shown in Figure 2, high value added products like (readymade garments) have received attention only in the later part of the period under our consideration, i.e. their export experience is skewed to the right. In order to capture the medium-run structural change, short-run structural change and the static specialisation/ diversification of the composition of exports, we have closely followed Gutierez *et al.* (1997) to generate these three measures.

The first measure, TRAD5, is the variance of the traditionality index calculated across industries. This measure is constructed by using five-year intervals rather than the full sample period.[4] Thus we have value for TRAD5 from 1975 to 1996; the value of 1975, for example, is the variance of the 28 industry values of T_i obtained using the period 1973 to 1977 as a reference period. Higher values of TRAD5 imply that the industries experienced relatively divergent pattern of export growth during the period. Therefore, higher variance is interpreted as an episode of structural change centred on the period in question. A low variance implies that the composition of exports was relatively stable over the 5-year period.

The second measure, *CSX*, is a measure of the change in export composition taking place in a single year. It is calculated as

$$CSX = \sum_{i=1}^{28} \min(s_{i-t}, s_{i,t-1}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

[4]This is conceptually different from the within industry variance presented in Table 1, which can be used to test the difference between industry means in traditionality.

where $s_{it} = e_{it} / \sum e_{it}$, the share of industry *i*'s exports in national exports in year *t*. A value of CSX close to 1 implies that there is very little change in export composition while if it is close to zero than that means that a country has exported a portfolio of goods, none or very little of which were exported in the previous year. High value of *CSX* indicates short-run instability in export composition. Finally, static measure of specialisation, *SPECL*, is calculated as

$$SPECL = \sum_{i=1}^{28} (s_{i,t})^2 \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \qquad (4)$$

in a manner analogous to the Herfindahl-Hirschman index used to measure industrial concentration. A score approaching 1 implies reliance on a single export (a high degree of specialisation), while a score approaching 0 implies a high degree of export diversification.

Figure 3 shows the behaviour of Pakistan's export diversification index (*SPECL*) over time. The initial period represents Z. A. Bhutto's socialist regime. Around 1980, the index begins a sustained decline and this pattern continued till 1985, the year that marked the returned of the democracy in Pakistan. After 1985 the return journey towards relatively less diversification started and the index became volatile in the subsequent years, but generally the level of diversification in exports was reduced to pre-1980 levels.

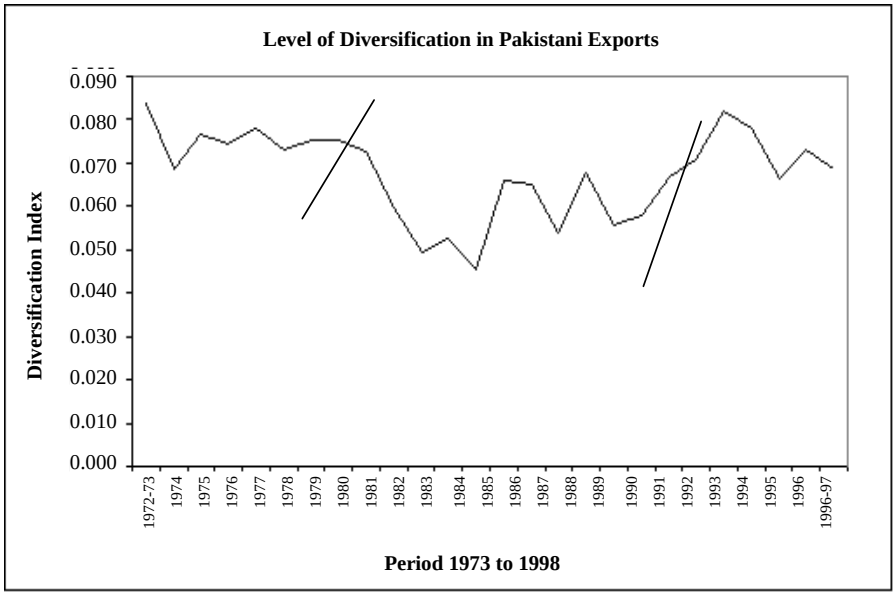


Fig. 3.

In the subsequent analysis, the three measures of export composition are compared with each other and also with Pakistan's real GDP growth (PGDPG), Pakistan's real export growth (PEXPG), world real GDP growth (WGDPG), and real effective exchange rate (RRER). Table 2 illustrates the behaviour of the main variables used in the analysis. One can draw a broad picture of the relationship among growth, export structure, and macroeconomic variables over the 26-year period. In general growth periods in Pakistan have been associated with upturns in the world growth and real exchange rate appreciation. Growth periods are also associated with stable composition of exports as measured by CSX. Recession periods, in relative terms are associated with world recession and exchange rate depreciation.

Table 2

Comparison of Diversification Measures with the Macro-economic Variables

				Growth Rates			
Year	TRAD5	CSX	SPECL	PkGDP	WrGDP	PkExports	REER
1972-73			0.084				71.26
1974		0.796	0.069	5.298	2.245	–3.741	81.83
1975	0.1219	0.756	0.077	3.231	1.351	14.757	97.92
1976	0.0661	0.746	0.074	4.618	5.333	0.450	83.73
1977	0.0648	0.778	0.078	8.288	4.430	–16.210	118.56
1978	0.0819	0.772	0.073	3.533	4.091	0.678	146.61
1979	0.0829	0.809	0.075	4.768	4.076	12.629	143.48
1980	0.0729	0.761	0.075	8.768	2.657	29.660	117.18
1981	0.0836	0.791	0.073	6.795	1.635	20.530	100.00
1982	0.0354	0.734	0.060	6.542	0.402	–9.144	110.38
1983	0.0624	0.700	0.049	6.781	2.670	12.744	77.05
1984	0.0651	0.644	0.053	5.055	4.811	–1.185	95.92
1985	0.0393	0.638	0.045	7.579	3.970	2.380	87.08
1986	0.0578	0.682	0.066	5.507	3.341	6.029	68.12
1987	0.0324	0.731	0.065	6.465	3.926	14.282	73.86
1988	0.0188	0.752	0.054	7.616	4.556	23.237	53.27
1989	0.0288	0.676	0.068	4.972	3.294	10.370	36.43
1990	0.0577	0.616	0.056	4.450	2.881	2.566	31.62
1991	0.0560	0.666	0.058	5.442	2.300	30.961	23.22
1992	0.0312	0.670	0.067	7.842	3.128	15.542	17.18
1993	0.0245	0.653	0.071	1.929	2.938	1.549	12.58
1994	0.0325	0.624	0.082	3.858	4.236	–7.294	11.81
1995	0.0373	0.627	0.078	5.152	3.445	–1.786	12.39
1996	0.0664	0.606	0.066	5.016	3.928	10.293	11.54
1996-97		0.572	0.073	1.222	2.876	–5.111	8.04
1997-98		0.577	0.068	3.292	2.875	2.363	7.60

4. EXPORT-GROWTH RELATIONSHIP

In pursuing our time-series analysis, we turn first to the question of Granger-causality. It is argued that Granger-causality tests, which have increasingly dominated the empirical literature on the subject, are ill suited for capturing the export-led growth phenomenon, which manifests itself over a historical time frame. These tests measure responses only to the short-run shocks with a year or two lags [Gutierrez *et al*. (1997)].

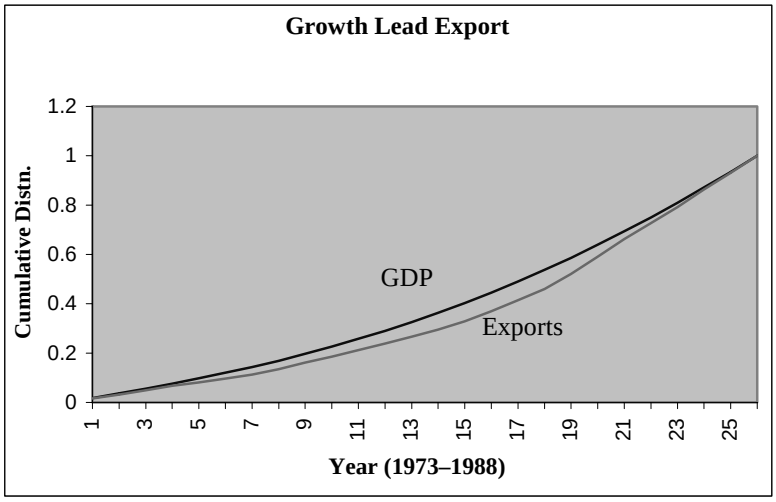


Fig. 4.

Figure 4 illustrates cumulative experience functions for the real GDP and real exports for Pakistan over the period 1973–1998. This is analogous to the cumulative experience functions for specific export categories in Fig. 1. Figure 4 clearly indicates that output 'leads' exports over the relevant historical time frame. This figure can be considered as a sort of non-parametric test, which rejects the notion underlying Granger-causality tests that export dynamism requires that exports precede output in time.

Since the seminal paper of Jung and Marshall (1985), many refinements have been used in assessing the empirical evidence for export led growth. These refinements include modifications of the standard Granger-causality test, including tests for optimal lag structure, tests for non-stationarity and/or co-integration between variables, and including other variables besides exports and growth of GDP.

Granger-causality Approach

We begin by employing Granger's (1969) causality test to analyse the inter-relationship between exports, income growth, and imports. We have conducted two

sets of tests. First, we test the bi-variate causality relationship between every pair of variables using the standard two-variable approach, as specified below:

$$x_t = \sum_{j=1}^{p} a_j x_{t-j} + \sum_{j=1}^{p} b_j y_{t-j} + u_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

$$y_t = \sum_{j=1}^{p} c_j x_{t-j} + \sum_{j=1}^{p} d_j y_{t-j} + v_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

where x_t denote exports growth and y_t denote income growth (measured in terms of GDP).

We estimate the above mentioned two equations by ordinary least squares. The hypothesis that exports causes economic growth, if supported by data, should imply that the null hypothesis that $c_j = 0$ (for all j, exports fails to Granger cause growth) be rejected.[5] Similarly if growth causes exports than the null hypothesis that $b_j = 0$ (for all j) should be rejected.

Tests for Integration and Co-integration

Prior to estimating Granger causality, we have followed the standard practice of the time series analysis and have tested for the order of integration and co-integration of all the variables included in the analyses. The results of the ADF test are presented in Appendix I. These results show that all the variables are integrated of order 1, I(1) at 95 percent critical value. The ADF results on the first difference of these variables indicate that they are integrated of order 2. I(2) specification at 95 percent critical value in all cases can be rejected. The results of the co-integration tests indicate that the null hypothesis of no co-integration among any of these variables cannot be rejected.

Results of Bi-variate Causality Analysis

In the bi-variate analysis, we test four different causal relationships among the threes variables. Rsults of the bi-variate analysis are presented in Table 4. The choice of lag structure is based on Akaike Information Criteria, (AIC) and Schwartz Criteria, (SC). The optimal lag structure is three and both AIC and SC criterion are minimised at third lag structure.[6] Our results show that exports do not lead growth but growth causes exports. In other words the hypothesis of export-led growth can be rejected in case of Pakistan.

[5]Wald test is used to test the joint significance of the lags.
[6]Wald test is used to test the joint significance of the lags.

Table 4

Results of Bi-variate Causality Analysis

Variables	Direction of Causality	Coefficient	Chi-square (Probability)	Result
Income (Y) and Exports (X)	X → Y	4.7420	0.192	No causality
	Y → X	7.9694	0.047*	**Y causes X**
Export (X) and Imports (M)	X → M	6.5365	0.088**	**X causes M**
	M → X	0.8744	0.832	No causality
Income (Y) and Imports (M)	Y → M	5.4722	0.1400	No causality
	M → Y	0.8744	0.832	No causality

*At 5 percent Chi-square critical value (Wald Statistics).
**At 10 percent Chi-square critical value (Wald Statistics).

The other significant relationships between pairs of variables include export and import. In case of export and import, we find unidirectional causality. Export causes imports. Our results show that export causes imports. This is also quite intuitive in that the major proportion of raw material used in merchandise exports is imported. The proportion of manufactured exports in total exports from Pakistan has experienced a rising trend over the last two decades, therefore it is quite likely that as merchandise exports increases it could lead to increased imports.

Results of Tri-variate Causality Analysis

The second set of tests examines the tri-variate (three-variable) Granger causality. The idea is to test the joint influence of two variables on the third variable. The joint tri-variate causality model is specified as:

$$x_t = \sum_{j=1}^{p} a_j x_{t-j} + \sum_{j=1}^{p} b_j y_{t-j} + \sum_{j=1}^{p} e_j m_{t-j} + u_t \quad \ldots \quad \ldots \quad \ldots \quad (5.5)$$

$$y_t = \sum_{j=1}^{p} c_j x_{t-j} + \sum_{j=1}^{p} d_j y_{t-j} + \sum_{j=1}^{p} f_j m_{t-j} + v_t \quad \ldots \quad \ldots \quad \ldots \quad (5.6)$$

$$m_t = \sum_{j=1}^{p} q_j m_{t-j} + \sum_{j=1}^{p} r_j y_{t-j} + \sum_{j=1}^{p} s_j x_{t-j} + w_t \quad \ldots \quad \ldots \quad \ldots \quad (5.7)$$

where m_t denote imports. The null hypotheses to be tested in trivariate case are:

H_1: $c_j = 0$, $j = 1$ ....p (exports fail to Granger cause output in the three variable universe).

H_2: $b_j = 0$, $j = 1$ ....p (output fail to Granger cause exports in the three variable universe).

H_3: $f_j = 0$, $j = 1$ ....p (imports fail to Granger cause output in the three variable universe).

H_4: $e_j = 0$, $j = 1$ ....p (imports fail to Granger cause exports in the three variable universe).

Our results clearly indicate that export do not cause growth of GDP under tri-variate Granger causality (Table 5). Similarly, the tri-variate results confirms the results of the bi-variate Granger causality that growth lead exports in Pakistan. Another important point to note about these tri-variate causality results is that imports has no significance in the export-growth relationship in Pakistan.

Table 5

Results of Tri-variate Causality Analysis

Variables	Direction	Coefficient	Chi-square (Probability)	Results
Export (X), Income (Y) and Imports (M)	X ⟶ Y	4.0700	0.254	No causality
	Y ⟶ X	7.3439**	0.062	**Y causes X**
	X ⟶ M	3.9522	0.267	No causality
	M ⟶ X	0.5285	0.913	No causality
	Y ⟶ M	2.9536	0.399	No causality
	M ⟶ Y	0.3624	0.948	No causality

*At 5 percent Chi-square critical value (Wald Statistics).
**At 10 percent Chi-square critical value (Wald Statistics).

Next, we have tried to investigate whether our three measures of diversification have significantly modified the time series macro economic relationship among Pakistan's aggregate output, Pakistan's exports, world output, and the real effective exchange rate. We have looked for reduced forms to explain Pakistan's aggregate growth and export growth. In order to seek additional marginal effects of our export structure, we obtained the following equations:

$$\Delta Rgdp = 7.9367 + 0.4784\Delta RgdpW - 0.457\Delta Reer - 4.472\Delta RCSX$$
$$(17.18) \quad (0.127) \quad (-2.208) \quad (-7.347)$$
$$R^2 = 0.792$$

Pakistan's export growth is not correlated with world growth. This is a bit surprising since one would expect on macroeconomic grounds that the transmission mechanism between world growth and Pakistan's growth operate through exports. After controlling for world growth and exchange rate, Pakistan's growth is negatively correlated with CSX (stability of export composition) at 0.01 percent level of significance using two-tail test. This indicates that as the composition of

Pakistan's exports become more diversified it will help in output growth. The other two measures of export diversification proved to be un-correlated with Pakistan's output growth.

The growth in Pakistani exports is also not highly correlated with world growth, but it is negatively correlated with the appreciation of the real effective exchange rate, as one might expect. The relationship between exports, world income, real effective exchange rate, and our export structure variables are given in the following equations:

$$\Delta Texp = -0.369 + 0.771\Delta RgdpW - 0.330\Delta Reer - 0.609\Delta RCSX$$
$$(-1.718) \quad (0.452) \quad (-3.493) \quad (-2.196)$$
$$R^2=0.404$$

$$\Delta Texp = -0.173 + 1.502\Delta RgdpW - 0.407\Delta Reer + 213.2\Delta Rtrad5$$
$$(-1.654) \quad (0.270) \quad (-4.371) \quad (2.675)$$
$$R^2=0.513$$

The results for both Rtrad5 (the medium term structural adjustment measure) and *DCSX* confirms that variation in export growth depends on the degree of diversification in exports. The more the exports are diversified the greater will be the growth in exports. *Rtrad*5 and *RCSX* are highly correlated with exports. The variable *Rspecl* proved not to be correlated with exports after controlling for *Rreer* and *RgdpW*.

5. CONCLUSION

We have examined two major issues in this paper. First, we have developed various measures of export diversification for Pakistan. We have made use of these measures in the subsequent regression analysis to see if diversification of exports have a role in determining export/growth performance. Pakistani exports are concentrated mostly in primary or semi-manufactured product categories. An important point that emerges from this analysis is that it is a mistake to identify primary products with "traditional exports" and manufacturing with "non-traditional exports". Results of the export experience analysis reveal that even within textile group, the emphasis in the early period was on low value-added and labour intensive products (e.g. raw cotton and cotton yarn). However, in more recent years, the emphasis has shifted to relatively higher value-added products.

We have examined the issue of export-growth relationship using Granger causality approach. There are a few important points that emerge from the analysis of export-growth relationship, using Granger Causality approach. First our results show that exports do not lead growth in any of the Granger-causality tests. On the contrary, growth lead exports in all most all the tests. Second, contrary to what is generally believed in Pakistan, imports do not play any role in the export-growth relationship.

Structure of exports can play a vital role in the growth process of both exports and income. These results are consistent with the possibility that, export diversification enhanced Pakistan's growth performance (as has been the case between 1979-1987) relative to the periods with a rigid export mix (i.e. between 1973 to 1978 and 1988-1998). In order to test this hypothesis, long-run cross-country comparisons between countries, which did and did not diversify would be useful. In addition, such an effort reveal what, if any, relationship among export diversification, growth, and exchange rates are generalisable across countries. We believe this represents a fruitful area for future research.

APPENDIX I

Unit Root and Co-integration Tests

	Augmented Dickey Fuller Test			
	Level		1st Difference	
Variables	AFD Test	Order of Integ.	AFD Test	Order of Integ.
Texp	–1.9794	I(1)	–2.912	I(0)
	(–2.896)		***(–2.896)***	
Rgdp	–2.031	I(1)	–2.976	I(0)
	(–2.896)		***(–2.896)***	
Rtimp	–2.5372	I(1)	–3.276	I(0)
	(–2.896)		***(–2.896)***	
Reer	–1.8688	I(1)	–2.901	I(0)
	(–2.896)		***(–2.896)***	
Rtrad5	–2.6179	I(1)	–4.164	I(0)
	(–2.896		***(–3.296)***	
RCSX	–2.5679	I(1)	–4.101	I(0)
	(–2.896)		***(–3.296)***	
Rspecl	–2.3783	I(1)	–3.276	I(0)
	(–2.896)		***(–2.896)***	
RgdpW	–2.1323	I(1)	–2.976	I(0)
	(–2.896)		***(–2.896)***	

ADF critical values for the rejection of hypothesis of unit root is in the parenthesis.

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Comments

This is an interesting paper on issues of considerable importance for Pakistan. The two main objectives are to test the hypothesis of export-led growth; and to explore the role of export diversification in the growth process of both exports and output. The principal findings of the study are that the hypothesis of export-led growth is rejected in the case of Pakistan; and that greater diversification in exports would contribute positively to growth in both total exports and output.

My comments on the paper are summarised below:

- The paper adopts the standard Granger-causality test to determine the direction of causation between exports and output. This test is inappropriate in the present context as the paper finds evidence of a common stochastic trend between exports and output. It is well known that when the two variables are cointegrated, the Granger-causality test may fail to detect causality when in fact it may be present. This is because the Granger-test focuses only on short-run dynamics and ignores, the adjustment of variables to long-run equilibrium implied by the cointegrating relationships. In view of this shortcoming, the results of causality tests are obviously questionable.
- A widely used test for the temporal causation in the presence of cointegrated variables is based on the Error Correction Modeling approach, due to Engle and Granger. The Error Correction model integrates the short-run dynamics with the long-run equilibrium relationship by incorporating an error correction term in the causality equations. The error correction term captures the short-run-adjustment of variables to long-run equilibrium trends and opens up another channel through which causality can be detected. It needs to be pointed out here that a recent study by Ashfaque H. Khan and others used this approach, and found convincing evidence of bi-directional causality between exports and output in the case of Pakistan. Incidentally, this study has not been reviewed in the paper.
- The paper also finds evidence of causality from exports to imports. The authors assert that this is due to the fact that a major proportion of raw materials used in merchandise exports is imported. This does not seem to be correct reasoning, as Pakistan's major exports like textiles, leather products, and carpets rely largely on domestically produced raw materials. A more plausible explanation could be that higher exports allow for higher imports by easing the foreign exchange constraint.

- The approach adopted for testing causality in the three variable universe is also questionable, as it does not take into account the long-run relationships among the variables. An added complication here is the possibility of multiple cointegrating vectors which can arise when more than two variables are involved. This is an issue of crucial importance in testing causality in a dynamic multivariate context. The appropriate technique here is the Johansen's multivariate cointegration testing procedure, which can identify multiple cointegrating relationships.
- Coming to the empirical examination of the role of export diversification in the growth process, the paper does not spell out the theoretical underpinnings of the specified models. It is difficult to justify the results without an underlying theoretical framework. It would certainly add to the substance of the paper if the theoretical foundations of the empirical models are elaborated in some detail.

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