

Employment Creation Effects of Pakistan's Exports

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I. INTRODUCTION

During the past two decades, an increasing number of developing countries have sought to pursue export-oriented trade and industrial policies as against the import-substitution strategy of industrialization.¹ It has been argued that production for the world market not only restores the momentum of industrial growth but it leads to efficient resource allocation, greater capacity utilization, permits the exploitation of economies of scale, generates technological improvement in response to competition abroad and, most importantly, creates productive employment opportunities for a labour-surplus country [Balassa (1978), p. 180].

This paper is not concerned with the merits or otherwise of export-oriented trade and industrialization policies rather we concentrate on the most important contribution of outward looking or export-oriented policy, i.e., its employment creation effects. It has been argued that an increased level of activity in the export sector gives rise to dynamic external economies of scale besides having its own direct effect. For example, an increase in exports creates jobs for workers directly engaged in the production of the export commodities. This being the direct effect, an increase in exports also creates employment via the linkage effect, multiplier effect and foreign exchange effect.² A large number of studies over the last two decades have attempted to measure the direct and indirect contributions of exports in employment creation in developing countries.³ Almost all studies have used static input-output analysis to quantify the contribution of exports in employment generation. It is found that exports do offer great opportunities for employment creation.

Notwithstanding these findings, we argue that the use of static input-output analysis is at best a mechanical exercise and may provide some numbers regarding

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¹For a detailed discussion on the import substitution policy versus export-promotion policy, see Krueger *et al.* (1981); Krueger (1988).

²For further detail on each of these effects see Khan (1991)

³It is difficult to list all the studies, individually, however, see Verbruggen (1985); Dijk (1986); Dijk and Verbruggen (1984) for an extensive bibliography on this issue.

employment creation but it does not provide any theoretical foundation to measure the relationship between exports, output and employment. In particular, it does not say anything about the transmission mechanism as to how an export expansion affects employment.

Like many other developing countries Pakistan is facing a serious unemployment problem. Industrial development has usually been considered as a means to absorb surplus labour. But in the case of Pakistan, the industrial sector, which although grew impressively, failed to generate enough employment. In this paper we attempt to explore the possibility of creating employment in the export sector. We do so by constructing a four equation simultaneous system in which exports, output and employment are determined simultaneously with proper feedback. Time-series data covering the period from 1972–88 are used. We believe that the theoretical foundation provided in the paper can be used for other developing countries for the same reason.

The plan of the paper is as follows. In Section II we discuss the model. The results are reported in Section III. The final section contains concluding remarks.

II. THE MODEL⁴

In order to analyse the contribution of exports in employment generation we need a functional relationship between these two variables. However, an increase in exports is expected to affect employment by first affecting output growth. Hence, we need a functional relationship between exports, output and employment with proper feedback.⁵ Following Balassa (1978) and Khan and Saqib (1990) we specify an export-augmented Cobb-Douglas production function such that

$$Y = AL^{\gamma_1} K^{\gamma_2} X^{\gamma_3} e^u \dots \dots \dots (1)$$

where Y is gross domestic product; L is employed labour force; K is capital stock; X is real value of exports; A is efficiency Parameter; and $\gamma_1, \gamma_2, \gamma_3$ are the output elasticities of labour, capital and exports respectively.

Taking logarithmic transformation to linearize Equation (1) we have

$$\ln y = \ln A + \gamma_1 \ln L + \gamma_2 \ln K + \gamma_3 \ln X + u \dots \dots \dots (2)$$

⁴This section relies to a larger extent on Khan and Saqib (1990).

⁵Khan and Saqib (1990) found a strong positive association between total export (primary and manufactured exports as well) expansion and GDP growth for Pakistan.

In specifying the export function we follow the approach of simultaneous determination of export demand and export supply functions. Following Goldstein and Khan (1978); Balassa *et al.* (1989); Khan and Saqib (1990) we have estimated export demand and supply functions simultaneously.

The export demand function is specified to depend upon foreign income and relative price variables. The world GDP index (Y_w) is used to represent foreign income while the relative price variable $[P_x(\$)/P_w(\$)]$ is defined as the ratio of the index of domestic prices to world prices of exports, both expressed in terms of US dollars. Using Cobb-Douglas functional form the export demand function is specified as;

$$X^d = C Y_w^{\alpha_1} [P_x(\$)/P_w(\$)]^{\alpha_2} e^v \dots \dots \dots (3)$$

where X^d is real value of export demanded; and C is constant term

Taking logarithmic transformation to linearize Equation (3) we have

$$\ln X^d = \ln C + \alpha_1 \ln Y_w + \alpha_2 \ln [P_x(\$)/P_w(\$)] + V \dots \dots \dots (4)$$

where α_1 and α_2 are respectively foreign income and relative price elasticities such that $\alpha_1 > 0$ and $\alpha_2 < 0$.

The export supply function is specified to depend upon domestic production of exportable and relative prices. The gross domestic product (Y) is used to represent domestic production of exportable and relative price variable $[P_x(\$) * eR]$

$\frac{P_g}{P_x(\$)}$ is defined as the ratio of the index of Pakistan's export prices (incorporating changes in the dollar prices of exports, the exchange rate and export subsidies) to the domestic price level. Again using the Cobb-Douglas functional form the export supply function is specified as:

$$X^s = ZY^{\beta_1} \frac{[P_x(\$) * eR]^{\beta_2}}{P_g} eW \dots \dots \dots (5)$$

where X^s is real value of export supply; eR is index of effective exchange rate; P_g is implicit GDP deflator; Z is constant term

Taking logarithmic transformation to linearize Equation (5) we have

$$\ln X^s = \ln Z + \beta_1 \ln Y + \beta_2 \ln \frac{[P_x(\$) * eR]}{P_g} + w \dots \dots (6)$$

where β_1 and β_2 are respectively domestic income and relative price elasticities such that $\beta_1 > 0$ and $\beta_2 > 0$. Assuming equilibrium in the export sector we have $X^d = X^s = X$.

Following Klein (1983), which suggests that if output and capital can be determined from other relationships in the model then by re-writing Equation (2) we can derive a labour requirement equation. Since in our model output is determined from Equation (2) and capital is assumed as exogenously given therefore, we can derive labour requirement Equation by re-writing Equation (2) as

$$\ln L = \psi_0 + \psi_1 \ln K + \psi_2 \ln X + \psi_3 \ln Y + \varepsilon \dots \dots \dots (7)$$

where

$$\psi_0 = -1/\gamma_1 \ln A; \psi_1 = -\gamma_2/\gamma_1; \psi_2 = -\gamma_3/\gamma_1; \psi_3 = 1/\gamma_1$$

$$\text{and } \psi_1 < 0; \psi_2 < 0; \psi_3 > 0$$

Equations (2), (4), (6) and (7) form a system of simultaneous equations which is estimated with the help of Three Stage Least Squares (3SLS) estimation technique.⁶

An important question yet to be answered is how to measure the contribution of export expansion to employment from the four equation model. It may be noted that there are two types of effects operating simultaneously in the model – output effect and substitution effect of export expansion on employment. An increase in exports increases output by $\gamma_3 (\Delta X)$ from Equation (2) which, in turn, increases employment by $\psi_3 (\Delta X)$ in Equation (7). Hence, the output effect of an increase in exports on employment is $\psi_3 [\gamma_3 (\Delta X)]$. As far as the substitution effect is concerned, an increase in exports reduces employment by $\psi_2 (\Delta X)$ in Equation (7) [Note: $\psi_2 < 0$, but if $\psi_2 > 0$ it would imply that exports and employment are complementary inputs]. Hence, the *net* effect of an increase in exports on employment is given by Equation (8).

$$\Delta L = \frac{\psi_2 (\Delta X)}{\text{Substitution Effect}} + \frac{\psi_3 [\gamma_3 (\Delta X)]}{\text{Output Effect}} \dots \dots \dots (8)$$

Whether an increase in exports increases (reduces) employment clearly depends on the domination of output (substitution) effect over substitution (output) effect.

⁶Discussion on data and its sources are given in Khan (1991).

III. RESULTS

Having discussed the model in the preceding section we now present results. We disaggregated total exports into primary and manufactured exports and measured their contributions to employment creation separately. The results corresponding to all the three categories of exports are reported in Table 1.

Turning first to the results of total exports and its contribution to employment creation, it can be seen from Table 1 that all the coefficients bear the expected signs and are statistically significant at the 5 percent level with the exception of the relative price in the export supply function. The coefficient of exports in the production function [Equation (2)] is 0.28 which suggest that a one percent increase in export leads to a 0.28 percent increase in the GDP. With regards to export demand and supply functions [Equations (4) and (6)], the foreign income elasticity of the demand for Pakistani exports is 1.56 while the domestic income elasticity of supply of exports is 1.09. A comparison of two income elasticities indicates that Pakistan's exports are more responsive to changes in world GDP rather than to domestic economic activity. The relative price of export demand is 0.35 which suggests that a one percent increase in the dollar price of Pakistan's exports relative to dollar price of world exports leads to a decline in Pakistan's exports by 0.35 percent.

As regards the contribution of total exports on employment [Equation (7)], it can be seen from the table that the output effect is [$0.87 \times 0.28 = 0.2436$ i.e. $\psi_3 = 0.87$; $\gamma_3 = 0.28$; $\Delta X = 1$ percent] dominated by the substitution effect [$-0.30 \times 1 = -0.30$ i.e. $\psi_2 = -0.30$ and $\Delta X = 1$ percent]. Hence, the *net* effect of export expansion on employment is $-0.30 + 0.2436 = -0.0564$, that is, export expansion leads to a reduction in employment (or labour requirement) in Pakistan. The results corresponding to primary exports are reported in Table 1. Like the previous case, all the coefficients bear the expected signs and are statistically significant at the 5 percent level with the exception of relative price in export demand [Equation (4)]. The coefficient of primary exports in production function [Equation (2)] is 0.20 which suggests that a one percent increase in primary exports increases GDP growth by 0.2 percent. The income elasticities of export demand [Equation (4)] and export supply [Equation (6)] are roughly of the same magnitude which suggest that both the foreign and domestic economic activities are of equal importance for Pakistan with respect to primary goods exports. The price elasticity of export supply is high (0.67) which indicates that by maintaining external competitiveness through the exchange rate policy Pakistan can increase its supply of primary goods exports.

Table 1

Estimates of Relationship between Exports, Output and Employment

Variables	Total Exports				Primary Exports				Manufacturing Exports			
	Eq. (2)	Eq. (4)	Eq. (6)	Eq. (7)	Eq. (2)	Eq. (4)	Eq. (6)	Eq. (7)	Eq. (2)	Eq. (4)	Eq. (6)	Eq. (7)
Intercept term	11.64 (2.17)*	0.43 (0.35)	-4.15 (1.44)	-12.77 (3.78)*	-7.83 (5.93)*	0.58 (0.21)	-11.41 (1.85)**	7.40 (3.96)	-5.04 (2.49)*	4.64 (3.63)*	10.63 (6.40)*	15.25 (4.67)*
Labour (<i>L</i>)	1.01 (6.71)*				0.87 (10.12)*				0.67 (3.68)*			
Capital (<i>K</i>)	0.87 (1.99)*			-1.04 (2.74)*	1.24 (8.85)*			-2.21 (13.19)*	1.06 (5.75)*			-1.38 (4.13)*
Export (<i>X</i>)	0.28 (4.84)*			-0.30 (7.34)*	0.20 (4.66)*			-0.28 (5.43)*	0.19 (2.32)*			0.60 (5.20)*
World GDP Index (<i>Y_w</i>)		1.56 (6.23)*				1.33 (2.40)*				2.42 (9.43)*		
Relative Price [<i>P_x</i> (<i>\$</i>)/ <i>P_w</i> (<i>\$</i>)]		-0.35 (5.71)*				-0.03 (0.28)				-0.33 (5.64)*		
GDP (<i>Y</i>)			1.09 (8.03)*	0.87 (7.79)*			1.38 (3.39)*	1.09 (6.28)*			1.57 (13.35)*	0.02 (0.08)
Relative Price [<i>P_x</i> (<i>\$</i>) x <i>eR/P</i>]			0.02 (0.04)				0.67 (1.76)**				0.09 (0.64)	
<i>R</i> ²	0.89	0.83	0.84	0.73	0.98	0.36	0.42	0.88	0.99	0.92	0.94	0.82
<i>DW</i>	1.91	1.69	1.66	1.79	1.68	1.56	1.61	1.70	1.57	1.43	1.65	1.68

Note: *t*-statistics are given in parentheses.

* denotes significance at 5 percent level.

** denotes significance at 10 percent level.

With regards to the contribution of primary exports on employment creation [see Equation (7)], the output effect of primary exports expansion is $1.09 \times 0.20 = 0.218$ [$\psi_3 = 1.09$; $\gamma_3 = 0.20$; $\Delta X = 1$ percent] and the substitution effect is estimated to be 0.28 [$\psi_2 = -0.28$; $\Delta X = 1$ percent]. The *net* effect of primary export expansion on employment (or labour requirement) is $-0.28 + 0.218 = -0.062$. Like in the case of total exports, the substitution effect dominates the output effect and as a result, primary export expansion reduces employment (or labour requirement) in Pakistan. Finally, we turn to the results corresponding to manufactured exports and its effect on employment creation. The coefficient of manufactured exports in the production function [Equation (2)] is 0.19 which indicates that a one percent increase in manufactured exports leads to a 0.19 percent increase in the GDP. The foreign income elasticity of demand (2.42) for Pakistan exports is considerably higher than income elasticity of supply of exports (1.57). These income elasticities suggest that Pakistan's manufactured exports are more responsive to changes in foreign income rather than to domestic income. The price elasticity of demand for export is 0.33 which suggest that Pakistan's manufactured exports are sensitive to price changes.

With regard to the contribution of manufactured exports on employment creation [Equation (7)], the output effect of exports expansion is calculated to be $0.02 \times 0.19 = 0.0038$ [$\psi_3 = 0.02$; $\gamma_3 = 0.19$; $\Delta X = 1$ percent]. On the other hand, instead of substitution effect, manufactured exports and employment are found to be *complementary inputs*, i.e.; $\psi_2 > 0$ [$\psi_2 = 0.60$; $\Delta X_m = 1$ percent]. Hence, the *net* effect of manufactured exports expansion on employment creation (or labour requirement) is found to be $0.60 + 0.0038 = 0.6038$. This is an important finding because, unlike the previous two cases (total exports and primary exports), an increase in manufactured exports increases employment (or labour requirement) in Pakistan. The elasticity of 0.6038 indicates that a one percent increase in manufactured exports increases employment (or labour requirement) by 0.6 percent.

IV. CONCLUDING REMARKS

In this paper we have examined the contribution of exports on employment creation by constructing a simultaneous equation system with proper feedbacks. In our system, exports affects employment via output as well as directly. Therefore, two types of effects—output effect and substitution effect—are operating simultaneously. It is stated that the *net* effect of export expansion on employment depends crucially on the domination of one effect over the other.

This paper finds a strong association between export performance and GDP growth, thereby providing yet another evidence in support of an export-oriented trade policy for Pakistan.⁷ The foreign income elasticity is found to be considerably higher for manufactured exports than the primary exports [2.42 and 1.33]. Given this information it is suggested that Pakistan should orient exports towards manufactured goods. This is all the more important because of the fact that manufactured exports have shown their potential to be a major labour absorbing sector. It is found that a one percent increase in manufactured exports leads to a 0.6 percent increase in employment. On the other hand, primary exports are found to be labour displacing.

The message of the paper is that an outward-oriented trade and industrialization policy *must* be pursued and a shift from the primary commodity exports to the *labour-intensive* manufactured exports appears necessary to arrest further aggravation of the unemployment problem in the country.

REFERENCES

- Balassa, B. (1978) Exports and Economic Growth: Further Evidence. *Journal of Development Economics* 5 : 2 181-189.
- Balassa, B., E. Voloudakis, P. Fylaktos and S. T. Suh (1989) The determinants of Export Supply and Export Demand in Two Developing Countries: Greece and Korea. *International Economic Journal* 3 : 1 Spring 1-16.
- Dijck, P. V. (1986) *Causes and Characteristics of Export-Oriented Industrialization in Developing Countries*. Amsterdam: Free University Press.
- Dijck, P. V., and H. Verbruggen (1984) *Export-Oriented Industrialization and Employment: Policies and Response with Special Reference to ASEAN Countries*. Manila: Council for Asian Manpower Studies.
- Goldstein, M., and M. S. Khan (1978) The Supply and Demand for Exports: A Simultaneous Approach. *The Review of Economics and Statistics* 60 : 2 May 275-286.
- Khan, Ashfaq H. (1991) Employment Creation Effects of Pakistan's Exports. Paper presented at the 7th Annual General Meeting of the Pakistan Society of Development Economists (PSDE), Islamabad, January 6-8.
- Khan, Ashfaq H., and Najam us Saqib (1990) Exports and Economic Growth; Another Look. Submitted for publication in the *Weltwirtschaftliches Archiv*

⁷This finding is in complete agreement with Khan and Saqib (1990) who found a strong association between exports and economic growth in Pakistan.

September.

- Klein, Lawrence J. (1983) *Lectures in Econometrics*. Amsterdam: North-Holland Publishing Company.
- Krueger, A. O. (1988) The Relationship between Trade, Employment, and Development. In Gustav Ranis and T. P. Schultz (eds) *The State of Development Economics: Progress and perspectives*. Oxford: Basil Blackwell.
- Krueger, A. O., H. B. Lary, T. Monson and N. Akrasanee (eds) (1981) *Trade and Employment in Developing Countries* (Vol. 1). Chicago: The University of Chicago Press.
- Verbruggen, H. (1985) *Gains from Export-Oriented Industrialization in Developing Countries with Special Reference to South-East Asia*. Amsterdam: Free University Press.

Comments on "Employment Creation Effects of Pakistan's Exports"

It gives me great pleasure to comment on Ashfaq Khan's paper having worked with him closely in connection with the P.I.D.E. Macro-econometric Model in the early eighties and having been his colleague in graduate school in the mid seventies.

Clearly, one of the most serious and pressing problems facing developing countries is the persistence of unemployment and under-employment. Therefore, any study that sheds light on or uncovers relationships between employment and other economic variables is a welcome addition to the literature. To ascertain the employment impacts of export expansion in Pakistan, this paper first formulates and then estimates four simultaneous structural relationships between exports, employment, and output, "with proper feedback", over the period 1972-1988.

While the empirical work seems to have been competently executed, I have serious reservations about the theoretical formulations, and therefore view the empirical findings as being close to meaningless. Consequently, while I confine my comments to the theoretical formulations, there are some misstatements made in the paper which I cannot resist clarifying first.

Referring to earlier studies that have attempted to measure the overall contributions of exports in employment creation in developing countries, Ashfaq points out that most of them "used static input-output analysis . . . employment generation". This statement is not problematic by itself but then Ashfaq goes on to be "dismayed", that no similar attempt has been made for Pakistan with the exception of Guisinger (1981) regarding whose methodology he makes the telling comment: "Like the input-output method, this method also lacks theoretical foundation to analyse the contribution. . . employment generation."

Taking the two statements together, it is fair to conclude that Ashfaq does not view highly the use of input-output analysis, since it lacks theoretical foundation. This is not true as we all know. In fact, I am extremely embarrassed in even trying to defend the use of the input-output model of analyses in the presence of Professor Lawrence Klein. Instead let me refer Ashfaq to Professor Klein's presidential address delivered to the American Economic Association (AER, March 1978). In this address, Professor Klein proposed linking the production side (as legitimately represented by input-output relationships) to the

demand side of the economy, an idea which subsequently led to my Ph. D. dissertation.

Furthermore, there is no need for being "dismayed" about the lack of studies linking exports to employment with proper feedbacks in Pakistan. First, there is the *P.I.D.E. Macro-econometric Model of the Pakistan Economy* which Ashfaq co-authored and has been updating periodically. Second there is my dissertation, "Growth Prospects of a Developing Economy: Pakistan" and finally there is his own Ph. D. dissertation. All three works model the entire economy including exports and employment, at a fairly disaggregated level, with proper feedbacks. Given his access to high speed computational facilities, it would be a simple exercise to ascertain employment effects of a unit change in exports. In fact that is one of the simulations performed in both the P.I.D.E. work and in my Ph. D. dissertation.

Let me turn now to the theoretical formulations. The first equation is the production function (Cobb-Douglas form) linking output to labour, capital, and exports. I am surprised on finding exports, which are an output, being a factor of production. We have been used to seeing Ashfaq use money as a factor of production in Pakistan in several studies. Now exports have made their *debut*.

The rationale offered, for including exports as an input, is not very convincing, i.e. as an index of efficient resource allocation, greater capacity utilization, exploitation of economies of scale, and generating technological improvement. First, it is surprising how exports could do all that in an economy which exports primary and manufactured goods less than 10 percent of GDP. Second, would not all these effects be captured in the efficiency parameter and be embedded in labour and capital which appear as arguments in the function? Finally, would not all these effects of increasing exports be relevant to an economy whose exports are demand constrained rather than a supply constrained one as is Pakistan?

It is puzzling to observe the demand for Pakistani exports depending in part on relative prices. Clearly, Pakistan is a small exporter and consequently should face an infinitely price elastic demand curve. This is one of the key lessons from Econ 101. No rationale is provided for formulating a downward sloping demand curve for Pakistan's exports. The export supply function is perhaps the most satisfactory formulation in the paper and is similar to earlier specification, as in the P.I.D.E. model. In the presence of the export supply function, there is no need for the export demand function.

Finally the labour requirement specification [Equation (7)] is most unsat-

isfactory as it is nothing but the production function [Equation (2)], normalized on labour. Given the presence of this equation, the net effects of exports increase/decrease on employment will be exactly zero. This can be easily demonstrated, using Ashfaque's definitions of substitution and output effects of an export expansion on employment. The relationships between the parameters of the two equations are laid out explicitly:

$$\psi_0 = 1/\gamma_1 \ln A; \psi_1 = -\gamma_2/\gamma_1; \psi_2 = -\gamma_3/\gamma_1; \psi_3 = +1/\gamma_1$$

where the γ_i 's and ψ_i 's are parameters of Equations (2) and (7) respectively. The output effect is defined as: $\psi_3 [\gamma_3(\Delta X)]$ which can be rewritten in terms of parameters of Equation (2) as $(\gamma_3/\gamma_1)\Delta X$. The substitution effect is defined as $\psi_2 \Delta X$ which is equivalent to $(-\gamma_3/\gamma_1)\Delta X$ in terms of parameters of Equation (2). The net effect of an export expansion on employment is the sum of the two effects and is equal to $(\gamma_3/\gamma_1)\Delta X - (\gamma_3/\gamma_1)\Delta X$ which is exactly zero.

Given that the two Equations are equivalent, the estimates of ψ_i 's obtained indirectly from the parameter estimates of γ 's should be similar to the ones obtained directly. (They would be identical in a deterministic model.) Some rough calculations based on parameter estimates reported in Table 1 reveal the following.

Indirect Estimate of ψ_i			Direct Estimate of ψ_i
$\psi_0 = (1/\gamma_1) \ln A = (-1/1.01) 11.64 = -11.52;$			-12.77
$\psi_1 = -\gamma_2/\gamma_1 = -0.87/1.01 = -0.86;$			-1.04
$\psi_2 = -\gamma_3/\gamma_1 = -0.28/1.01 = -0.27;$			-0.30
$\psi_3 = 1/\gamma_1 = 1/1.01 = 0.99;$			0.87

Notice the similarity. They are not identical because of the stochastic nature of the two equations.

The net effect of total export expansion on employment is reported to equal -0.0564. Notice how close it is to zero. When exports are disaggregated, the net effects of unit increases in primary goods and manufactured goods exports on employment are -0.062 and 0.6038 respectively. Based on these calculations Ashfaque emerges with the "important finding" that only in the case of an increase in manufactured goods exports will employment increase in Pakistan whereas employment will register a net decrease should primary goods exports increase. These findings are counter-intuitive for Pakistan where the agriculture sector still is labour-intensive and the manufacturing sector is relatively less so. In fact all

three net effects should have been zero given that Equations (2) and (7) are the same. Consequently not much credence can be placed on the empirical finding of this paper.

To salvage this paper, at a minimum Equation (7) needs to be respecified and the entire system re-estimated. Also, the export demand function can be dispensed with. On the other hand, as one of the professed objectives of this paper is to measure the employment impacts of exports with proper feedbacks, I suggest doing this exercise in the framework of the P.I.D.E. model. Presumably, that model was formulated and estimated for such purposes.

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