The Implications of an Export Tax on Sectoral Growth: A Case in Pakistan
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Abstract

The implications of an export tax on sectoral economic growth in the cotton and yarn sectors of Pakistan are examined. Pakistan utilized an export tax on raw cotton fiber from 1988-1995 in order to lower input cost to domestic yarn spinners. The growth effects are simulated based on the results of a structural econometric model. Simulation results show that the export tax had a significant adverse impact on growth in the raw fiber sector. The lower input cost as a result of the tax, however, did not appear to stimulate growth in the yarn sector over what would have occurred without the policy.

Introduction

Empirical results on the impact of growth in exports on general economic growth have been mixed. Some observations on export growth show that such growth tends to contribute more than its own increase in national income (Feder; Bhagwati and Srinivisan; Adelman). Some argue that exports contribute to economic growth because the export sector is not only more productive than the non-export sector, but also because it generates external effects that tend to enhance the productivity of the non-export sector (Chen and Tang).

Others find that subsidies and incentives towards exports lead to distributional deterioration because the export mechanisms benefit the proprietors of scarce resources, thus concentrating wealth (Taylor et al.). One explanation for the fact that growth in exports does not necessarily lead to general economic growth is that the "linkage" between exports and the extent of imperfections in the domestic economy preclude the translation of export earnings into increases in total output (Corden). Others, such as King and Rebelo and Clark et al., have found important roles for taxation and government policy in growth.

Understanding the role of government policy and different types of taxation is important for evaluation of policies in less developed countries (LDCs). LDCs have (1) actively used different policies in an attempt to control or manipulate sectors of their economies and (2) actively sought to increase economic growth rates. One popular policy has been the use of an export tax on a raw product, the rationale for which has several dimensions. First, the export tax may be used to reserve a larger quantity of that product for internal use to produce government revenue. At the same time, the export tax lowers the internal price of that product for domestic processors, which induces production of processed goods, thereby increasing the value-added captured. If

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increases in exports of the processed can be generated, more foreign exchange can be earned.

The primary objective of the export tax is to induce growth in the processing sector by lowering input costs. However, the implications of this type of policy on growth in a sector-by-sector framework are not well understood. The processing sector is linked to the raw product market. Thus, the implications of the export tax on the raw product to growth in both the raw product and processing sectors is examined in this paper.

Cotton Policy in Pakistan

The Government of Pakistan utilized an export tax on raw cotton fiber from 1988 to 1995, which was based on a two price system (International Cotton Advisory Committee [ICAC], 1992; U.S. Dept. of State). The policy had several direct impacts. First, the export tax held the internal market price for cotton below international market prices by an average 15 US¢/lb over the 1998-1993 period (Hudson and Ethridge). Exports of cotton decreased significantly after the implementation of the export tax in 1988. Although cotton production continued to increase, it became more erratic after 1988 and decreased by 1995.

Because cotton is a primary input into the production of cotton yarn, the export tax on cotton had direct implications for the cotton sector as well. The cost of cotton represents about 50% of the total variable cost of yarn production (Asian Development Bank). Thus, yarn spinners in Pakistan realized a total variable cost savings of 7.5 US¢/lb of cotton versus other countries over the 1988-1993 period. Cost savings of this magnitude have two apparent impacts. First, lower input cost induces larger output of yarn (this trend was apparent). Second, if yarn spinners used the lower input cost to lower export price, increased exports would result (this was also observed).

The export tax appears, at least on the surface, to have achieved its objective of increasing the level of production and exports of a value-added product (yarns). Hudson and Ethridge showed that this police transferred income that could be used to generate economic growth from cotton producers to yarn spinners. However, this study also found a large transfer of income out of the yarn sector. Whether or not the export tax on raw cotton actually generated growth in the yarn sector is the subject of this analysis.

Analytical Framework

The conceptualization of the effects of the export tax on growth in Pakistan is divided into the two relevant sectors (cotton and yarn). Although presented separately, the linkages between sectors are discussed. For purposes of this analysis, growth is assumed to be represented by expansion in the real value of total output.

The aggregate production function for cotton fiber is represented by

$$Y_c = f(K_c, L_c, T),\qquad(1)$$

where Y_c is the aggregate production of cotton fiber, K_c is the amount of aggregate capital used in cotton production, L_c is the amount of labor used to produce cotton, and T is the amount of land planted to cotton. A profit function for the cotton sector is defined as

$$p = P_c Y_c - rK_c - wL_c - zT,\qquad(2)$$

where π is real industry profit, P_c is the real price of cotton, r is the real price of capital, w is the real wage rate, and z is the real cost of land. Profit is assumed to be net after depreciation so that r represents the price of capital per unit of time.

Equation 2 is reformulated to express real total output

$$RTO_c = p + rK_c + wL_c + zT, \tag{3}$$

where RTO_c is the real (deflated) price of cotton multiplied by the output of cotton. All first

partials are assumed to be positive so that increases in any variable lead to increases in real total

output. The item of interest in terms of growth is the change in real total output, which is found

by taking the total differential of Equation 3

$$
\begin{aligned}
dRTO_c = & \frac{\P p}{\P p} dp + \frac{\P rK_c}{\P r} dr + \frac{\P rK_c}{\P K_c} dK_c + \frac{\P wL_c}{\P L_c} dw \\
& + \frac{\P wL_c}{\P L_c} dL_c + \frac{\P zT}{\P z} dz + \frac{\P zT}{\P T} dT.
\end{aligned} \tag{4}
$$

The effects of the export tax on growth in real total output (RTO) of the cotton industry

are linked to the accumulation of capital through the savings from industry profit. Consider the

accumulation of capital to be specified as

$$dK_c = sdp, \tag{5}$$

where s is the industry savings rate. This says that the change in the capital stock (after covering

depreciation) is some proportion, s, of the change in real industry profit. Substituting Equation 5

into 4 and simplifying results in

$$
\begin{aligned}
dRTO_c = & dp \ (1 + sr) + K_c dr + L_c dw \\
& + wdL_c + Tdz + zdT.
\end{aligned} \tag{6}
$$

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Marginal changes in the use of capital are assumed to have no impact on the real price of capital. Changes in the use of capital may have some impact on the nominal price of capital, but are not likely to affect the real rate of interest. The change in the real wage rate is also assumed to equal zero. This appears to be a reasonable assumption for Pakistan because of the relative abundance of unskilled labor. Likewise, employment in the cotton sector is not likely to change. In an LDC such as Pakistan, a certain portion of the population is expected to be employed in agriculture no matter the level of production (Memon). Marginal changes in the quantity of cotton produced would not likely alter the amount of labor employed to produce cotton. This amounts to assuming that Pakistan has not yet reached the diminishing marginal returns threshold on the labor that is currently has employed in cotton production.

Finally, the change in the real rental rate of land is assumed to be zero. Land is not considered a constraining resource in developing countries such as Pakistan (Solow). As such, increases in land use would not lead to increases in the real rental rate. Given the above assumptions, Equation 6 reduces to

$$dRTO_c = dp\ (1 + sr) + zdT\ .\tag{7}$$

Thus, changes in RTO are directly affected by changes in real profit and land used in cotton production. Changes in industry profit are related to changes in the price of cotton and how the costs of production respond to the quantity of cotton produced. It is assumed that total revenue decreases faster than total costs as the price of cotton decreases (i.e., demand is inelastic). Thus, profit decreases as cotton price decreases, which leads to lower rates of capital accumulation and lower RTO, *ceteris paribus*. Likewise, decreases in the price of cotton lead to decreases in the area of land devoted to cotton production. Therefore, the reduction in cotton price to the cotton

grower with the export tax is anticipated to lead to smaller changes in real total output in the cotton sector, implying a slower rate of economic growth in that sector.

The model for the yarn sector is substantially similar to above (see Hudson and Ethridge for a full derivation). The primary difference is that changes in the price of cotton affect changes in real total output in the yarn sector. This is the linkage between the two sectors through which the price policy in the cotton sector affects the yarn sector.

The impacts of the export tax policy on each individual sector can be derived. However, the impacts on the economy as a whole are more complex. The linkages between these industries (fiber and yarn) and the allied industries (chemical suppliers, seed dealers, electricity cooperatives, etc.) are not clearly defined. For example, if land is shifted out of cotton production into sugarcane production, an adverse impact on cotton seed dealers is expected. However, if these same cotton seed dealers are dealers of sugarcane seed, the impact on them becomes more ambiguous. Because these issues are beyond the scope of this study, they are not directly addressed.

Simulation

The structural relationships within the cotton and yarn markets were estimated using a structural econometric model. See Hudson and Ethridge for specifics of this model. Using the estimated equations from this model, the area of cotton and total cotton production were estimated for each year. The price of cotton (Pakistan Central Cotton Committee) and the total cost of production (ICAC, Various Issues) were deflated using the Gross Domestic Product deflator (Ministry of Finance). The real price of cotton (P_c) was then multiplied by total cotton production (Y_c), resulting in a real total output (RTO_c) estimate for each year in the data set

$$RTO_c = P_c \cdot Y_c. \qquad\qquad (8)$$

Real total production cost per hectare (RPC/HA) was multiplied by the estimate of area (HA),

resulting in an estimate of the real total cost (RTPC$_c$) for each year

$$RTPC_c = RPC / HA \cdot HA. \qquad\qquad (9)$$

Industry profit was derived by subtracting real total cost from RTO for each year

$$p_c = RTO_c - RTPC_c. \qquad\qquad (10)$$

The result of this process was a series of estimates for RTO, real profit, and area of cotton

for each year in the data set. The item of interest, however, is the change in these variables.

Thus, a first difference of each series was taken, resulting in a series of changes in each of these

variables. To facilitate comparison, the mean of the change in each series was taken. The result

of this process was an estimate of the average change in RTO, real profit, and area devoted to

cotton under existing conditions (export tax policy) in Pakistan.

The second part of the simulation of the cotton sector involved re-estimating the above

series under world cotton price. That is, rather than using the internal market price to estimate

area, total output, and profit, the yearly world cotton offer price was used. The world cotton

price is expressed in US¢/lb. Thus, it was converted to rupees using the average annual exchange

rate from each year (Ministry of Finance).

Pakistan is a large producer/exporter of cotton so that changes in production of cotton in

Pakistan can have an impact on the world price of cotton. Thus, the world cotton price was

adjusted using a global price elasticity of demand for cotton of -0.121, which was a weighted

average of the price elasticities of demand for major consuming countries in Coleman and

Thigpen. This assumes that the rest of the world's production remains at their respective levels for that year, which is a limiting assumption.

Using the "adjusted" world cotton price, estimates for the average change in RTO, real profit, and area devoted to cotton were generated in a fashion similar to the export tax scenario. This resulted in two sets of estimates of the relevant variables for the cotton sector–one under the export tax and one under free market conditions.

A similar approach to the above was used to simulate growth in the yarn sector. The variables under question were real total output, real profit, labor, domestic consumption of cotton, and the real price of cotton. In the "free-market" simulation, the real price of cotton was the "adjusted" world price of cotton from the cotton simulation above.

Pakistan is also a large producer/exporter of cotton yarn, leading to an expectation of changes in the world price of yarn with changes in yarn production in Pakistan. No estimate of a global price elasticity of demand for yarn was available on which to base adjustments. However, the structural equations showed no significant change in production of cotton yarn was expected with changes in cotton price (coming from the export tax)(Hudson and Ethridge) so that no adjustment to the world price of cotton yarn was necessary. The results of both sets of estimates (raw cotton and yarn) under the export tax scenario were compared to their respective free market estimates to determine what impact the export tax on raw fiber was having on the growth in the raw cotton and textile sectors of Pakistan.

Results

Table 1 shows the simulated effects of the export tax on the raw fiber sector. Under the export tax, the area devoted to cotton production increased by an average 40,980 hectares per

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year. Average real profit, however, was decreasing (-834 million rupees per year). Some of this loss in real profit is attributable to high inflation. Also, input prices increased substantially during the later part of the study period due to a decrease in government input subsidies. Real total output increased, on average, over the period (about 1.8 billion rupees per year). This indicates that Pakistan experienced some positive growth in the value of cotton production over the period, which is consistent with what was found by Thigpen et al.

Under open market conditions, the area of cotton is expected to have increased by an average 78,000 hectares per year. This is almost twice the average change in area compared to the export tax scenario, which is logical because the internal price of cotton was substantially lower than the international price. Real profit was also expected to have increased over the period under the open market scenario, in contrast to the export tax scenario, indicating that the export tax caused a decline in industry profits. RTO was expected to increase at an average 6.8 billion rupees per year, 80% more than under the export tax scenario. Thus, the export tax resulted in a substantially slower rate of growth in the raw fiber sector relative to a free market situation.

The simulations show that there is essentially no difference between the export tax scenario in the yarn market (Table 2). This result likely stems from the fact that the structural model showed no significant effect of cotton price on yarn production (Hudson and Ethridge). The result from the yarn sector indicates that the export tax on raw cotton had no beneficial effects on the growth in RTO in the yarn sector, implying that the growth in output experienced in the latter part of the study (1988-1993) would have occurred without the export tax on raw fiber. This is important for two reasons: (1) the policy operated at a substantial net loss to these sectors

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in Pakistan (Hudson and Ethridge) and (2) despite the cost, it achieved only that increase in growth that would have occurred otherwise.

Conclusions

It appears from this analysis that growth in exports is not necessarily growth inducing. It seems particularly important how the growth is induced. That is, the attempt was made by the Government of Pakistan to transfer income from cotton producers to yarn spinners and to lower the input cost in yarn production (Hudson and Ethridge). It certainly achieved those objectives. However, the results of this analysis suggest that the income transferred to yarn spinners from cotton producers in Pakistan was not used to generate additional growth. Consequently, new technology was not adopted and efficiencies were not captured.

Another potential explanation lies in the fact that yarn production is a globalized, high volume/low margin industry. Yarn spinners in Pakistan may have used the lower input cost to lower output price in order to gain market share. Thus, the benefits of the export tax on raw cotton that were intended to stimulate growth in the yarn sector may have been passed on to yarn consumers around the world. This raises the question of whether this result is related to the fact that yarn production is high volume/low margin. It is plausible that an industry that is lower volume/higher margin or less globalized than textiles might be able to capture more of the benefits of such an export tax, reinvest that benefit, and accelerate growth rates.

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Table 1. Summary of Growth Effects of the Export Tax in the Raw Fiber Sector.

Variable	Average Change
------ Under Two-Price Policy ------	
Area	40,980 hectares
Real Profit	-834,100,000 rupees
Real Total Output	1,766,460,000 rupees
------ Under Open Market Conditions ------	
Area	78,300 hectares
Real Profit	2,840,715 rupees
Real Total Output	6,524,109,000 rupees
Difference between estimates of real total output	-4,757,649,000 rupees
Percentage difference	-80%

Table 2. Summary of the Growth Effects in the Yarn Sector of the Export Tax in the Cotton Sector.

Variable	Average Change

------ Under the Export Tax ------

Variable	Average Change
Real Cotton Price	49.427 rupees
Domestic Cotton Consumption	54,610 metric tons
Labor	1,254,182,000 spindle hours
Real Profit	4,055,437,000 rupees
Real Total Output	6,050,042,000 rupees

------ Under Open Market Conditions ------

Variable	Average Change
Real Cotton Price	46.91 rupees
Domestic Cotton Consumption	54,172 rupees
Labor	1,254,182,000 spindle hours
Real Profit	4,080,051,000 rupees
Real Total Output	6,094,403,000 rupees
Difference between estimates of real total output	-44,361,000 rupees
Percentage difference	-0.70%