INTERNATIONAL REVIEW OF ECONOMICS AND BUSINESS - Volume XLI, n. 5 - May 1994

ISSN 0035-6751

RIVISTA INTERNAZIONALE DI SCIENZE ECONOMICHE E COMMERCIALI

Anno XLI Maggio 1994 N. 5

Pubblicazione mensile - Sped. in abb. postale/50% - Bologna

SOMMARIO

Urban Unemployment and Gains from Trade under Capital Immobility (Disoccupazione urbana e guadagni dal commercio con immobilità di capitali)
CHI-CHUR CHAO, SAUWALUCK PAKOTIPRAPHA, and EDEN S.H. YU Pag. 385

Rent Seeking and the Byproduct Theory of Labor Movements (Ricerca di rendita e teoria dei movimenti sindacali)
JOHN H. MANGEL, CHARLES D. DELORME, JR., and DAVID R. KAMERSCHEN » 399

Causality and Lag Structure Between Black Market Foreign Exchange Rates and Consumer Prices. A Case Study of Sudan (Causalità e struttura del ritardo tra il cambio estero al mercato nero e i prezzi al consumo. Il caso del Sudan) ABDEL-MAHMOUD M. ABDEL-RAHMAN » 423

Factor Efficiency in Pakistani Industry: The Influence of Private versus Public Ownership in Affecting Capital and Labor Productivity (Il fattore efficienza nell'industria pakistana: l'influenza della proprietà privata e pubblica sulla produttività del capitale e del lavoro)
ROBERT E. LOONEY » 449

Recensioni (Book-reviews) » 471

Libri ricevuti (Books Received) » 476

Relazioni di bilancio: Credito Fondiario e Industriale, Centrobanca, Credito Italiano » 478

SOTTO GLI AUSPICI DELLA
UNIVERSITÀ COMMERCIALE LUIGI BOCCONI
E DELLA UNIVERSITÀ DEGLI STUDI DI MILANO

CEDAM - CASA EDITRICE DOTT. A. MILANI - PADOVA

Rivista Internazionale di Scienze Economiche e Commerciali
Volume 41 (1994), N. 5, 449-470

FACTOR EFFICIENCY IN PAKISTANI INDUSTRY: THE INFLUENCE OF PRIVATE VERSUS PUBLIC OWNERSHIP IN AFFECTING CAPITAL AND LABOR PRODUCTIVITY

by
ROBERT E. LOONEY *

Introduction

Pakistan's recent fascination with privatization stems from two sources: external and internal. External influences are largely associated with the increased role of the International Monetary Fund in the country's policy making decision process. Internal pressures for privatization are from three main sources.

First concerns the fiscal situation. Government deficits have been a growing problem in recent years and the conventional wisdom has been that in large part these deficits have stemmed from losses accrued by public enterprises. As a result, the perception has developed that a privatization program may go some way to relieving fiscal pressure.

The second source of internal pressure concerns ideology with respect to the role of the state. The emphasis of economic thinking in the late 1980s was on issues such as government failure and the power of the market. In such an ideological environment, the inclination of advisers is to roll back the power of the state and privatization is seen by some as the tool to achieve that objective. This view also gains some support from elements in the current theological debate about what an Islamic economic system should look like. The third source of pressure comes from the business community who sense the opportunity of making a financial killing on the transaction.

In general, however, most economists reject both total public sector domination of production and complete *laissez-faire*. The critical issue is not

* Naval Postgraduate School, Monterey, CA (U.S.A.).

one of privatization or public ownership *per se*, but, particularly in the case of manufacturing, where to draw the demarcation line between the two. What should best be left to the public sector and what to privatize.

While the issues surrounding the areas to privatize will ultimately be determined by political considerations, there are nevertheless some general economic considerations that policy makers ought to consider as they proceed in restructuring the economy. In particular are private firms in Pakistani industry more efficient than their counterparts in the public sector and if so in what regard? Are efficiency differences between state and private firms likely to be large or modest? Do efficiency differences between state and private firms hold across a wide number of industries or are they confined to several segments of manufacturing? Are the observed efficiency differentials confined to better utilization of capital or labor or both? What role do factors such as firm size and regional location play in affecting the productivity of capital and labor?

Privatization and Efficiency

Increased reliance on market forces in developing countries has become the conventional wisdom in development economics. The reasons behind this are varied and include: [1]

1. An intellectual belief, particularly held by economists in the superior attributes of markets versus government central planning regimes and government (public) ownership.
2. The observed inefficiency of state-owned enterprises in developing countries.
3. The success of the NICs, especially those of Asia (Taiwan, Hong Kong, Singapore and Korea) which are perceived to have relied more on market forces than other developing countries.
4. The growth performance of Japan since World War II, where again the perception is one of market reliance.
5. A spill-over effect of conservative political tide which has swept many developed countries in the 1980s, the extreme example of which is Thatcherism in the U.K.; which has been marked by both an intellectual/ideological belief in the superiority of the market system and a commitment to reduce the size of the government deficit/debt. Both of these in turn giving rise to a strong privatization move.

Lesser [2] notes that what has probably been of greatest influence in the

[1] LESSER (1991, p. 160).
[2] *Ibid.*

swing of the advocacy of private markets is the combination of the relative failure of some thirty years of development efforts to significantly increase the standard of living in developing countries, or to close the income gap between developing and developed countries, and the predominant role which governments in most developing countries have played in the development process. In simple terms, government planning is perceived not to have worked, and the advocacy of markets emerges as the alternative [3].

For some, the identification of the alternative (versus perceived failure of government per se) is an ideological premise based on a dual belief that first, efficiency is, or should be, the paramount goal of an economy and second, that markets are the best available means of achieving efficiency. For others the market alternative is seen as a pragmatic option, a means of correcting the perceived failure of government planning systems and state-owned enterprises [4].

As noted above our concern here is largely one of assessing efficiency differences between public and private firms in Pakistan. However, to consider efficiency systematically it is necessary to make a distinction between two types of efficiency – productive and allocative. Productive efficiency is straight forward and refers to the type of efficiency which most lay persons would recognize when they use the term "efficiency". It means producing an output in the least cost possible way, and is secured when the firm is producing the output at minimum average cost. Allocative efficiency is more difficult to grasp. It looks at the output of a company or plant in relation to the output from all the other companies or plants in the economy and asks if the output is too much or too little given a society's preferences. The question is whether the plant is getting too many or too few of the scarce resources in the economy given what society wants. In general allocative efficiency is secured by ever changing competitive prices. Increased competition will (other things being equal) lead to improved allocative efficiency.

Allocative and productive efficiency can often pull in opposite directions. For example, it was often said in the UK that the nationalized industries provided allocative efficiency because the government could impose competitive prices, but that this was at the expense of productive efficiency since there were no obvious mechanisms in the public sector to force lower costs [5].

With regard to productive efficiency, some argue that simply the act of

[3] See for example: BERG (1987).
[4] VERNON-WORTZEL and WORTZEL (1989).
[5] STEVENS (1989, p. 64).

moving the enterprise from the public to the private sector would improve productive efficiency. This assumes that public enterprises are chronically and universally inefficient. There are some theoretical grounds supporting this view associated with economic theories of agencies [6] and public choice [7]. There are no empirical grounds to assume either sector is automatically superior to the other. Superior performance is essentially determined by the environment in which the enterprise operates and the act of privatization alone cannot be assumed to lead to productive efficiency.

Gains to allocative efficiency. [8] – How well markets function will determine privatization's impact on allocative efficiency. Public enterprises operating in competitive markets should be privatized since there is no first or second best rationale for public intervention of any sort. In these cases gains in efficiency will be minor, since the public enterprises will have already been exposed to a competitive environment. These public enterprises will typically be found in the service or manufacturing sectors in areas where there are no scale economies and where the market can support several firms [9].

It would appear that the potential for important efficiency gains is to be found in imperfect markets or in potentially competitive markets where public ownership is the result of unwarranted intervention. In either case however, gains in allocative efficiency from privatization are unclear. In competitive markets, public ownership is sometimes associated with inefficient intervention: a statutory public monopoly established in a market that should support several firms; a public enterprise granted protection from competition; or perhaps public ownership subsidized to support state distributional objectives. In such cases greater efficiency gains can be expected from regulatory reform than from privatization itself, even though in practice the two often come together [10].

The likely gains in imperfect markets are similarly modest. As Hemming and Mansoor argue, "allocative efficiency is a function of market structure rather than ownership" [11]. In the absence of other reforms that affect the pattern of relative prices in the economy and increase competition, the privatized enterprise still faces the same prices as the public enterprise before it. Privatization by itself will not change the nature of the market in

[6] See for example VICKERS and YARROW (1988).
[7] See for example PEACOCK (1979).
[8] The following is based largely on VAN DE WALLE (1989, pp. 604-605).
[9] VAN DE WALLE (1989, p. 604).
[10] VAN DE WALLE (1989, pp. 604-605).
[11] HEMMING and MANSOOR (1988, p. 13).

which the firm operates, and the environment which shapes its pricing decisions. A public monopoly makes way for a private monopoly, for example, but monopoly pricing will remain in effect.

Gains to Productive Efficiency. – With some important exceptions the gains in allocative efficiency from divestiture are likely to be modest. The case for privatization then rests with the gains in productive efficiency that it will bring about within the firm. Privatization advocates argued that public enterprises are more likely to exhibit greater internal inefficiencies than private firms for several reasons:

1. Public enterprises tend to misuse production inputs because they are protected from competition and thus allow considerable slack or "X-Inefficiencies" [12] to develop in their production processes. Public enterprises in many countries have easy access to capital, often at subsidized levels, and thus can be expected to undervalue capital in their investment decisions. Subsequent to privatization an enterprise would compete with other firms for access to capital, and use it more efficiently.
2. The property rights school argues that managerial incentives to maximize profits and minimize costs are undermined by public ownership and regulations [13]; public managers are given numerous and inconsistent objectives by government overseers. Unwieldy bureaucratic controls and the absence of shareholders with a direct interest in profits lessening the pressure on managers to maximize company performance.

Previous Estimates of Public Sector Efficiency

How important are these inefficiencies in production? Certainly in Pakistan's case there are few estimates. While X-inefficiencies are assumed to be important in some cases, it is not clear in what proportion they result specifically from public ownership, rather than from protection from competition more generally. In addition because public enterprises are saddled with noncommercial functions, criteria for performance are more ambiguous and difficult to monitor effectively. Also in Pakistan's case, public enterprises have been burdened with employment creation or overt redistributive functions. In such situations it is difficult to distinguish technology-induced inefficiencies from those brought on by government social welfare objectives.

[12] LEIBENSTEIN (1966).
[13] See for example: DEMSETZ (1968) and FURUBOTN and PEJOVICH (1972).

With these considerations in mind it is interesting to look at the previous empirical work on public/private efficiency and profitability rates. These studies have provided mixed pictures. In one of the first studies of this type Sarmad [14] selected four ratios from a choice of seventeen performance indicators (on the basis of their predictive power). This methodology enabled him to select, in particular, the profitability ratios most appropriate for performance evaluation in the prevailing market conditions. Of his findings several stand out [15]:

1. Nine poorly performing enterprises were identified whose current state was the result of the aggravation of a declining trend in profitability which was already present in the earlier years of 1977-78-1981-82 period.
2. A comparison of the operational conditions of poorly performing enterprises with those of the well performing ones showed that the former, labor intensities were much higher and factor utilization relatively unproductive. However, despite continuous deficits, the low-performing enterprises were not allowed to go into liquidation.
3. The regression results regarding the determinants of enterprise profitability were just as expected. Enterprise size was found to be negatively related to the profit rate while for the group of smaller enterprises the relation was positive, suggesting a certain critical level beyond which enterprise size exerts a negative influence on the profit rate.
4. The growth rate of the asset variable is significant and positively related to profit rate, which is explained by the increase in capacity utilization of nearly all public enterprises during the years from 1977-78 to 1981-82. The negative relation of leverage to the profit rate is explained by the greater risk associated with a higher equity-asset ratio.

Sarmad concluded [16] that the lower profit rate in big enterprises could result from two causes. First such enterprises tend to have a large share of the total supply of the product and because of less competition have little incentive to improve efficiency. Secondly, given the limited size of the domestic market, capacity utilization in large enterprises is low, particularly during the earlier years of operation. Sarmad notes that while the inverse relationship between enterprise size and rate of profit is true in general, the incidence of slackness is mostly in the small asset sized group.

As noted above, owing to multiple objectives, i.e., commercial and non-commercial, assessment of asset utilization in public enterprises is a

[14] SARMAD (1984).
[15] SARMAD (1984, p. 153).
[16] SARMAD (1984, p. 153).

complex task. The most important element which influences the performance of these firms is government control on prices of their inputs and outputs. Barring a few manufacturing enterprises prices of almost all of the public enterprises in Pakistan are directly or indirectly controlled by the government which in turn influence their sales as well as profits [17].

Despite the presumption that public enterprises in Pakistan lack profitability because of price controls, a recent report by the Auditor General [18] shows that in 1987-88 the return on government investment works out to 8 percent. The GSC report demonstrates that in 1988-89, 154 public enterprises' return on net shareholder equity works out to 10.4 percent. In addition, enterprises paid total taxes of Rs 25.8 billion which is 26.7 percent of total consolidated taxes received by the government. During the same years these enterprises generated a saving of Rs 24.8 billion against an investment of Rs 26.8 billion, leaving a gap of only Rs 2 billion i.e., 7.7 percent.

However, the analysis of the financial performance also shows a significant number of negative trends [19].

1. Since inflation in Pakistan is approximately 9 percent and the interest rate around 15 percent enterprises generating less than this return on assets can be considered giving negative return on assets employed. There were only six enterprises which in 1988-89 gave a return above 15 percent and ten enterprises which gave returns above 10 percent.
2. Out of 154 GSC enterprises, at least 51 units with about 12 percent assets incurred losses. In the manufacturing sector alone 5 units with about Rs 2 billion assets were closed down; and
3. In 1988-89 out of 356 companies listed at the Karachi Stock Exchange 44 belonged to the public sector. These companies with 56 percent share in assets contributed 454 percent of the sales and generated only 38 percent net profit. Similarly their share in corporate tax was 37 percent and the dividends at 35 percent.

As Mehdi [20] notes, the above findings may simply demonstrate the effects of the negative element of public ownership rather than inefficiency of management. This however, is consistent with the notion that in general public sector firms have higher cost structures. A primary conclusion of a survey of public enterprises world wide is that they have not performed up

[17] MEHDI (1991).
[18] AUDITOR GENERAL OF PAKISTAN (1989).
[19] MEHDI (1991, pp. 896-897).
[20] MEHDI (1991, p. 896).

to the expectations of their creators and founders [21]. In Pakistan also such conclusions have strengthened the case for economic reforms in which privatization plays a major role.

Along these lines, LaPorte and Ahmed [22] note their starting assumptions concerning state ownership, the role of public enterprises in the economy of Pakistan, and the performance of these organizations: [23]

1. state ownership is unavoidable
2. public enterprises play a major role in the economy of Pakistan
3. the commercial performance of public enterprises is poor
4. if government continues to use public enterprises, improvements in management and performance must be pursued; and
5. alternatives to "government" by public enterprise should be pursued.

are essentially correct.

Qualifying the third point, they note that while their results suggested that the public enterprise sector as a whole was not the savings generating sector as envisaged by its advocates, nor were many public enterprises profit makers; not all lost money and some not only generated savings, but made profits for the government. They found that public enterprises whose management systems were quite archaic or that had just begun to adopt business-type systems, generated savings and made profits despite being over staffed. They do caution however that these enterprises were in economic sectors where they enjoyed a monopoly status, and had very high demands for their goods or services. In this regard, it should be noted that the principle examples they cite where this occurrence was common was not in manufacturing but the Water and Power Development Authority (WAPDA) and Telegraph and Telephone.

In a much more detailed study, Shaikh examined the operational performance of Pakistan's vegetable ghee industry during the ten year period 1970-80 [24]. Here the particular focus was on the trend in performance and relative efficiency under the two ownership periods: [25]

1. In terms of the growth rate of public profitability in constant prices the period of study could be divided into three phases, each coinciding with a different

[21] NELLS (1990).
[22] LAPORTE and AHMED (1989).
[23] LAPORTE and AHMED (1989, pp. 146-147).
[24] SHAIKH (1985).
[25] SHAIKH (1985).

external control structure: high rate of growth from a very low base under private ownership, stagnation under the provisional governments and impressive growth from a relatively high base under the Ghee Corporation.
2. In terms of average level of public profitability in constant prices, the performance of the period under public ownership was significantly better than the performance in the period under private ownership.

Shaikh qualifies his findings by suggesting [26] that managerial performance under private ownership was probably better than indicated by these results for several reasons. First there was uncertainty in the supply of inputs during some years of the private period. Secondly, deliberate underreporting of operational performance occurred for purposes of tax evasion. Third, it can be argued that some of the increased production was a passive response to shifting demand. How the private sector would have responded in the absence of nationalization is something that cannot be tested.

In spite of these qualifications, the results can be used to argue [27] against the inevitability of lower efficiency under public ownership. The results also suggest the fact that it is not ownership *per se* but rather the nature of the technology, prevalent institutional arrangements and specific policies adopted by the government which affect performance. This fact is dramatically brought out by the contrast in the performances during the two phases of public ownership. Both the level and the rate of growth in public profitability in constant prices are significantly higher for the period under the Ghee Corporation than for the period under the provincial governments.

In their study of privatization Naqvi and Kemal [28] concluded that most of the *a priori* arguments in favor of privatization – e.g., that it improves allocative or productive efficiency by promoting greater competition, that it helps to raise more money for the government to help solve its budgetary deficit problems and that it lays the foundation of the so-called people's capitalism – are not convincing in Pakistan's context.

In particular, their analysis suggests that: [29]

1. Privatization may yield modest, if any gains in allocative or productive efficiency because the (private) market structures are basically oligopolistic.
2. The public sector's profitability is due not to the higher level of protection that it enjoys (indeed, the effective protection rates are lower for them) nor due to

[26] SHAIKH (1985, p. 716).
[27] SHAIKH (1985, p. 716).
[28] NAQVI and KEMAL (1991).
[29] NAQVI and KEMAL (1991, p. 131).

any restrictions placed on the entry of new firms, but to its better performance and superior productive efficiency.
3. The charge of the inherent inefficiency of the public industrial enterprises is based neither on good theory nor solid empirical evidence.
4. The country's stock exchanges are too thin and the small potential takers of the stocks of the diversified public enterprises are basically risk averters.

From this they concluded [30] that changing the locus of ownership of industries is by itself neither a necessary nor a sufficient condition for an efficient operation of specific industrial enterprises. Their evidence shows that both the private and public sector firms have operated efficiently as well as inefficiently, depending on the type of industry to which they belong. Their results also suggest very strongly that in Pakistan, there is nothing inherently good or bad about the public sector; or even about the private sector for that matter. Specifically they cite data showing that the thirty nine units out of the sixty public enterprises units for which data is available have had capacity utilization rates exceeding 75 percent. This piece of information also confirms the fact that public sector enterprises do not necessarily act as monopolists (or oligopolists) restricting output and raising prices.

Indeed Naqvi and Kemal's data show that in terms of production, the performance of the public sector corporations has been commendable [31]:

1. That public industrial companies have not necessarily been inefficient is quite clear from the indicators such as pre-tax profits on new equity and the growth rates of output. Over the 9 years period from 1978-79 to 1987-88 the production increased at a rate of 8.9 percent which is no lower than the average growth rate of the large manufacturing sector as a whole over the period.
2. Furthermore the average rate of return on equity of 10.0 percent (in 1987-88) has been no less than the average rate of interest on domestic borrowing. Indeed it has been significantly higher than the average inflation rate of around 6 percent (in 1988-89).

Naqvi and Kemal [32] also note that the experience of the public industrial enterprises shows marked variations both across industrial units within an industry and across different industries. These differences may have been caused by differences in the scale of production, the quality of management, and the environment in which they operate. The favorable impact of change

[30] NAQVI and KEMAL (1991, p. 131).
[31] NAQVI and KEMAL (1991, pp. 131-132).
[32] NAQVI and KEMAL (1991, p. 132).

in management on the efficiency of operations can probably be best explained with reference to the Pakistan National Fibers (producing polyester fiber) which made a loss up to 1984-85, but with a change in management in 1985 it has turned into a profitable unit since 1985-86. The success of management is even more significant because over the 1986-90 period, there has been a substantial reduction in the protection given to the polyester industry.

Finally, Naqvi and Kemal [33] observe that privatization leads to a higher level of efficiency only to the extent that it enhances competition; but this does not always happen, because the presence of a large number of firms in almost all the industries where public enterprises operate offers scope for (monopolistic) competition. The only exception to this rule is Pakistan Steel, which enjoys a monopoly in most of the products it sells; though in certain other products it faces competition both from the private sector and from the imported products. Moreover, the average effective rate of protection in the public sector industries is significantly less than the average for the industrial sector. All of these considerations point to the conclusion that where industrial inefficiency is the problem, steps should be taken to improve the situation regardless of the locus of ownership. The divestiture of public enterprises, mainly on ideological grounds to secure dubious economic gains or to satisfy the sensibilities of donors and creditors, is certainly not an optimal policy.

In summing up the previous work on public enterprise performance in Pakistan, it is clear that a number of issues remain unresolved. In part the difficulty involved in deriving some general conclusions are associated with the common practice of lumping all public enterprises together. Clearly the performance of public enterprises in manufacturing is somewhat different than experienced by similar firms in utilities or other sectors of the economy.

A related issue is that conclusions concerning the performance of public enterprises often hinges on the (somewhat arbitrary) selection of a measurement of profitability or efficiency. Profits, capital utilization, labor efficiency and the like all give somewhat different pictures of efficiency. Finally different studies have examined firms at different points in time. Obviously the economic environment in the 1970s was different enough from that in the 1980s to have produced a significant effect on firm efficiency.

In the analysis that follows we hope to overcome these problems through focusing exclusively on production efficiency.

[33] NAOVI and KEMAL (1991, p. 132).

Methodology

The data is composed of the industrial statistics provided in the annual *Census of Manufacturing Industries* [34]. The raw data by industry consists of:

1. Number of Reporting Establishments;
2. Value of fixed assets at the end of the year;
3. Changes in stocks;
4. Average daily persons engaged;
5. Average daily Employment including contract labor-number;
6. Average daily Employment including contract labor-cost;
7. Industrial cost during the year;
8. Value of production during the year; and
9. Value added during the year.

Each of these variables is identified by region: (a) Total Country, (b) Punjab, (c) Sindh, (d) NWFP and (e) Baluchistan and by ownership pattern: (a) individual ownership, (b) partnership, (c) private limited company, (d) public limited company, (e) co-operative society, (f) federal ownership, (g) corporation by act of National/Provisional assembly, (h) provincial government establishment, (i) and local body government establishment. Individual ownership, partnership and private limited company were aggregate to obtain total private firms. The remaining firms were classified as public sector entities.

The industrial groups are:

Food Beverages and Tobacco
Food Manufacturing
Beverage Industry
Tobacco Manufacturing

Textile, Apparel & Leather
Manufacture of Textiles
Wearing Apparel
Leather and Leather Products
Foot Wear except rubber or plastic
Ginning and bailing of fibers

Wood, Wood Products and Furniture
Wood, wood and Cork products
Furniture and fixtures, not metal

[34] FEDERAL BUREAU OF STATISTICS (1976 through 1986-87).

Paper, Printing and Publishing
Paper and Paper Products
Printing and Publishing

Chemicals, Rubber and Plastics
Drugs and Pharmaceutical Products
Industrial Chemicals
Other Chemical Products
Petroleum Refining
Products of Petroleum Refining
Products of Petroleum and Coal
Rubber Products
Plastics

Non-Metallic Mineral Products
Pottery, China and Earthenware
Glass and Glass Products
Other non-Metallic Products

Basic Metal Industries
Iron and Steel
Non-Ferrous Metal Basic Industries

Metal Products, Machinery, Equipment
Fabricated Metal Products
Non-Electrical Machinery
Electrical Machinery and Supplies
Transport Equipment
Scientific and Measuring Instruments
Photographic and Optical Goods

Handicrafts, Sports and Others
Handicrafts
Sports and Athletic Goods
Other Manufacturing

The basic model was estimated in a two step manner:

1. The first step involved estimating [35] two separate factor productivity relation-

[35] Ordinary least squares estimates were performed. See *SPSS/PC + Base System User's Guide, version 5.0* (Chicago: SPSS Inc., 1992) for a description of the computational method. Data from: Government of Pakistan, Federal Bureau of Statistics, Statistics Division, *Census of Manufacturing Industries* annual editions, 1975-76 to 1986-87.

ships. The first, the contribution of capital (the productivity of capital) to overall value added, and the second the contribution of labor (the productivity of labor).
2. On the assumption the predicted values for each of these equations represent the average productivity of capital (and labor), an additional step assessed the factors responsible for deviations from this norm. Specifically, what factors contributed to firms attaining output levels higher (and lower) than that normally associated with a certain quantity of capital (and labor)?
3. Operationally, 2 above involved regressing separately two sets of variables on the residuals from the capital/value added and labor/value added equations: the first set of variables consisted of other factor inputs (raw materials and labor for the capital equation and raw materials and capital for the labor equation), together with the size of the firm.
4. The size of firms (defined in terms of capital per firm in the capital productivity equations and in terms of labor per firm for the labor productivity equations) was included to control for the fact that public sector firms are, on average, larger than their private counterparts, i.e. we wanted to eliminate the spurious correlation between ownership and the size of the firm.
5. The second set of variables consisted of a series of structural parameters: the effect of regional location, a time/policy dimension and finally, whether the firm was private or public. Here the attempt was to determine the effect of ownership on factor productivity after controlling for as many other factors as possible.

Results

Before examining the findings in detail, several qualifications are in order:

1. In addition to the usual limitations of the data, several conceptual problems should be noted. The dependent variable is value added. It is likely that market imperfections will bias the results although the general direction of this bias is not apparent. On the one hand public firms are more likely to face less competition than their private counterparts (and thus have an inflated value added). On the other hand many of these public enterprises have their prices controlled (and thus have a deflated value added).
2. The product mixes in the same industry will vary from private to public firms, thus the dependent variable (value added) may not be directly comparable for both types of firms.
3. The labor term is average daily employment per firm. The skill levels may vary systematically between public and private firms.

With these limitations in mind, the analysis produced a number of interesting patterns (summarized in Table 1):

1. For manufacturing as a whole (Table 1), variations in capital account for slightly over 75 percent of the variation in value added (equation 1). The same is also true for labor looked at individually.
2. Labor, materials and size were all statistically significant in accounting for deviations in value added from that predicted by the stock of capital. It should be noted that the size variable was negative, suggesting that larger firms may not be as efficient as their smaller counterparts in effectively utilizing plant and capacity.
3. While the regional variable was insignificant – locations in regions of descending level of development: Punjab = 1; Sindh = 2; NWFP = 3 and Baluchistan = 4 do not appear to systematically affect the productivity of capital – there was a distinct time trend. Breaking the period under consideration into four sub periods 1976-78, the Bhutto years; 1979-81 the early Zia years = 2; 1982-84 consolidation under Zia = 3; and 1985-87 = the transition towards civilian rule = 4, it was found this variable had a negative sign (indicating falling productivity associated with time).
4. Finally the ownership variable was positive and statistically significant. Since this variable assumed values of 1 for private and 2 for public firms, it appears that public ownership is associated with a more productive capital stock than that controlled by the private sector.

Before we can conclude that public ownership appears to generate more value added per unit of capital than do comparable amounts under private ownership it should be noted that the overall improvement in the explanation of the capital residual term (Table 2, equation 1) was relatively minor. Even including the regional, and time variables – the adjusted $r2$ term increased from 0.238 to 0.253. On the other hand this result (Table 2 equation 3) does suggest that for manufacturing as a whole there are no gross inefficiencies in capital usage associated with public ownership per se.

A somewhat similar picture emerges from the analysis of labor productivity (Table 2 equations 4, 5 and 6):

1. Again, other factor inputs (materials and capital) together with size were statistically significant in accounting for differences in productivity. However, capital was significant at only the 90 percent level. As with capital, regional location does not appear to affect the productivity of labor.
2. On the other hand, time was no longer a significant factor affecting productivity. More importantly the negative sign on the ownership term suggests that labor is more effectively utilized by private firms.

Again it should be noted that the structural variables – region, time and ownership – provided only a marginal improvement in the overall explanation of differences in labor productivity.

TABLE 1

SUMMARY OF EMPIRICAL FINDINGS ON THE PRODUCTIVITY OF CAPITAL AND LABOR IN PAKISTANI MANUFACTURING

Industry	Factor Inputs			Size	Structural		
	Capital	Labor	Materials		Region	Time	Public/Pr
Total Manufacturing							
Capital		+++	+++	---	ins	---	+++
Labor	+++		+++	---	ins	ins	---
Food							
Capital		+++		---	---	ins	---
Labor	ins		ins		---	+++	ins
Textiles							
Capital		+++	+++	---	--	---	ins
Labor	++		+++	---	---	ins	--
Wood Products							
Capital		ins	++	--	++	--	ins
Labor	ins		+++	---	+++	ins	ins
Paper/Publish							
Capital		+++	ins	---	+	ins	ins
Labor	ins		+++	---	ins	ins	--
Chemicals							
Capital		+++	+++	---	ins	ins	+
Labor	+		+++	---	ins	ins	ins
Non-Metallic Minerals							
Capital		ins	+++	---	---	-	++
Labor	+		+++	---	ins	ins	-
Basic Metals							
Capital		ins	+++	ins	++	ins	++
Labor	ins		+++	ins	+++	ins	--
Metal Products/ Machinery							
Capital		ins	+++	---	+++	--	++
Labor	ins		+++	---	+++	ins	ins
Handicrafts/ Sports/Other Manufacturing							
Capital		++	ins	ins	ins	--	ins
Labor	+++		ins	---	ins	ins	ins

SOURCE: Compiled from Tables 2-11. NOTES: + = positive coefficient (+ significant at 90% level of confidence, ++ = 95%, +++ = 99%). - = negative coefficient (- significant at 90% level of confidence, -- = 95%, --- = 99%).

TABLE 2

PAKISTAN: FACTORS AFFECTING RESOURCE PRODUCTIVITY: TOTAL MANUFACTURING INDUSTRIES

Productivity of Capital (K)

(1) $VA = 1.25 + 0.89\,K$
(9.20) (56.46)*** r^2(adj) = 0.754; $df = 1036$; $F = 3187.27$***

Analysis of Residuals (RE = Actual-Predicted), Labor (L), Materials (MT), Size (SC)

(2) $RE = -2.81 + 0.33\,L + 0.25\,MT - 0.56\,SC$
(−16.05) (7.83)*** (9.11)*** (−13.89)***
[0.43] [0.49] [−0.68]
r^2(adj) = 0.238; $df = 1034$; $F = 109.07$***

Region (RG), Time Period (TP), Ownership-Public/Private (PS)

(3) $RE = -2.49 + 0.25\,L + 0.27\,MT - 0.57\,SC - 0.05\,RG - 0.19\,TP + 0.20\,PS$
(5.70)*** (9.69)*** (−12.64)*** (−1.53) (−3.68)*** (2.26)**
[0.36] [0.48] [−0.69] [−0.04] [−0.10] [0.11]
r^2(adj) = 0.253; $df = 1031$; $F = 59.47$***

Productivity of Labor (L)

(4) $VA = 2.96 + 1.27\,L$
(29.44) (60.01)*** r^2(adj) = 0.776; $df = 1036$; $F = 3601.02$***

Analysis of Residuals (RE = Actual-Predicted), Capital (K), Materials (MT), Size (SL)

(5) $RE = -2.74 + 0.05\,K + 0.41\,MT - 0.63\,SL$
(−17.62) (1.90)* (14.34)*** (−17.61)***
[0.11] [0.76] [−0.65]
r^2(adj) = 0.256; $df = 1034$; $F = 119.92$***

Region (RG), Time Period (TP), Ownership-Public/Private (PS)

(6) $RE = -2.93 + 0.06\,K + 0.42\,MT - 0.56\,SL - 0.04\,RG + 0.07\,TP - 0.25\,PS$
(2.07)** (14.60)*** (−11.32)*** (1.34) (1.35) (−3.40)***
[0.13] [0.78] [−0.58] [0.04] [0.04] [−0.14]
r^2(adj) = 0.266; $df = 1031$; $F = 63.56$***

NOTES: Ordinary least squares estimates. r^2(adj) = adjusted coefficient of determination; F = F Statistic; df = degrees of freedom; ( ) = t statistic with: *** significant at the 99% level; ** significant at the 95% level; * significant at the 90% level. [ ] = standardized coefficients; VA = value added; K = value of fixed assets; L = Average daily employment; MT = cost of materials. VA, K, L and MT are in natural logarithms and on a per firm basis. RG = regional dummy variable with Punjab = 1, Sind = 2, NWFP = 3 and Baluchistan = 4. PS = ownership dummy with private firms = 1 and public firms = 2. There are two size variables. SC is defined in terms of the firm's capital stock with value less than 5 million Rs = 1; 5 million to 10 million = 2, 10 million to 50 million = 3 and greater than 50 million = 4; SL is defined in terms of the workforce per firm with less than 25 workers = 1; 25 to 100 = 2; 100-500 = 3 and greater than 500 = 4. Time period (TP) reflects the evolving political/economic environment toward less state intervention with 1976-78 = 1; 1979-81 = 2; 1982-84 = 3; and 1985-87 = 4.

To determine the generality of these patterns, similar regressions were performed on the value added of other major industrial groupings. While space does not permit a detailed accounting of each main division of manufacturing, several findings are of particular interest. For the food industry (Table 3):

1. By itself variations in capital accounted for about 50 per cent of the observed differences in value added (Equation 1, Table 3). In contrast, labor accounted for over 86 percent in the differences in value added between firms (Table 3, Equation 4).
2. In contrast to manufacturing as a whole, regional location appears to play an important role in affecting the productivity of capital (Equation 3, Table 3). Here the negative sign indicates that plants located in the less developed regions – NWFP and Baluchistan utilize capital less efficiently than their counterparts in the more developed parts of the country – Punjab and Sind.
3. While there appears to be no productivity effects associated with time, the ownership variable is negative (Table 3, Equation 3), suggesting that capital is used relatively ineffectively by public firms.
4. As noted, labor is much more important than capital in accounting for differences in value added between firms in the food industry. Furthermore, capital and materials appear to be insignificant in accounting for differences in value added across firms (Equation 5, Table 2).
5. Although labor productivity differences across firms can not be explained by the relative use of supporting resources (capital and materials) several structural variables do play a role. In particular, firms in the more developed regions have labor productivity levels above their counterparts in the more backward areas of the country. In addition, there appears to be a general increase in labor productivity with time.
6. Finally, although public firms in the food industry appear to use capital less efficiently than their private sector counterparts, they are not at a disadvantage with regard to the utilization of labor (Table 3, Equation 6).

For the remaining industries, several general patterns emerge:

1. Industrial inputs-materials, fuel and the like are consistently quite significant in affecting the productivity of labor and capital.
2. Regional location appears to be a bit more important in determining the productivity of capital rather than labor, although there are several exceptions to this rule. The main pattern here is one whereby if regional location affects the productivity of one factor it generally also does so for the other.
3. There does not appear to be a regional pattern with regard to the common definition of industries into light (food, textiles, wood, paper and handicrafts) and heavy (chemicals, non-metallic minerals, basic metals and metal products). Locat-

TABLE 3

PAKISTAN: FACTORS AFFECTING RESOURCE PRODUCTIVITY: THE FOOD INDUSTRY

Productivity of Capital (K)

(1) $VA = -0.42 + 1.15\,K$
(-0.46) $(11.99)^{***}$ $r^2(\text{adj}) = 0.499$; $df = 142$; $F = 143.73^{***}$

Analysis of Residuals (RE = Actual-Predicted), Labor (L), Size (SC)

(2) $RE = -3.87 + 1.25\,L - 1.11\,SC$
$(11.02)^{***}$ $(-7.81)^{***}$
$[1.15]$ $[-0.82]$
$r^2(\text{adj}) = 0.463$; $df = 141$; $F = 62.59^{***}$

Region (RG), Time Period (TP), Ownership-Public/Private (PS)

(3) $RE = -3.53 + 0.41\,L - 1.06\,SC - 0.29\,RG + 0.24\,TP - 0.56\,PS$
$(10.81)^{***}$ $(-7.00)^{***}$ $(-3.13)^{***}$ (1.43) $(-2.85)^{***}$
$[1.30]$ $[-0.78]$ $[-0.19]$ $[0.90]$ $[-0.22]$
$r^2(\text{adj}) = 0.503$; $df = 138$; $F = 29.98^{***}$

Productivity of Labor (L)

(4) $VA = 2.92 + 1.42\,L$
(11.53) $(29.91)^{***}$ $r^2(\text{adj}) = 0.863$; $df = 142$; $F = 894.57^{***}$

Analysis of Residuals (RE = Actual-Predicted), Capital (K), Materials (MT)

(5) $RE = 1.07 - 0.03\,K - 0.07\,MT$
(1.90) (-0.37) (-0.80)
$[-0.05]$ $[-0.11]$
$r^2(\text{adj}) = 0.012$; $df = 141$; $F = 1.87$

Region (RG), Time Period (TP), Ownership-Public/Private (PS)

(6) $RE = 1.52 - 0.13\,K - 0.06\,MT - 0.22\,RG + 0.37\,TP + 0.26\,PS$
(-1.45) (-0.58) $(-3.31)^{***}$ $(3.30)^{***}$ (1.19)
$[-0.21]$ $[-0.09]$ $[-0.26]$ $[0.27]$ $[0.16]$
$r^2(\text{adj}) = 0.128$; $df = 138$; $F = 5.21^{***}$

NOTES: same as Table 2.

ing in the poorer regions tends to reduce the productivity of capital in food, textiles, and non-metallic minerals, but increases it in wood products, paper, basic metals and metal products industries.

4. In general, capital became less productive over time. That is for those industries where time had a statistically significant effect on the productivity of capital it was

always in a negative direction. Labor productivity in food was the only case where output per unit of a factor increased systematically with the passage of time. For all other industries, labor productivity does not appear to have varied systematically with time.

5. As noted for industries as a whole, public firms appear to utilize capital more effectively than their private counterparts. However, this is offset a bit in several cases by the fact that these firms use labor less efficiently. It should be noted that this relationship between state ownership and capital productivity is confined largely to the heavier industries, chemicals, non-metallic minerals, basic metals and metal products industries. As such this result is a bit surprising given the fact that public firms usually use considerably more capital per unit of labor than that associated with private production.

6. Possibly a related pattern involves the inability of heavy industries – non-metallic minerals, basic metals and metal products/machinery – to increase capital productivity per firm though increasing the number of supporting workers per firm. This pattern suggests relatively fixed technical coefficients for these firms, leaving management and organization as the mainly responsible for overall capital productivity.

7. In contrast capital productivity in the lighter industries (with the exception of wood products) is increased considerably with the addition of additional workers.

Conclusions

The analysis undertaken above was largely concerned with those areas where the gains from privatization in Pakistan are likely to produce improvements in productive efficiency (as opposed to allocative efficiency). In general the main findings noted above are consistent with those of Naqvi and Kemal, and suggest that privatization *per se* may not provide the significant increases in output and productivity predicted by advocates of these programs.

If the government continues to move ahead with privatization in manufacturing, its best strategy would seem to be selective privatization in the lighter manufacturing areas such as food and textiles. Although even here the work noted on the vegetable ghee industry suggests that the gains from privatization may be minimal. In any case, the lighter manufacturing industries should be examined carefully before moving on to the heavier industries where there are significant gains in productivity.

The general increases in output that might be expected from increased capital efficiency in the lighter manufacturing areas should also be reinforced if the privatization movement also reduces through further divestiture the overall size of firms. Also the most productive areas to explore for

privatization in the food and textiles industries appear to be in the more underdeveloped regions – NWFP and Baluchistan.

REFERENCES

AUDITOR GENERAL OF PAKISTAN, *Investments and Loans of the Federal Government in Public Enterprises*, Lahore: Office of the Auditor General of Pakistan, June 1989.

BERG Eliot, "The Role of Divestitures in Economic Growth", in S. Hanke, ed., *Privatization and Development*, San Francisco: Institute for Contemporary Studies, 1987, 23-32.

DEMSETZ H., "Why Regulate Utilities", *The Journal of Law and Economics*, 1968, *11*, 55-65.

FEDERAL BUREAU OF STATISTICS, Statistics Division, Government of Pakistan, Islamabad, various issues, 1976-1987.

FURUBOTN E.G. and PEJOVICH S., "Property Rights and Economic Theory: A Survey of the Recent Literature", *Journal of Economic Literature*, No. 6, December 1972, *10*, 280-86.

HEMMING Richard and MANSOOR Ali M., "Privatization and Public Enterprises", *Occasional Paper No. 56*, Washington: International Monetary Fund, 1988.

LAPORTE Robert Jr. and AHMED Muntazar Bashir, *Public Enterprises in Pakistan: The Hidden Crisis in Economic Development*, Boulder, Colorado: Westview Press, 1989.

LEIBENSTEIN H., "Allocative Efficiency vs. X-efficiency", *American Economic Review*, No. 3, June 1966, *56*, 393-415.

LESSER Barry, "When Government Fails, Will the Market Do Better? The Privatization/Market Liberalization Movement in Developing Countries", *Canadian Journal of Development Studies*, No. 1, 1991, *12*, 159-72.

MEHDI Istaqbal, "Privatization-A Device for Reforming Public Enterprise Sector in Pakistan", *The Pakistan Development Review*, No. 4 Part II, Winter 1991, *30*, 895-905.

NAQVI Syed Nawab Haider and KEMAL A.R., "The Privatization of Public Industrial Enterprises in Pakistan", *The Pakistan Development Review*, No. 2, Summer 1991, *30*, 105-144.

NELLS John, "Privatization in Reforming Socialist Economies", paper submitted in Conference on Privatization in East Europe, Ljubljana, Yugoslavia, November 1990.

PEACOCK A., *The Economic Analysis of Government and Related Themes*, Oxford: Martin Robinson, 1979.

SARMAD Khwaja, "The Profitability of Public Enterprises in Pakistan", *The Pakistan Development Review*, Nos. 2-3, Summer-Autumn 1984, *23*, 147-53.

SHAIKH Abdul Hafeez; "Evaluating the Operational Performance of Manufacturing Enterprises: An Evaluation Framework and Application to Pakistani Industry", *The Pakistan Development Review*, Nos. 3-4, Autumn-Winter 1985, *24*, 703-17.

STEVENS Paul, "Privatization in the Middle East and North Africa", *Arab Affairs*, No. 10, 1989, 58-75.

VAN DE WALLE Nicolas, "Privatization in Developing Countries: A Review of the Issues", *World Development*, No. 5, 1989, *17*, 601-15.

VERNON-WORTZEL Heidi and WORTZEL Lawrence, "Privatization: Not the Only Answer", *World Development*, No. 5, 1989, *17*, 683-702.

VICKERS J. and YARROW G., *Privatization – An Economic Analysis*, Cambridge, Mass.: MIT Press, 1988.

IL FATTORE EFFICIENZA NELL'INDUSTRIA PAKISTANA: L'INFLUENZA DELLA PROPRIETÀ PRIVATA E PUBBLICA SULLA PRODUTTIVITÀ DEL CAPITALE E DEL LAVORO

Lo scopo di questo articolo è di esaminare le possibili influenze economiche della privatizzazione nel Pakistan. In particolare, stabilire se le imprese private dell'industria pakistana sono piú efficienti delle imprese corrispondenti nel settore pubblico e, in caso affermativo, in che modo. La conclusione è che la privatizzazione in sé può non portare i significativi aumenti di produzione e produttività che i sostenitori di questi programmi asseriscono. Se il governo continua sulla strada della privatizzazione nelle industrie, la miglior strategia sembrerebbe essere una privatizzazione selettiva nei settori industriali leggeri come l'alimentare e il tessile.