

Note:

Intra-Model Employment Elasticities
(A Case Study of Pakistan's Small – Scale Manufacturing Sector)

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Abstract

In the paper we have estimated elasticities of employment with respect to the expansionary factors. According to our finding, in the small scale manufacturing sector size of employment is negatively related with wage elasticity, positively related with capital elasticity and also positively related with value of product elasticity.

Introduction

In Pakistan investment and registration status are used to distinguish the small scale manufacturing sector. The Federal Bureau of Statistics has classified all registered factories as large scale and unregistered establishments as small scale. For administrative purposes the definition of small scale is based on the value of fixed assets, irrespective of its registration status. Industrialized countries define small-scale firms as those employing less than 200-300 workers. In the National Income Accounts, firms employing less than 10 persons are classified small. However, the definition of small scale industry is quite arbitrary and changes from country to country and from time to time.

Small-scale industry is defined as an industry whose firms or farms operate with small-sized plant, low employment, and hence small output capacity. Economies of scale do not normally exist for such firms or farms. But they often tend to utilize their limited physical, human, and financial capital more efficiently than many large firms or farms. Whereas a small farmer is defined as a farmer owning a small family-based plot of land on

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which he grows subsistence crops and perhaps one or two cash crops, relying almost exclusively on family labor.

As the size of an industry is defined on the basis of employment in this paper, we have divided employment elasticities in small-scale industry into two groups. First, employment elasticities in small-scale firms employing 1 to 9 workers, second, employment elasticities in small-scale firms employing 10 to 19 workers, and also we have taken combined employment elasticities in small-scale firms employing 1 to 19 workers.

The paper is organized as follows. Firstly, we have reviewed the available literature about small-scale industries and their employment contribution. Secondly, a discussion about methodology used and data availability and its limitations. Thirdly, we discuss the empirical findings, and fourthly, conclusions and policy proposals are drawn.

Review of Literature

Small Scale and Household Manufacturing Industry can contribute to economic development by providing employment creating jobs with low capital costs. In Pakistan, the importance of the small scale manufacturing industry has been given its due recognition. The various five-year plans mention small-scale industry and focus their main attention in the area. For example, to quote from the First Five Year Plan (1955-1960). "Small industries have a specific contribution to economic development. In the first place it can contribute to the output of needed goods without requiring organization of large new enterprises or the use of much foreign exchange to finance the import of new equipment. Second, it can provide opportunities for employment beyond the narrow boundaries of urban centers. Finally, as history shows, it can perform an important function in promoting growth, providing a training ground for management and labor and spreading industrial knowledge over wide areas".

According to Khalid Nadvi (1990), the informal sector consisting of small enterprises and household units appears to be expanding more rapidly than the formal sector and more than the formal sector provides employment to the majority of those engaged in urban manufacturing in Pakistan. Informal sector units are characterized by extremely low levels of employment and a high incidence of unwaged family workers. As to capital intensity there appears to be a distinct technology hierarchy on the basis of which household units are the most labor intensive and formal sector concerns the most capital intensive. Furthermore, capital intensity is in real terms growing more rapidly in the formal sector leading to a net displacement of labor. As a result labor

productivity is substantially greater in the formal sector while capital productivity is inversely related to unit size.

According to Asad Sayeed (1995), the large scale capital goods sector can create the appropriate linkages for the embodiment of technical change in equipment, which can then enhance the productivity of the small sector accordingly. Secondly, because of economies of scale, the large scale sector can contribute towards reducing the cost of intermediate and capital goods for the small scale sector. Thirdly, with large firms subcontracting to the small, productivity enhancement and technical up-gradation is further encouraged through user producer interactions, quality standards, specification requirements etc. Syed Akbar Zaidi (1999) maintains there is no denying the fact that the small -scale sector plays, and is going to play, an increasingly important role in Pakistan's economy.

J.H. Powr (1962), Bhalla, A.S (1973) and J.N. Bhagwati (1978) worked on small industrial enterprises in Bombay, Delhi and Karachi and argued that "the development of small scale industries, on the other hand, is not expected to make inefficient utilization of resources. The small industries have relatively high employment per unit of capital and short term advantage of lower capital output ratio". This implies that maximization of employment opportunities as an objective of industrialization in developing economies can best be achieved by promotion of labor-intensive small-scale enterprises. Semin Anwar (1975) stated "small scale manufacturing sector has a number of output and employment characteristics". Viqar Ahmed and Rashid Amjad (1984) state "Viewed by the expansion in small scale we can create more employment." Malik and Cheema's (1986) study's main conclusion is that small scale provides employment opportunities to a large number of workers, require less technical skills, depend mostly on indigenous resources, and have better linkages with the other sectors of the economy. *Economic Survey* (1986-87, page 97) writes "the small scale industry account for 5.5 per cent of GDP, 30 per cent of value added in manufacturing sector, more than 80 per cent of employment in manufacturing sector and about 18 per cent of Pakistan's total exports". Mahmood and Sahibzada (1988), found that small scale and Household Manufacturing Industry can contribute to economic development by providing employment with low capital costs. The small-scale industry is extremely labor intensive and its growth can be of help in absorbing the rapidly expanding non-agricultural labor force. Moreover, small scale industry is an efficient user of capital and investment and it adds more to value added than it does large scale industry. Also small scale industry uses domestically produced machinery on the one hand, generates feed-back effects and further strengthens the country's capital goods manufacturing

capability and on the other hand, requires little foreign exchange and thus relaxes an important constraint on the country's economic development. Infact, the expansion of small-scale industry probably has a favorable impact on the distribution of income in the country. (The Asian Employment Programme, ILO-ARTEP, January 1983, Employment and structural change in Pakistan. A report for the Pakistan Planning Commission for the Sixth Five Year Plan, 1983-88). The small-scale industry has greater domestic linkages in the form of employment and demand for local machinery, is efficient in the use of capital (scarce resources) and generates an investible surplus (per unit of capital) as large, if not larger, than that generated by large scale capital intensive industry. In brief it is intended to demonstrate that there is a strong case for promoting the growth of small-scale industry. Ghulam Kibriya (1991) has estimated that the whole small industries sector has an investment of over Rs. 20,000 million providing goods and services worth Rs. 40,000 million to Rs. 50,000 million and 1.3 million to 1.5 million jobs. Lyberaki (1988) coded in Hubert Schmit, discussion paper no 261, May 1989, found that some small scale industrialists had successfully embarked on the high tech-high quality route. However the terms on which their workers were employed were as poor as those in enterprises (the majority) who made do with old technology and used cheap inputs. Dawson (1988), coded in Hubert Schmit, discussion paper no 261, May 1989, suggests that the gain of new economic space was outpaced by the flood of entrants. They were young people who completed their apprenticeship, who could not find suitable wage employment and hence set up their own workshops. K.B.Suri (1989) concluded that small scale industry plays a vital development role by spreading industry in the underdeveloped areas, by encouraging entrepreneurship and providing employment. Gharless Brown, James Hamiltion, and James Modoff (1991) argue that small firms do not generate the vast majority of jobs. But they produce a majority of new jobs.

Methodology and Data

We have formulated a model to study the employment elasticities (in the small scale sector) with respect to average wage, capital labor ratio and value of product. For this purpose, we have constructed a model that includes the following variables and their logarithmic variables are as follows:

$$\text{Log (DL)} = f [\text{Log (W)}, \text{Log (K)}, \text{Log (O)}]$$

Where: DL = Average daily person engaged, W = Average wage, K = Capital labor ratio, O = Value of product.

To estimate the elasticities of employment with respect to different employment groups, we have divided small-scale employment size into two groups (1) employment elasticities in 1 to 9 workers employed in small-scale (2) employment elasticities in 10 to 19 workers employed in small-scale. For employment elasticities in employment generating (1 to 9 workers) small scale industries we have used the following model.

$$\text{Log (DLa)} = f [\text{Log (Wa)}, \text{Log (Ka)}, \text{Log (Oa)}] \quad (1)$$

Where: DLa = Average daily person engaged in (1 to 9), Wa = Average wage in (1 to 9)

Ka = Capital labor ratio in (1 to 9), Oa = Value of product in (1 to 9),

$$\text{Log (DLa)} = L_{11}, \text{Log (Wa)} = L_{12}, \text{Log (Ka)} = L_{13}, \text{Log (Oa)} = L_{14}$$

For employment elasticities in high employment generating (10 to 19 workers employed) small scale, we have used the following model.

$$\text{Log (DLb)} = f [\text{Log (Wb)}, \text{Log (Kb)}, \text{Log (Ob)}] \quad (2)$$

$$L_{21} = f [L_{22}, L_{23}, L_{24}]$$

Where: DLb = Average daily person engaged in (10 to 19), Wb = Average wage in (10 to 19)

Kb = Capital labor ratio in (10 to 19), Ob = Value of product in (10 to 19),

$$\text{Log (Db)} = L_{21}, \text{Log (Wb)} = L_{22}, \text{Log (Kb)} = L_{23}, \text{Log (Ob)} = L_{24}$$

The combined elasticities model of both groups (elasticities in low employment generating small scale and elasticities in high employment generating small scale) is as follows.

$$\text{Log (DL2)} = f [\text{Log (W2)}, \text{Log (K2)}, \text{Log (O2)}] \quad (3)$$

$$L_{31} = f [L_{32}, L_{33}, L_{34}]$$

Where: $L_{31} = \text{Log (DL2)} = \text{Log (DLa + DLb)}/2$

$$L_{32} = \text{Log (W2)} = \text{Log (Wa + Wb)}/2$$

$$L_{33} = \text{Log}(K2) = \text{Log}(K_a + K_b)/2$$

$$L_{34} = \text{Log}(O2) = \text{Log}(O_a + O_b)/2$$

To estimate the model, data were taken from the Census of Manufacturing Industries (CMI, 1986) and it covers the industries listed at the endfooter. In this paper we have estimated employment opportunities by expansion in the small-scale sector in Pakistan on the basis of their elasticities for the period 1976 to 1986. We had to depend on the date of 1976 because the last four years data were not available in the Census of Manufacturing Industries. We have 275 observations, while the remaining industries data were not available. We have divided each industry into two groups [low employment generating group (employing 1 to 9 workers) and high employment generating group (employing 10 to 19 workers)]. Data were collected on the variables such as value of product “the yearly production multiplied by price”, average wages obtained by dividing, “labor cost divided by average daily persons engaged”, capital labor ratio i.e “total fixed assets divided by average daily person engaged”. Data on two variables, government policy about small scale sector and capacity utilization in small scale sector were not available in the census, so we have dropped these two variables from the model. By the use of the data at hand, we are able to explain how the average daily person engaged is affected by per cent changes in one of the above explanatory variables.

Findings

In this paper we have analyzed elasticities of employment in Pakistan’s small scale manufacturing sector. The model formulated in the methodology section was applied to Pakistan’s small scale manufacturing sector data. By using three identical models [employing (1 to 9), (10 to 19), and (1 to 19) workers], the empirical results are as follows.

Table-1: Comparison Intra-Model Elasticities

Identical models	Wage elasticity	Capital ratio elasticity	Value of Product elasticity
First model (1 to 9)	-0.47	-0.24	0.66
Second model (10 to 19)	-0.37	-0.29	0.69
Third model (1 to 19)	-0.42	-0.43	0.72

The results are interesting and provide the elasticities of employment with respect to wages, capital labor ratio and value of output.

The results are in line with other studies carried out in this area. For the analysis, we have applied an identical model for both employment groups and computed their elasticities, which are shown in Table-1. With the help of the computed table's results a comparison has been made between the elasticity of employment with respect to wages in both groups and also in the combined group. The elasticities of employment with respect to capital labor ratio in both groups, and also in the combined group, and elasticity of employment with respect to value of output in both groups, and also in the combined group have been calculated.

In the low employment generating group (employing 1 to 9 workers) wage elasticity is more negative than the high employment generating small-scale group [employing 10 to 19 workers]. This indicates that when employment size increases wage sensitivity decreases and value of output sensitivity also increases. In the combined models, the elasticities of employment with respect to wage is less than the elasticity of employment with respect to the capital labor ratio and elasticity of employment with respect to value of output, respectively. From these results it appears that in the small scale-manufacturing sector, size of employment is negatively related to wages, positively related with capital labor ratio and value of product. In these three identical models, elasticity of employment with respect to output is greater than the other two elasticities (elasticities of employment with respect to wage and capital labor ratio). Value of product is expanded by two factors i.e. output and price of output. In our paper we have taken data of value of product and we have supposed that output price within a year is constant. The literature discussed earlier supports our view by the three identical models explained by us.

The above results point to certain subsequent facts when there is an increase in the wage of labor. The average number of daily persons engaged declines with the rate of elasticities. From the theory we are aware that labor wages are inversely related with the firm's profits and any increase in wages, consequently demand for labor will decline. Further, the rate of elasticity varies with the size of employment of a unit. If unit size is larger (10 to 19 or 1 to 19) elasticity is less affected as compared to smaller unit (1 to 9). Employment elasticity with respect to the capital labor ratio also shows a negative relation with labor demand. If there is an increase in capital only in the units and not increase in labor in the units, its relation shows a decline in labor demand. When we compare smaller and larger units, it shows more decline in larger units as compared to smaller units. This also implies that marginal product of capital is more than marginal product of labor, which indicates that in the production process more capital is being combined as compared to labor.

Employment elasticity with respect to value of product is positively related with labor demand, and shows that with an increase in value of product, labor demand also increases. This increase is higher in larger units as compared to smaller units. This result also shows that for one rupee increase in value of output (an increase in firm output or its price) 0.69% goes to labor demand.

Table-2: Employment and Labor Productivity Growth in Small-scale and Large-scale Industries.

	Industry Sector	
	Large-scale	Small-scale
<i>Employment Growth</i>		
1971/ 72 to 1978/ 79	0.7	6.1
1978/ 79 to 1986/ 87	0.0	2.4
<i>Employment Elasticity</i>		
1971/ 72 to 1978/ 1979	0.21	0.80
1978/ 79 to 1986/ 87	0.00	0.28
<i>Labor Productivity</i>		
1971/ 72 to 1978/ 79	2.6	1.0
1978/ 79 to 1986/ 87	10.4	5.9

Sources: Hyder (1994), Workforce Situation Report 1993 (1995) and *Statistical Yearbook* 1994.

The employment patterns of the industrial sector (Small-scale and large-scale industries) can be judged through the employment growth in both industries, employment elasticities in both industries and labor productivity in both industries.

The employment elasticity measures the relationship between employment (or quantity of labor) and output of a specific sector or economy and labor productivity explains the relationship between quality of labor and output. Labor productivity reflects the effects of improved education, higher technical knowledge, and technological advancement etc. in both labor forces. From Table-2 we are clear that employment growth and employment elasticities are both comparatively high in small-scale industries, while labor productivity is nearly double in large-scale as compared to small-scale industries. In this paper our concern is to compare

employment elasticities in both industries, as the values of elasticities indicate that employment elasticities in the small-scale sector were higher during 1971/ 72 to 1978/ 79 and 1978/ 79 to 1986/ 87. From the literature about small-scale and large-scale employment elasticities, we are well aware that small-scale industries are labor intensive as compared to large-scale industries, because in the small-scale less capital is combined with more labor in the production process, while comparatively in large scale industries capital intensive techniques are used for production because usually the capital labor ratio in large-scale is higher.

One reason for this difference is that small-scale industries are located in rural areas, while large-scale are located in urban areas, and in the rural areas there is a large part of the labor force as compared to urban areas. Another reason is that small-scale use skilled and unskilled labor, while large scale industries prefer to utilize skilled labor because skilled labor is more efficient (as productivity differences in Table-2). Small-scale use old and traditional technology with more labor intensive techniques, while large-scale use modern and latest technology where less labor is needed in the production process.

Regarding the WTO agreement, small-scale must develop in line with large-scale industries. However in the earlier literature we have the following argument regarding small-scale and large-scale. The small-scale industries based on domestic traditional technology using labor intensive techniques provide more jobs with much less investment. Large-scale industries are highly capital intensive requiring huge investment but providing relatively less jobs. Capital intensities are substantially lower in small-scale industries as compared with large scale industries and as such, much greater employment can be generated with the same investible resources. Small-scale manufactures tend to have strong backward linkages to domestic agriculture and are least dependent on imported raw-materials and equipment. Large-scale industries find it extremely difficult to operate close to their optimal capacities because of limitations of the domestic market and lack of indigenous technological capability to maintain and run the units, while small-scale industry is not affected by similar demand and technological constraints.

Conclusion and Policy Proposals

- The results are interesting and provide the elasticities of employment with respect to wages, capital labor ratio and value of output.

- The results are in line with other studies carried out on this issue (1994).
- If labor becomes expensive, consequently less labor will be combined in the production processes.
- More use of capital intensive technology will reduce labor demand and if quantity of both (capital and labor) increases proportionately that will remain as a positive impact on employment.
- Output and its value are very effective employment generating factors. The increase is higher in larger units as compared to smaller units. The result shows that one rupee increase in value of product (output or price) leads to 0.69 percent going to labor demand.

For policy making if we want an expansion in small-scale manufacturing sector, we must concentrate on these three factors for expansion purposes: wages of labor, capital labor ratio of production process and value of product but at the same time as the employment elasticity with respect to value of product is greater than the other two elasticities. As such employment elasticity with respect to value of product is a more convenient factor for expansionary purposes i.e. with price incentive we could encourage the producer to produce more in the short-run, which becomes a source of labor demand in the long-run. With this perception new small-scale units may be planned.

There will be a question that the consumer is affected by this measure (if the government increases the prices of output so, through price incentive, more investment takes place and in the production process more labor is combined). On the other hand the consumer is paying higher prices, so the government has the option of complementing or supplementing policy to compensate the consumer and producer also. Employment elasticity which is much higher suggests that 1 rupee value increase in production or its price, the firm allocates 72% of this revenue for demanding more of labor. The supply of labor is also highly dependent on wages and this is also proved with the results. An increase in wages may increase saving if the sector of the economy is not at the subsistence level, savings increase capital that increase investment and labor's share as an input in the process. Therefore, employment increases. Regarding the WTO agreement, the small-scale sector must be within the framework of large-scale industries planning for the development of Pakistan.

Endfooter

Group of Industries

- 1) Food Manufacturing, Beverage Industries and Tobacco Manufacture.
- 2) Manufacture of Textiles.
- 3) Manufacturer of Footwear (except rubber footwear).
- 4) Manufacture of Leather & Leather Products (except footwear).
- 5) Ginning, Pressing & Baling of Fiber.
- 6) Manufacture of Wood & Cork Products (except Furniture).
- 7) Manufacture of Furniture and Fixtures (except primarily metals).
- 8) Manufacture of Paper and Paper Products.
- 9) Printing, Publishing & Applied Industries.
- 10) Manufacture of Drugs & Pharmaceuticals.
- 11) Manufacture of Industrial Chemicals.
- 12) Manufacture of other Chemical Products.
- 13) Manufacture of Rubber Products.
- 14) Manufacture of Plastic Products NEC.
- 15) Manufacture of Pottery China & Earthen Ware.
- 16) Manufacture of Glass Products.
- 17) Manufacture of other Non-Metallic Mineral Products.
- 18) Iron & Steel Basic Industries.
- 19) Non-Ferrous Metal Basic Industries.
- 20) Manufacture of Fabricated Metal Products (except machinery & equipment).
- 21) Manufacture of Machinery except electrical.
- 22) Manufacture of Electrical Machinery Apparatus, Appliances & Supplies.
- 23) Manufacture of Transport Equipment.
- 24) Manufacture of Scientific Precision & Measuring Instruments & equipment.
- 25) Other Manufacturing Industries.

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