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INTRA-SECTORAL PRODUCTIVITY DIFFERENTIAL: The Large Scale versus the Small Scale Sector in Pakistan

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We have tried to identify factors responsible for the differential in productivity between the small-scale and the large-scale manufacturing industries in Pakistan. Using a labour productivity equation derived from a Cobb-Douglas production function, we find the differentials on account of capital intensity, wages and vertical integration to be important determinants of the differential in productivity between the two sectors, while the differential in size does not emerge as an important factor.

I. Introduction

Labour productivity in Pakistan's small scale manufacturing sector is lower than that in the large scale manufacturing sector. What factors explain the lower level of labour productivity in the small scale sector? Is it attributable to the availability of more sophisticated imported technology, better trained and skilled labour to be found in the large-scale manufacturing sector, or to scale economies, substitution of labour by capital, or higher wage rates paid by the large-scale sector? An attempt has been made in this paper to explore some of these issues and provide explanations. Limitation due to non-availability of data on several variables however, prevented us from extending the analysis to the desirable extent.

Productivity is a relationship between inputs and output, and can be gauged by computing a total factor productivity index or a partial productivity index. Total factor productivity is estimated by dividing output by a sum total of inputs. This methodology assumes perfect competition in the factor markets, constant returns to scale and a linear and homogeneous production function. Partial productivity is estimated by dividing output with units of only one input i.e., land, capital or labour. The assumptions embedded in the total factor productivity method do not seem realistic, particularly for the economic environment prevailing in developing economies. However, the advantage is that this methodology enables a quantification of the total cost incurred in the growth process. Partial productivity measures, on the other hand, are quite the opposite. They do not make the kind of unrealistic assumptions discussed earlier, but specify only the partial and not the total cost incurred in the growth process. In view of the above, we have adopted a labour productivity approach in this paper. We are, however, aware that it does not tell the whole story, nevertheless the story is not a distorted one. We have tried to identify factors responsible for the differential in the level of labour productivity between the large-scale and the small-scale sectors. Since time series data on the small scale sector are not available, ours is a cross sectional analysis using the 1983-84 survey of small-scale industry, while data for the large scale sector comes from the Census of Manufacturing Industries (CMI), 1982-83.

The importance of the study stems from the fact that very little work has been done on the small scale manufacturing sector of Pakistan, which provides employment to almost 80 per cent of the total manufacturing labour force and has a significant share in manufactured exports. It uses domestically produced simple technologies and indigenous raw material, and therefore has a strong linkage effect on the economy. Following the introduction, section II contains a discussion of data sources and their limitations, section III compares the small scale sector with the large scale sector. The model used to explain productivity differential between the two sectors is laid out in section IV, while section V contains the empirical analysis and the results. The paper is summarized and the conclusions presented in section VI.

II. Data Sources and their Limitations

The main sources of data pertaining to different industries are the Census of Manufacturing Industries (CMI) 1982-83 and the Survey of Small and Household Manufacturing Industries (SHMI) 1983-84. These are published by the Federal Bureau of Statistics. Since the definition of variables and the classification of industries is the same in both the sectors, the two sectors are comparable. The SHMI has classified small scale establishment and household units separately. We have taken the data on establishments, because it is more reliable as compared with the data on household units. For the large-scale sector the data on value added, value of output, wages, employment, non-operative employees, number of establishments, value of fixed assets have been taken from the CMI 1982-83. For the small scale sector, these have been taken from the SHMI 1983-84. The data on imports have been taken from the Foreign Trade Statistics 1983, but since these data were not available industry-wise, we had to calculate import data from the given information on commodity imports. In order to avoid comparison of dissimilar industries, we picked only those 62 industries at the four digit level of industrial classification which produce identical products in both the large scale and the small scale sectors.

The definition of small scale industry is quite arbitrary and differs from country to country and from time to time. Size has been variously defined on the basis of employment, fixed assets, and by whether or not a firm is registered. In the industrial countries small scale firms are often defined as those employing fewer than 200 or even 500 workers. But in developing countries, firms employing up to 49 workers may be considered small. In Pakistan, sometimes investment and registration status are used to distinguish small and large scale manufacturing sectors. For the purpose of national income accounts the Federal Bureau of Statistics has classified all registered factories as large scale and unregistered establishments as small scale.[1] This is the definition used in the 1983-84 Survey of Small Scale industry, and thus the present study.

One cause for concern is that the data for both the sectors are not available for the same year, but since the lapse is only by one year, it does not cause serious concern. The problem arising due to classification of scale however, does pose a problem, since every registered firm is considered large scale, and every unregistered firm as small scale. There is the possibility that data pertaining to large unregistered firms might be included in the small scale sector. This seems to be the greatest limitation of the study, but something about which we are unable to do much.

III. Comparison of the Large Scale and the Small Scale Manufacturing Sectors

The similarities and differences between the large-scale and the small-scale sectors are brought out in the following paragraphs.

Structure of the Manufacturing Sector

The small scale manufacturing sector consists of a large number of labour-intensive establishments, while the large scale sector comprises of a small number of capital-intensive large units. Industries that are mostly found in the small scale sector are textiles, food, garments, handicrafts and leather. These industries usually use traditional technologies, although modern technologies are now increasingly adopted by the small scale sector as well. This sector produces almost everything

[1] Small scale industry has also been defined on the basis of the value of fixed assets, the upper limit being Rupees one million, irrespective of the registration status.

which is manufactured in the large scale sector except those that require sophisticated technology and heavy investment such as fertilizer, cement and sugar. There are linkages between the two sectors, with each sector using output produced by the other sector.

Although agro-based industries are found both in the large and the small scale sectors, they have a greater share in large scale manufacturing, as revealed by the significant contribution of food industries towards large scale manufacturing value added in 1977 [Appendix (Table 1)]. This is followed by textiles and tobacco. One can observe a change in industrial structure five years later in 1983. Although agro-based industries are still the dominant sub-sector, the contribution of food and textile manufacturing declined, while several basic industries increased (non-metallic mineral products, industrial chemicals and iron and steel).

The pattern of change differs somewhat for the small-scale manufacturing sector. In 1977, textile sub-sector's contribution to small scale manufacturing value added was the highest, followed by the food manufacturing sub-sector. By 1984, food manufacturing had become the largest contributor to small-scale sector value added. The phenomenal increase in the share of food manufacturing was the result of high growth rate of fast-food industries, while the share of the textile sub-sector declined substantially to make it the second largest contributor. Share of other industries declined only slightly.

Contribution to GDP

During the early 1970s due to nationalization of basic industries, increase in oil prices, international recession and devaluation of the rupee, there was a decline in the share of the large scale manufacturing sector in GDP, which was only partly offset by growth in the small-scale manufacturing contribution of GDP [Appendix (Table 2)]. A change in government in 1977 also meant a change in government policy towards the private sector. The new government gave several incentives such as income tax holidays, reduction in import duties on machinery and raw materials, and a reduction in corporate income tax from 60 per cent to 45 per cent. Moreover, the agro-based industries were denationalized. As a result of these measures, the private share of investment in the manufacturing sector increased from 24 per cent in 1977-78 to 54 per cent in 1982-83, and the contribution of large-scale manufacturing to GDP rose from 11 to 14 per cent during the same period.

With continued (though slower) growth in the small scale sector,[2] the share of

[2] It does however, need to be acknowledged that until 1969-70 the growth of the small scale sub-sector was assumed to be the same as the rate of growth of population. The small scale sector grew at the spectacular rate of 13.7 during the 1970s [Hamid (1982)]. This high growth rate may have been as a result of a combination of factors. First, prior to devaluation of the rupee, the large-scale manufacturing sector enjoyed a cost advantage as it was able to obtain raw material and machinery at cheap rates. Moreover, devaluation of the rupee was able to boost export-oriented small-scale industries such as carpets, garments, made-up textile

total manufacturing in GDP rose to 17 per cent by 1983. Appendix (Table 2) shows that the share of the small scale sector to GDP increased from 4 per cent to 5 per cent during 1972-73 to 1984-85. Although the increase is quite modest, it is despite the lack of any encouragement from the government.[3] In fact, the policies of the government militated against the small scale sector, for example, import licenses were given mostly to large commercial importers as the licensing authority found it easier to control a few big importers. Moreover, the small scale sector could not take advantage of the import of capital goods and raw material at cheap exchange rates, as this sector was mostly using domestically produced capital goods. What is more, fiscal, credit and financial policies were unfavourable to the small scale sector.

Employment Generation

In the 1960s, government policies favoured highly capital intensive industries, with limited employment potential. On the other hand, the small scale manufacturing sector based on domestic traditional technology, using labour intensive techniques provided more jobs, with much less investment. In 1961, the small scale sector provided 15 lakh jobs against 3 lakhs in the large scale sector. [Appendix (Table 3)]. By 1982-83, labour force in the large scale manufacturing sector increased to 6 lakhs, while the small scale sector provided jobs to 26.8 lakh persons. We find that the small scale sector generates almost 4 times more jobs than the large scale sector.

Capital Intensity

We find that capital required for employing one worker is seven times higher in the large scale sector than in the small scale sector. Although capital intensity has been growing in both the sectors, but the rate of growth in the large scale sector is much higher. Appendix (Table 4) shows that capital intensity increased by 11 per cent per annum in the small scale sector, and by 18 per cent per annum in the large

goods, surgical instruments and sport goods. Second, increase in domestic market for consumer goods as a result of increased remittances from the Middle-East. Third, an aftermath of nationalization of industries in 1972 was a sharp decline in private investment in the large-scale sector. As the threat of nationalization did not apply to the small-scale sector, some of this investment got diverted to this sector. And finally, as a result of liberalization of the economy, the small-scale sector has better access to imported raw material. [Ahmad and Amjad, (1984)].

[3] For example, small scale industries where there were partnership or proprietorship were not eligible for tax holidays. Private small scale limited companies enjoyed a rebate of five per cent of income tax, whereas large units set-up as public limited companies received a higher rate of ten per cent. Moreover, small scale industries were unable to get institutional credit as easily as large scale industries, because these industries did not fulfill commercial bank's collateral requirements. They, therefore, had to pay higher interest rates. Further, since small scale industries did not export directly, they did not receive export rebate, although their exports were substantial.

scale sector during 1976-77 to 1982-83.[4]

Our data reveals that out of 62 industries in 1976-77 there were only three in which the small scale sector invested more capital per labourer than the large scale sector. While in 1985 the number of such industries had increased to six. For more than half of the industries in the small scale sector, capital per worker was less than 40 per cent than that observed for the large scale sector.

The greater capital intensity in the large scale sector may be attributed to different reasons. First, the small scale sector is a traditional sector using simple and traditional technologies which do not require large amounts of capital; the large scale sector mainly depends on imported technology designed for countries that are labour scarce and capital abundant. Second, the small scale sector does not have the same access to institutional credit as the large scale sector. The small scale sector is thus forced to 'cut its coat according to its cloth', and is not in a position to finance relatively capital intensive technologies. Some other factors responsible for capital intensity differential are labour laws, import policy and the apprehension about labour problems as a result of increase in the size of the labour force.

Wage Differential

Our data show that the average wage rate in the small scale sector is 36 per cent of the wage rate in the large scale sector. This wide differential is mainly due to the fact that different types of workers are employed in the two sectors. The large scale manufacturing sector uses imported machinery which requires the use of skilled and experienced workers, necessitating the payment of higher wages.Small scale industries on the other hand, use simple techniques and methods of production, on account of which they employ unskilled or semi-skilled workers and pay lower wages. Further, the small scale sector is not affected by minimum wage legislation. In a situation where there is abundant labour and not many available jobs, the employees of the small scale sector are in a weak bargaining position. Moreover, there are no trade unions in the small scale sector that could strengthen their position. On account of these factors, wages are lower in the small scale sector as compared with the large scale sector.

Our data reveal that there were only two small scale industries paying higher wages than the corresponding large scale industries in 1977 and one in 1983. All other large scale industries were paying higher wages and benefits. More than half of the industries in the small scale sector were paying wages that were a mere 40 per cent of the wages paid to employees in the large scale sector.[5]

4 As a result, by 1983-84, employment of an additional worker cost Rs. 95,280 in the formal sector, Rs. 10,300 in the informal small-scale sector and Rs. 4,200 in the informal household sector. [Nadvi, (1992)].

5 Nadvi (1992) also reports substantial wage differential between the formal and the informal sub-sectors.

Labour Productivity

We computed labour productivity (value added per worker) for small-scale and large-scale establishments in 62 4-digit ISIC industries. We find that there are only 2 industries in which labour productivity is higher in the small scale sector than in the large scale sector. In all other industries productivity is higher in the large scale sector. On the whole, labour productivity in the small scale sector is 48 per cent of its level in the large scale sector. Nadvi (1990) reports that labour productivity (value added per worker) is 616 per cent higher in the formal (large-scale) sector as compared with the informal (small-scale and household) sector. Whereas the differential on account of capital intensity between the two sectors is 925 per cent, implying that the informal sector is a more efficient user of capital.

IV. Model Explaining Productivity Differential

The model used to identify factors responsible for productivity differential between the large and the small scale sectors has been borrowed from Davies and Caves (1987), which was subsequently modified by Wizarat (1989) to suit the Pakistani environment. We suppose the production function of a firm in a given industry is Cobb Douglas[6] as in equation (1).

$$Y = AK^{\alpha} L^{\beta} \tag{1}$$

where Y = Value added
K = Capital
L = Labour

α and β are partial elasticities of value-added with respect to capital and labour respectively. If we divide equation (1) by L we get the labour productivity equation:

$$\frac{Y}{L} = \frac{AK^{\alpha} L^{\beta}}{L} \tag{2}$$

Rewriting equation (2) and adding the error term we get equation (3), which states that labour productivity is a function of capital intensity, plant size and the unexplained residual.

$$\frac{Y}{L} = A(K/L)^{\alpha} L^{(\alpha+\beta-1)} U \tag{3}$$

[6] We estimated a Cobb-Douglas production function for both the large scale and the small scale sub-sectors and found the magnitude and the significance of the partial elasticities the same for both the sub-sectors.

Rewriting equation (3) in estimable form gives equation (4)

$$\log (Y/L) = \log A + \alpha \log (K/L) + (\alpha + \beta - 1) \log L + U \qquad (4)$$

The impact of factors such as labour quality, skills, market structure, industrial organisation, etc., has been accounted for by the residual. We define our dependent variable as value added per employee in the small scale sector divided by value added per employee in the large scale manufacturing sector.

Capital Intensity

As discussed earlier in section III, the two sectors use different technologies, which affect the combination in which inputs are used in these two sectors. The large-scale sector employs sophisticated equipment and machinery, which requires heavy investment. The small scale sector, on the other hand, uses traditional techniques that involve less capital per labour at a given relative factor price ratio. We define the capital intensity variable as capital per worker in the small scale sector divided by capital per worker in the large scale sector, using the book value of fixed assets at the end of the year as a measure of the capital input and denote it by:

$$CP = \frac{\text{Capital/Labour in each small scale sub-sector}}{\text{Capital/Labour in each large scale sub-sector}}$$

Plant Size

An increase in plant size allows the firm to reap economies of scale from specialization. The empirical evidence in Gupta (1984) and Miller (1978) found a positive relationship between productivity and plant size in manufacturing industries. Similarly, Wizarat (1988) found differential in plant size to have a positive impact on productivity differential for 20 large scale industries during the period 1970-71 to 1980-81. Davies and Caves (1987), on the other hand, explained a negative correlation between productivity and plant size by the scarcity of the managerial input in large plants, and the greater likelihood of strikes in large plants in the U.K. All these studies relate to the large scale manufacturing sector where there are strong unions. The small scale sector, on the other hand, contains plants that are smaller in size than those in the large-scale sector. The coefficient on this variable will reveal whether economies of scale are a factor causing productivity differential, in which case the coefficient will be positive. Following Davies and Caves (1987), we replace plant size L by typical plant size, to take care of variation in plant sizes in an industry. Typical plant size is measured by average plant size,[7]

[7] Weiss (1963) suggests median plant size as a good proxy for typical plant-size, but we are unable to compute median plant size at this level of aggregation due to the non-availability of the required data.

(arithmetic mean of plants measured in terms of employment) in the small scale sub-sector divided by average plant size in the counterpart large scale sub-sector.

$$\text{Size} = \frac{\text{No. of employees/No. of establishment in each small scale sub-sector}}{\text{No. of employees/No. of establishment in each large scale sub-sector}}$$

Incorporating size into our model and changing the notation we get equation (5):

$$\log PD = \log A + \alpha \log CP + (\alpha + \beta - 1) \log SIZE + U \quad (5)$$

$$\text{Where } PD = \frac{\text{Value-added/No. of employees in each small scale sub-sector}}{\text{Value-added/No. of employees in each large scale sub-sector}}$$

Wages

Leibenstein (1960) relates average productivity of workers to their wages, indicating that high wages cause per capita productivity of workers to increase up to some point. Fei and Chiang (1966) state that since an average worker is unable to save, the entire wages are spent on consumption. They derive an S-shaped effort function, reflecting that when consumption is below the minimum level, we are in the starvation region, where the coefficient of productive effort is nil. As wages begin to increase, consumption begins to rise, but is still very low. This is the deficiency region. If wages increase further consumption increases, taking us into the sufficiency region and the coefficient of productive effort continues to rise. Any further increase in wages and consumption lead us into the comfort region. Beyond this point any further increase in wages has no effect on the coefficient of productive effort. Similarly, Sahoo (1985) shows that sixty per cent increase in calories cause output to increase by fifty per cent.

The foregoing arguments recognize the effect of wages on productivity through better health and nutrition. But according to the wage-productivity nexus postulated by Horowitz (1974), the impact of wages on productivity is both on account of better health and nutrition, as well as through the incentive effect. She states that higher wages provide security against slow-downs and strikes, since the workers feel contented and satisfied.

The coefficient on wages, however, needs to be interpreted with a fair amount of caution, as wages might be acting as a proxy for skill. A recent analysis of Indonesian panel data by Harris shows that wages are a good indicator of skill level. The same appears to be the case in the present study in view of the observation made earlier that workers in the small-scale sector do not have the same skills as those in the large-scale sector. This skill differential is associated with the use of modern and sophisticated machinery in the large-scale sector and simple and indigenous methods of production in the small-sector. It appears that the use of technologically superior machinery and the higher skill level that it entails, explains higher wages and thus higher labour productivity of the large-scale sector. The direction of causation could also run as follows: skill differential generating productivity differential, which would in turn lead to wage differential if ours was a time series analysis. This relationship is not likely to hold in a cross sectional analysis, however. This is because the feed back from productivity to wages is not instantaneous in the oligopolistic market environment prevailing in the manufacturing sector of Pakistan [see Wizarat, (1988b)]. Moreover, higher wages in the large-scale sector might also reflect that though unions are not that strong in the large-scale sector either, they are altogether non-existent in the small scale sector. Moreover, minimum wage legislation also does not apply to the small-scale sector. We expect a positive sign on the wage variable and measure it as the ratio of employment cost (excluding benefits) per employee in each small scale sub-sector to the employment cost (excluding benefits) per employee in each large scale sub-sector.

$$WGT = \frac{\text{Employment cost/ No. of employees in each small scale sub-sector}}{\text{Employment cost/ No. of employees in each large scale sub-sector}}$$

Non-Operative Workers

Non-operative or non-production workers consist of managers, research staff, technicians, canteen, maintenance and cleaning staff, etc. Since we do not have data on skills, the proportion of manager and technicians in non-production workers will act as a proxy for skill levels, and would affect productivity of labour through better managerial input and supervision. If managers and technicians proportion in total non-operative workers is significant, then the relationship between productivity and non-operatives would be positive. If, on the other hand, they are a small proportion of total non-operative staff, we expect a negative relationship. We measure this variable as the ratio of non-operative workers in total employment in each small scale sub-sector to the proportion of non-operatives in total employment in each large scale sub-sector.

$$NOP = \frac{\text{Non-operative workers/Total employees in each small scale sub-sector}}{\text{Non-operative workers/Total employees in each large scale sub-sector}}$$

Foreign Trade

Foreign trade is another source of productivity differential. There are different theories regarding the relationship between productivity and foreign trade. The impact of exports on productivity may be through expansion of the market, or what has come to be known in the literature as the Verdoorn law. Second, exports cause an increase in efficiency by exposing domestic goods to foreign competition. Since Pakistan is exporting mainly traditional products from both the sectors, they are the same for both the sectors and cannot therefore explain the differential in productivity.

The impact of imports on comparative productivity is however different for the two sectors. This is because the large scale manufacturing sector is using superior technologies, and manufacturing products which may, to some extent, be considered substitutes for imports. Imports generally do not compete with the products of the small scale sector, since this sector is not producing products similar to imports.[8] Hence, a high degree of import competition in a sub-sector is likely to affect the large-scale sector more adversely than the small-scale sector. We measure our import variable as the proportion of imports in total domestic production. Since this variable is expected to cause an increase in the denominator of the dependent variable, the expected sign on this variable is negative.

$$\text{Import} = \frac{\text{Value of Imports}}{\text{Value of Production}}$$

Vertical Integration

There is a lot of controversy in the literature regarding the relationship between vertical integration and productivity. Davies and Caves (1987) assertion that greater integration leads to economies of a technological nature as well as transaction costs leading to higher productivity, implies a positive relationship between vertical integration and productivity [see also Williamson, (1985)]. Moreover, if firms face difficulties in getting their inputs supplied, the lack of input supply becomes a cause of stoppages and the firm cannot utilize operational capacity. This causes lower productivity in specialized firm. In this situation, vertically integrated industries have an advantage over specialized industries, since they have greater reliability of input supply [Levy, (1984)]. Stigler (1951), on the other hand, stated that firms usually start out vertically integrated, then shift to buying inputs as demand increases, leading to greater specialization. If growing industries have higher productivity, then we can expect a positive relationship between productivity and specialization, and a negative relationship between productivity and vertical integration. The relationship might also be negative if the cost of managing dissimilar activities in a vertically integrated firm is higher than the cost of managing a uniform

[8] For example, rice milling in the large scale sector involves husking as well as cereals, whereas small scale rice milling involves rice husking only. Another example is the sugar industry, where refined sugar is produced only in the large scale and gur shakkar in the small scale sub-sector. There are similar examples to be found in soap and cosmetics manufacturing industries.

activity in a specialized firm. In view of different theoretical hypotheses regarding the impact of vertical integration on productivity, it is difficult to hypothesize about the sign on the coefficient of this variable.

The measurement of vertical integration at this level of aggregation is a problem. It is usually measured by dividing value added by output. The rationale being that a good prepared in a specialized set up has a higher value of gross output. On the other hand, if all the processes were done in the same firm as in vertical integration, the ratio of value added to the value of output will be higher and vice versa. We define our vertical integration variable as the ratio of value added to the value of output in each small scale sub-sector divided by the ratio of value added to the value of output in each large-scale sub-sector.

$$VI = \frac{\text{VA/VO in each small scale sub-sector}}{\text{VA/VO in each large scale sub-sector}}$$

We are aware of the reverse causation from the dependent variable to some of the explanatory variables, for example, wages, capital intensity, imports, etc. But since ours is a cross-sectional study, the feed-back from productivity to these variables is not likely to bias our estimates. We are therefore justified in using a single equation model to explain the productivity differential between the two sectors.[9]

V. Results

The model specified in section III was applied using ordinary least squares (OLS).[10] The results obtained are contained in Table 1. All the dependent and the independent variables are in log form. The value of R^2 is 0.45, which is quite high for cross-sectional analysis, and shows that quite a large proportion of the variation in the dependent variable has been accounted for. The coefficient on LCP is significant at the 10 per cent level, reflecting that the use of modern and sophisticated machinery causes productivity to be higher in the large-scale sector. The most important factor affecting relative productivity is the wage differential. We thus find empirical support for Leibenstein, Fei and Chiang's and Horowitz's arguments of a positive relationship between wages and productivity. Our analysis also implies that workers in the small scale sector do not have the same skills as those in the large scale sector, and therefore have lower productivity. We find that the differential on

9 Since increase in productivity does not lead to increases in wages instantaneously and proportionately in Pakistan's manufacturing sector. [Wizarat, (1988b)].

10 A core model was also estimated which had a lower value of R^2. By including other explanatory variables we are able to reduce the size of the unexplained residual somewhat.

account of size is not a significant determinant of productivity differential. Our analysis thus shows that the productivity differential between the two sectors cannot be attributed to the differential in sizes of firms in the two sectors. This may be explained by the fact, and as stated earlier, that large size establishments are more capital intensive and pay higher wages as compared with small scale enterprises. So the impact of size on productivity has already been accounted for. Our suspicion that the insignificance of the coefficient on size may be due to collinearity between size and some other variable is not supported by an inspection of the correlation matrix, which shows that none of the variables are collinear with one another.

Vertical integration is another factor responsible for productivity differential. Our empirical finding does not lend support to the hypothesis that vertically integrated firms have lower productivity as a consequence of carrying out dissimilar activities. On the contrary, Levy's argument that vertical integration ensures a regular supply of inputs, thereby preventing under utilisation of capacity, and Davies and Caves' argument of technical economies in vertically integrated industries seem to be borne out by our results. We do not find that imports affect relative productivity, as the import variable has the expected sign, but is statistically

TABLE 1

Ordinary Least Square Results
Dependent variable is log of relative productivity LPD

Variables	Coefficients	t-ratios
constant	– 0.046	– 0.14
LCP	0.163*	1.68
L SIZE	0.104	1.25
L WGT	0.427***	3.87
LVI	0.257**	2.36
LNOP	0.146	1.54
LIM	– 0.014	– 0.58

R^2 = 0.449
Adj R^2 = 0.389
F = 7.48
n = 62

* significant at the 10 per cent.
** significant at the 5 per cent.
*** significant at the 1 per cent

insignificant. The variable on non-operative workers (NOP) has a positive but insignificant coefficient.

We then dropped all the insignificant variables, Table 2 contains these results. This does not cause much difference in the magnitude of the coefficients, but causes an appreciable increase in their significance levels. Capital intensity (LCP) which was significant at the 10 per cent level earlier, becomes significant at the 5 per cent level. We find an increase in the significance level of the other variables as well. These results, explain 41 per cent of the variation in the dependent variable.[11]

TABLE 2

Ordinary Least Square Results
Dependent variable LPD

Variables	Coefficients	t-ratios
Constant	− 0.4199	− 2.19
LCP	0.1971**	2.17
LWGT	0.4533***	4.10
LVI	0.3024**	2.81
R^2 = 0.41		
Adj R^2 = 0.37		
F = 13.19		
n = 62		

** significant at the 5 per cent.
*** significant at the 1 per cent.

VI. Summary and Conclusion

Our major objective was to identify factors responsible for productivity differential between the large scale and the small scale sub-sectors. We find that both the sub-sectors produce consumer as well as capital goods, but the small scale sector does not produce goods which require modern and sophisticated techniques. The large scale sector depends heavily on imported plants and machinery. It is highly capital intensive and the rate of job creation is not commensurate with the rate of

[11] We checked the model for heteroscedasticity by applying the Glasjerer test. The absolute values of the residual of the first equation were regressed on each independent variable and on fitted values of the dependent variable. The test did not reveal the presence of heteroscedasticity.

investment in this sector. The small scale sector, on the other hand, provides more jobs. During the last thirty years the small scale sector employed a labour force almost four times larger than that employed by the large scale sector.

Since the two sectors adopt different techniques, the usage of skilled labour is different in the two sectors. The large scale sector uses more skilled labour, whereas the small scale sector provides jobs to the unskilled and semi-skilled workers. On this account, there is a wage differential between the two sectors, with wages being higher in the large scale sub-sector as compared with the small scale sub-sector.

On account of some of these reasons, labour productivity in the small scale sub-sector is lower than the large-scale sector. Our results show that the productivity differential is not due to differential on account of establishment size. Factors which are responsible for productivity differential between the two sub-sectors are differentials on account of wages, capital intensity and vertical integration. We also incorporated other variables, for example, the proportion of non-operative workers, the proportion of imports in domestic supply, etc. These, however, do not have a significant impact on the productivity differential. Our analysis, therefore, shows that better health and nutrition which become affordable with higher wages make the workers more productive causing an increase in productivity. Since wage differential in the two sub-sectors is also on account of skill differential, the results imply that differential on account of skills in the two sub-sectors is an important source of productivity differential. We also find that the large scale sub-sector having better access to imported capital goods is able to obtain a level of labour productivity which is higher than that attained by the small scale sub-sector. Vertical integration is another cause of productivity differential between the two sub-sectors. The small scale sub-sector uses capital more efficiently than the large scale sub-sector, due to which total factor productivity might be higher in the small scale sector as compared with the large-scale sector. Further research therefore needs to be conducted to determine both the level and the differential in total factor productivity between the two sub-sectors. Before deriving any policy implications from the present study, it is important to bear in mind a caveat to the study that was observed in the early part of the paper. The caveat was on account of inclusion of data on unregistered firms in the category belonging to the small scale sub-sector. Collection of data from a micro-level representative survey is recommended that would throw some light on whether the results of the present study stand corroborated or refuted.

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APPENDIX

TABLE 1

Share of Industries in Total Manufacturing Value Added

Industries	Large Scale Manufacturing		Small Scale Manufacturing	
	1977	1983	1977	1984
Food	23.0	20.0	10.0	27.0
Textiles	22.0	16.0	30.0	20.0
Tobacco	12.0	13.0	3.0	2.0
Pharmaceutical	4.0	4.0	0.3	0.1
Non-metallic Minerals	2.0	9.0	7.0	5.0
Iron	4.0	5.0	1.0	0.4
Industrial Chemicals	5.7	7.0	0.1	0.0
Others	27.3	26.0	48.6	45.5

Source: CMI 1982/83 and SHMI 1983/84

TABLE 2

Share of Manufacturing Industries in GDP

Year	Mfg.	LSM	SSM	SSM Share in Total Mfg.
1973-74	16.1	12.1	4.0	24.8
1974-75	15.6	11.4	4.1	26.5
1975-76	15.3	11.0	4.3	28.0
1976-77	15.2	10.7	4.5	29.5
1977-78	15.5	11.0	4.5	29.0
1978-79	15.9	11.3	4.6	29.1
1979-80	16.3	11.6	4.7	28.6
1980-81	16.9	12.2	4.8	28.1
1981-82	18.1	13.2	4.8	26.8
1982-83	18.6	13.6	4.9	26.5
1983-84	19.4	14.2	5.2	26.6
1984-85	19.4	14.3	5.2	26.6

Mfg = Manufacturing sector. LSM = Large scale manufacturing. SSM = Small scale manufacturing.
Source: National Income Accounts of Pakistan.

TABLE 3

Employment in the Manufacturing Sector

(000)

Sectors	1960-61	1971-72	1977-78	1982-83
Labour force in large scale manufacturing	337	480	580	690
Labour force in small scale manufacturing	1,501	1,795	2,240	2,680
Total manufacturing labour force	1,838	2,275	2,820	3,370
Total civilian labour force	13,517	18,270	21,840	25,220

Source: Employment and Structural Change in Pakistan: Issues For The Eighties, The Asian Employment Programme, January 1983.

TABLE 4

Capital Intensity in the Large and Small Scale Manufacturing Sectors

(Value in Rupees)

Sectors	Years	At constant prices of 1975	At current prices
Small Scale Manufacturing	1976-77	2,716	3,023
	1983-84	5,812	10,516
Large Scale Manufacturing	1976-77	19,416	21,354
	1982-83	52,684	84,305
Small scale Capital Intensity relative to	1977	0.14	
Large scale Capital Intensity	1983	0.12	

Source: CMI 1976-77, 1982-83 SHMI 1976-77, 1983-84.