PROFIT FUNCTION OF MICRO AND SMALL ENTERPRISES IN NATIONAL CAPITAL REGION, INDIA

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Abstract:

This study investigates into the profit function of micro and small enterprises in Delhi National Capital Region, India. It is based on the sample data (for 8 years ending 2013) collected for 399 enterprises drawn from manufacturing and service sectors, size wise, registration status wise and size of workforce wise. Profit has been modeled by the generalized Leontief function of the workforce and the utilization of non-human resources. It finds the coefficients of substitution between the two types of resources and the returns to scale exhibited by the sample enterprises. Overall, substitutability coefficients are very small and the returns to scale are increasing. An overwhelming majority of enterprises are in the normal profit range, although some (about 15% of enterprises) earn supernormal profits.

Key words: *(i) Generalized Leontief profit function, (ii) National Capital Region, (iii) Micro and small enterprises, (iv) factor substitution, (v) returns to scale, (vi) Nonlinear regression analysis.*

Introduction

As revealed by the Fourth All India Census MSME 2006-07, there are about 214.3 lakh micro and small enterprises (MSEs) in India employing about 497.6 lakh people and a fixed asset of Rs. 63.386 thousand million and thereby contributing approximately Rs. 100.15 thousand million to the gross domestic product of the nation. Of those, the number of unregistered enterprises is overwhelmingly large (198.74 lakh in number or 92.72% to the total). Among MSEs, about 53.64% are in manufacturing, 39.44% in service and the rest 6.92% in repairing/maintenance sector. The value of fixed asset with the registered MSEs is a little less than twice larger (62%) than that of the unregistered enterprises (38%) and the proportion of the total output they contribute is commensurate with their fixed assets (63.08% and 36.92% for registered and unregistered enterprises, respectively). Due to rather low capital/labour ratio (value of fixed assets per workforce = 1.27 lakh) they generate large employment, function as the nurseries for entrepreneurship and innovation, reduce disparities in industrial development across the country and the rural/urban areas, produce diverse products and services to cater to the local as well as global markets and also function as the intermediaries in the national and international value chains.

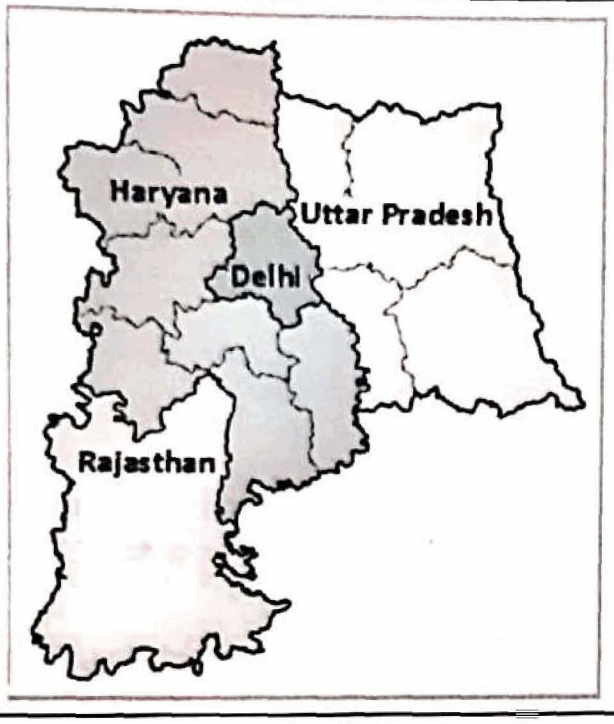
Especially after 1991, since when the new economic policy was adopted, the MSEs have experienced an exhilarating politico-economic environment for their thriving. In response to favourable economic climate, establishment of MSEs accelerated throughout the nation. Similar or perhaps more strong thrust was experienced in Delhi and the surrounding areas as well. Since MSEs attract a large number of people for industrial employment, Delhi experienced a boom of in-migrant population and it was felt that diverting the increasing pressure of population to varied, dispersed and systematically well-planned clusters was necessary in order to reorient planned development of the region and protect Delhi's infrastructure from excessive pressure as well. In 1985, National Capital Region Planning Board Act was enacted and the National Capital Region Planning Board was constituted. To begin, the NCR included seven districts of Haryana (Faridabad, Gurgaon, Jhajjar, Panipat, Rewari, Rohtak and Sonepat), five districts of

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Uttar Pradesh (Bagpat, Bulandshahr, Gautam Budh Nagar, Ghaziabad and Meerut) and one district of Rajastan (Alwar) with Delhi at its core. Presently, it has four constituent sub-regions as depicted in Fig.1.

Fig.1: Constituents of the National Capital Region



1. Haryana Sub-Region (13 districts): Faridabad, Gurgaon, Mewat, Rohtak, Sonepat, Rewari, Jhajjar, Panipat, Palwal (carved out from the erstwhile districts of Faridabad and Nuh/Mewat in 2008), Mahendragarh, Bhiwani, Jind and Karnal.

2. Uttar Pradesh Sub-Region (9 districts): Meerut, Muzaffarnagar, Moradabad, Hapur, Amroha, Ghaziabad, Gautam Budh Nagar, Bulandshahr, and Baghpat.

3. Rajasthan Sub-Region (2 districts): Alwar and Bharatpur.

4. Delhi (in the core).

Objectives of the present study: It is well known that the goal of an industrial or commercial organization (economic firm) may be profit maximization or it may have any other alternative goal/goals such as (i) long run survival and command over market share (Rothschild, 1947), (ii) sales maximization (Baumol, 1959), (iii) stake-holders satisficing (Simon, 1955; Cyert-March, 1963), (iv) managerial utility maximization (Williamson, 1964), (v) growth maximization (Marris, 1964), etc. However, in view of the fact that an overwhelming majority of MSEs are proprietary (about 94.4% of total, 90.1% of registered and 94.6% of unregistered enterprises, as reported by Ministry of MSME, 2014), it is unlikely that stake-holders' satisficing would be their objective. Further, in view of the extremely competitive environment in which the MSEs operate and there exists almost no barriers to the entry of new competitors, the objectives such as the long run survival, commanding market share or growth maximization are less relevant. The objective of sales maximization hinges on relatively long run perspective and possibilities of expansion of the scale of operation, which may not be very congenial to the proprietary instincts as well as the limitations on resources that the proprietors may face. As a matter of fact, all alternatives (to profit maximization) suit to a large and often oligopolistic organization. The MSEs, which are very small, proprietary and unable to strengthen themselves with various financial instruments, work in a tough competitive market with short run objectives, often resembling with the neo-classical ideal firm aiming to profit maximization (Scitovsky, 1943; Koplin, 1963; Osborne, 1964). Therefore, it is most likely that MSEs would strive for maximization of profits in the short and medium run.

The objectives of this investigation are, therefore, first to look into the profit function of micro and small enterprises with regard to the inputs (human and non-human or material resources) used by them. Additionally, this

study seeks to know the propensities of substitution between these resources and the returns to scale of operation these organizations exhibit. It enquires whether manufacturing enterprises show up resource substitutability and returns to scale different from the service enterprises and whether micro enterprises have different parameters of the profit function than the small enterprises. It also investigates into how the enterprises with relatively smaller number of workforce differ from those with relatively larger workforce.

Choice of the profit function: Profit function, which is a relationship between profit and the inputs used by an enterprise, may be specified or modeled in a variety of mathematical forms in the style of production functions (Mishra, 2010). A Cobb-Douglas profit function is defined in terms of profit (the current revenue minus current variable cost per unit of production normalized by the price of output) as a function of the numerical product of prices and quantities of inputs used to raise the output (Chand and Kaul, 1986). In translog profit function (Choudhary et al., 1985) profit is defined as in the Cobb-Douglas profit function but the relationship between profit and inputs to production takes on the translog form as formulated by Christensen et al. (1973).

In this investigation profit has been defined as the net return (NR = gross revenue minus all expenses, sans salaries/wages, incurred by the enterprise) normalized by the market value of the fixed asset ($MVFA$) as recorded for any particular period, i.e. $P = NR / MVFA$. This definition of profit is suitable to empirical analysis due to several reasons. First, each enterprise under study produces several products in different quantities that vary price wise as well as input-intensity wise. Secondly, there are many enterprises in the sample that produce a wide variety of products including numerous types of consumer goods, capital goods and services. To obtain data on such a gigantic scale is nearly impossible. Moreover, it may also be noted that at the level of a unit (enterprise) many inputs are clayey in nature such that they are not fixed and confined to producing a particular product, but, instead, can be either shared by many or shifted from the one to the other products. Also, there are quasi-fixed inputs that can be adjusted for a while but will not be adjusted all the way to the optimum level due to the constraints of adjustment costs. Further, there are nondiscretionary inputs whose level or utilization for a particular itemized product is not under the control of management since the production process turns out multiple products. They may correspond to quasi-fixed or fixed inputs whose minimum application is essentially required. It is more reasonable, therefore, to obtain cost of production at an aggregate rather than individual product level. In turn, to obtain profit, one must compute revenue also at an aggregate level in consonance with the cost of production. Reasonableness of such an approach is supported by the behavior of enterprises (and the management), which is more sensitive to monitoring revenue, expenses and profit at the gross level rather than at the itemized product level. Having made the measurement of profit operational, it is required that the rate of profit should be made comparable among the different enterprises that produce different types of products. For this purpose, it is reasonable to normalize the profit with the market value of the fixed asset, particularly because (i) the profit (revenue minus expenses) is measured on market value, (ii) in the short run fixed assets are more stable than other measures which may be used for normalization, (iii) value of fixed assets do not respond much to the shifts in product-mix decisions of the enterprise that are sensitive to fluctuating market forces, (iv) a good part of the fixed assets enter into the sunk cost, (v) normalization by fixed assets reduce differences in the scale of operation among the enterprises, and finally, (vi) data on market value of fixed assets of an enterprise is readily available.

As to the relationship between profit and inputs, Generalized Leontief function (GLF)

modified by Zellner-Revankar factor may be used. The GLF (Diewert, 1971) is given as:

$$P = h\left[\sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij}(x_i^{0.5}x_j^{0.5})\right];\ a_{ij} = a_{ji} \geq 0;\ x \geq 0;\ h > 0 \quad \ldots\ldots (1)$$

where P is the dependent variable (profit), x_i is the i^{th} explanatory variable (normalized workforce and expenses sans salaries/wages), a_i is the coefficient (unknown parameter) and h (unknown parameter) refers to the factor that equalizes both sides of the equation (also called the scaling factor). The Zellner-Revanker factor appears in the specification (Zellner and Revankar, 1969) as:

$$P\exp(bP) = c^{v} f^{v};\ v \geq 0 \quad \ldots\ldots (2)$$

where b and v are the parameters related to the returns to scale and f is the function that relates profits to the inputs e.g. Cobb-Douglas, CES (Constant Elasticity of Substitution), Generalized Leontief function such as in (1) above, etc. It may be noted that the specification of f in eqn. (1) above is very flexible for incorporation of many inputs and allows for variable Allen elasticities of substitution between any two variable inputs. It does not provide for measuring returns to scale (assumes that the constant returns to scale prevails). The specification in eqn. (2) endows f with a scope to incorporate monotonically variable returns to scale, decreasing returns to scale for a negative b. Accordingly, the profit function takes the form (for two inputs x_1 and x^2):

$$P = \frac{\left(ch\left(a_{11}x_1^{0.5} + a_{22}x_2^{0.5} + a_{12}x_1^{0.5}x_2^{0.5}\right)\right)^{v}}{exp\left(bh\left(a_{11}x_1^{0.5} + a_{22}x_2^{0.5} + a_{12}x_1^{0.5}x_2^{0.5}\right)\right)} \quad \ldots\ldots (3)$$

Thompson (1988) lists many other flexible functional forms that may suitably model a profit function. The choice of the model in eqn. (3) above has been made on account of easy interpretability of parameters, flexibility to incorporate additional inputs and amenability to statistical estimation.

Sources of data: Detailed enterprise wise data generated by the Fourth all India Census of MSME 2006-2007 are available on the website of the Ministry of Micro, Small & Medium Enterprises (www.dcmsme.gov.in). Taking it as a base, a sample of 420 small and micro enterprises was drawn by the stratified random sampling method for conducting further survey of the sample enterprises in order to collect more information as well as to update the relevant information already made available by the Census 2006-07. The collection of data was mainly motivated to study the human resource management aspects of MSEs in the NCR. The sample data could satisfactorily be collected only from 399 enterprises and the updated data so collected are covering the period 2006-2013. The sample enterprises are distributed in the spatial units of the NCR as: Delhi (105), Ghaziabad (71), Faridabad (70), Gurgaon (89) and Noida (64). Among them, 197 are manufacturing and 202 are service enterprises. Classified according to capital size, 188 are micro and 211 are small enterprises. Among them, 167 are registered and 231 are unregistered enterprises. A part of the sample dataset has been used here for the analysis of profit earned by the micro and small enterprises in the NCR.

Estimation of the profit function and interpretation of estimated parameters: In this study the financial data (revenue, expenses net of salaries and wages, etc.) for eight years (2006-2013) period have been averaged to obtain the profits. Similarly, the data for workforce (employees) and value of fixed assets are the average values. Averaging has been done due to two reasons. First, such averaging smoothen the year-to-year fluctuations and provides more stable values of the financials. Secondly, the financial data for all enterprises are not consistently (without break in the series) available for the run of eight years, 2006-2013. In a few cases data for 5 or 6 years only are available. In such cases, averages fill the gap and make inter-enterprise comparisons feasible.

The profit function (eqn. 3) has been estimated by nonlinear regression (optimized by sequential quadratic programming). The

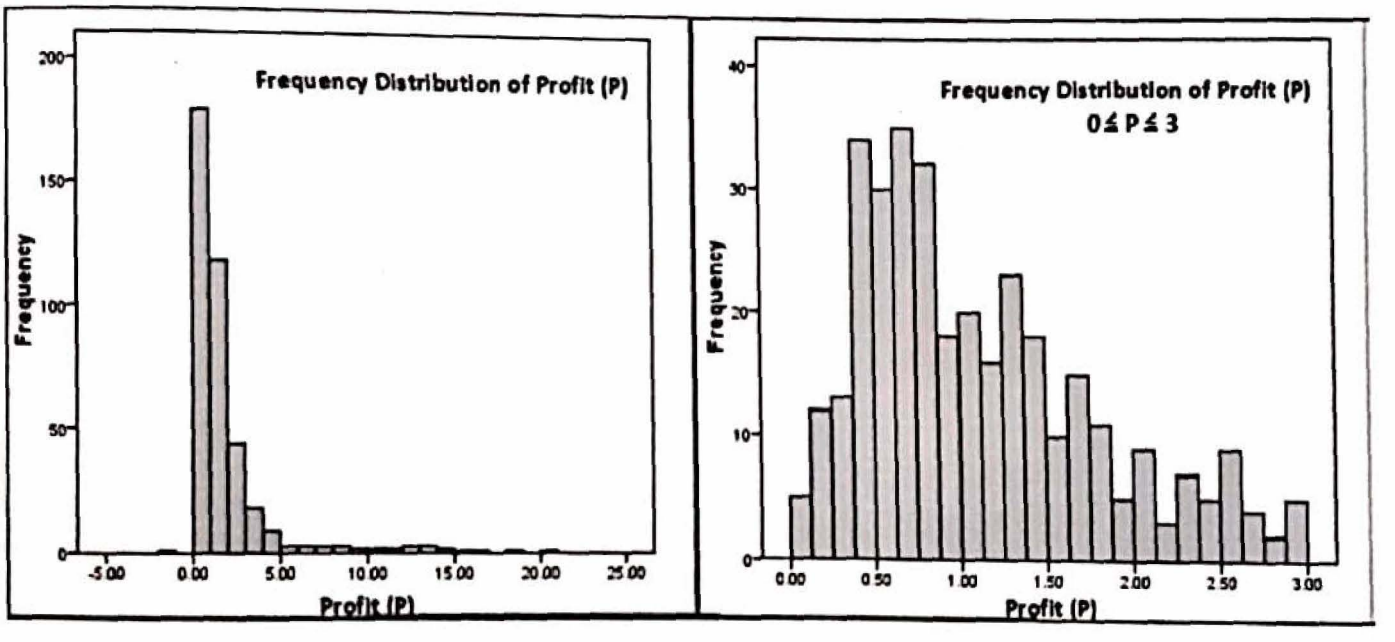
standard error of estimates of parameters and their lower/upper bonds for 95% trimmed range are obtained by bootstrapping.

The notion of empirical normal profit range: At this juncture it is appropriate to discuss the concept of Normal Profit Range (NPR). A normal profit range may be defined as a range occupied by the enterprises whose profits (P) do not show up statistical outliers, while outliers are the enterprises whose profits lay beyond a statistically acceptable spread range with respect to its own (P's) distribution and the model used to explain it. As the distribution of profits is highly right-skewed, use of arithmetic mean and standard deviation would be grossly inappropriate to detect such outliers and, thus, define the NPR. Use of median and median absolute deviation (MAD) as measures of location and dispersion is more appropriate.

Table-1: Percentile Distribution of Profit (w.r.t. MVFA) Earned by the Sample Small and Micro Enterprises in NCR

Percentile	10	20	25	30	40	50
Profit (P)	0.413	0.560	0.649	0.696	0.862	1.113
0 P 3	0.397	0.519	0.584	0.653	0.796	0.925
Percentile	60	70	75	80	90	100.00
Profit (P)	1.380	1.735	2.025	2.468	3.810	20.976
0 P 3	1.167	1.383	1.506	1.703	2.147	3.000

Fig.2: Distribution of Enterprises according to Profit (w.r.t. MVFA)



Rousseeuw and Croux (1993) suggest two more measures of location and dispersion. If we use Rousseeuw-Croux measures, the cut-off point would be P=3.239 or yet larger and the number of enterprises to be included in the NPR would be 347 (or more). However, we found in the present analysis that the estimated profit function with 347 (or more number of) enterprises increases the number of outliers with respect to the model (eqn. 3) that is being used for estimating the profit function. Hence, we have abandoned the Rousseeuw-Croux methods. On several trials we found out that the NPR may approximately be defined as the range between (2)$_{mm}PD-$ and (3)$_{,mm}PD+$where $_{m}P$ is the median profit and $_{m}D$is the median of absolute deviation of P from $._{m}P$ For the sample enterprises under study, this range is approximately P(0, 3). Normal profit is earned by the bottom 85% of the sample enterprises. It

may be seen that even this definition shows up three outlier enterprises. However, to eliminate them would require P(0, 2.5) which unduly eliminates many enterprises that have P well explained by the model (eqn. 3). That is to say, P(0, 2.5) has more statistical disadvantages but little advantage. Therefore, we have accepted the NPR in P(0, 3) rather than in P(0, 2.39).

Profit functions of the enterprises with below-median and above-median workforce: The distribution of the enterprises (Table-2) according to the size of workforce (no. of employees) reveals that about one-third of the enterprises have 9 or less number of employees, while in another one-third of the enterprises the number of employees varies between 10 and 25. The median enterprise (17 in number) has 15 employees. There are 189 enterprise having employees less than 15 in number. On the other hand, 193 enterprises have more than 15 employees.

Table-2: Percentage Distribution of Enterprises (According to No. of Employees or Workforce; Median = 15 Employees)

No. of Employees up to (median)	6	7	8	9	10	15
% of Enterprises	8.3	16.7	25.0	33.3	41.7	50.0
No. of Employees up to (> median)	20	25	30	36	50	75
% of Enterprises	58.3	66.7	75.0	83.3	91.7	99.7

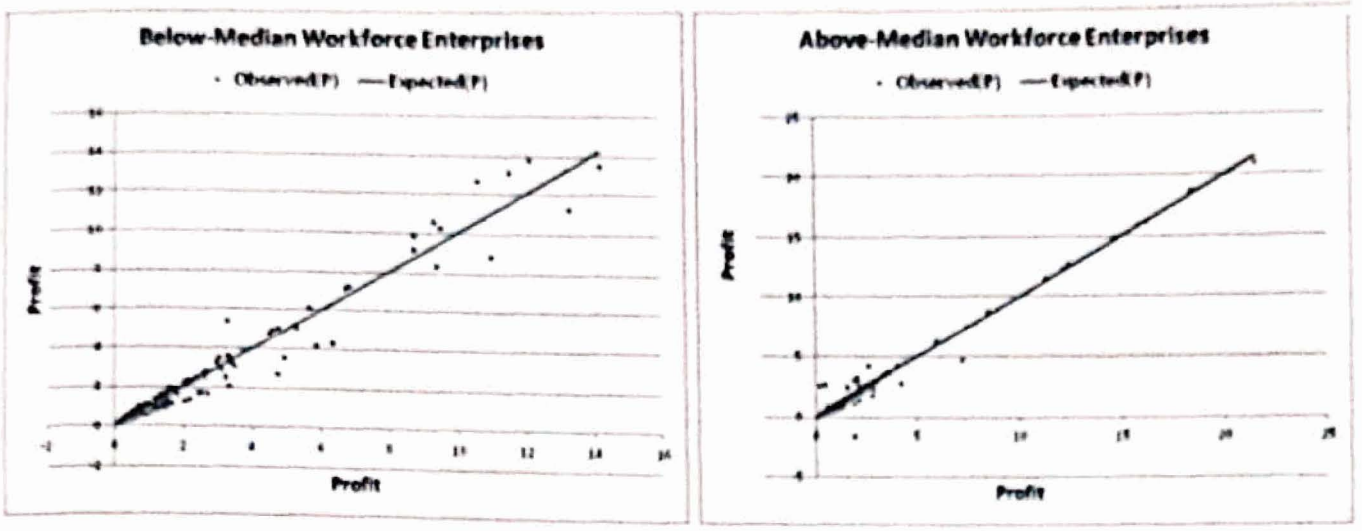
Table-3. Estimated Parameters of Profit Function of MSEs in Below-Median vs. Above-Median Workforce in National Capital Region, India

[Below-Median: n=189; R^2 = 0.943]; [Above-Median: n=193; R^2 = 0.960]

Parameter	Estimate	SEE	LB	UB
h(below median)	0.519	0.038	0.465	0.616
h(above median)	0.946	0.112	0.869	1.346
a_{11}(below median)	0.088	0.117	0.005	0.456
a_{11}(above median)	0.000	0.006	0.000	0.020
a_{22}(below median)	0.912	0.116	0.544	0.992
a_{22}(above median)	0.962	0.036	0.865	1.000
a_{12}(below median)	0.000	0.018	0.000	0.015
a_{12}(above median)	0.038	0.036	0.000	0.135
b(below median)	-0.137	0.352	-0.803	0.371
b(above median)	0.103	0.157	-0.144	0.468
v(below median)	1.853	0.293	1.276	2.288
v(above median)	2.181	0.391	1.527	3.093
c(below median)	1.764	0.213	1.401	2.169
c(above median)	1.005	0.115	0.638	1.101

Note: LB and UB are lower and upper bonds for 95% trimmed range; SEE is the Standard Error of Estimate of the parameters.

Fig.3: Profit Rates (as % to Value of Fixed Assets) of MSEs in the NCR, India (Workforce-wise)



The estimated parameters of profit functions (Table-3) reveal that the enterprises with below-median workforce exhibit decreasing returns to scale (negative b, and smaller v) and poorer substitutability (near-zero a12) between the factors of production than the above-median workforce enterprise, which show increasing returns to scale. They also show a wide range in P (Fig.3) vis-à-vis the above-median enterprises (mostly concentrated in the NPR). This is natural as the enterprises with below-median workforce already have smaller workforce, mostly barely necessary for their functioning.

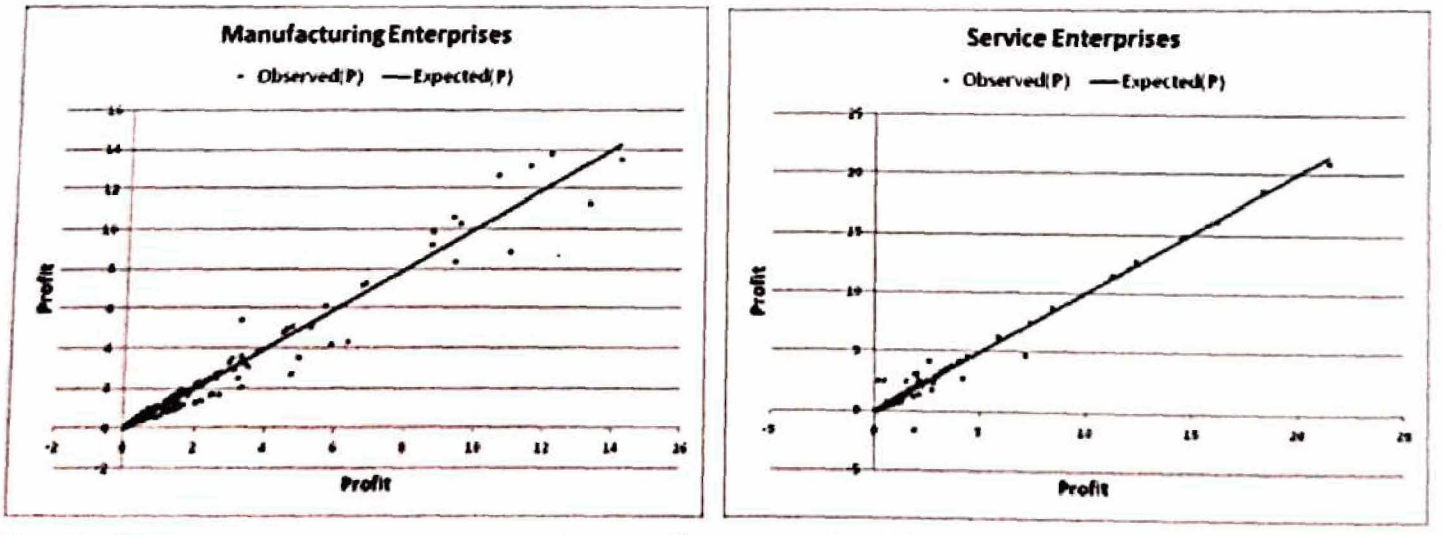
Profit functions of enterprises in manufacturing and service sectors: Among the sample (399) MSEs, 197 enterprises are in the manufacturing sector while the rest (202) are in the service sector. It is expected that profit function of the manufacturing enterprises will be significantly different from the service sector enterprises. The estimated parameters for manufacturing versus service sector enterprises are presented in Table-4 and the profits (observed as well as estimated) are depicted in Fig.4.

A comparison between the estimated parameters of profit functions of manufacturing and service sectors (Table-4) suggests that the coefficient associated with expenses (a22) in the manufacturing sector is smaller than that in the service sector. Moreover, the spread of this parameter (indicated by SEE and UB-LB) is larger in the manufacturing sector than in the service sector. The coefficient (a12) associated with the product 12()xx of labour 1()x and capital2(x, represented by non-wage expenses) is larger and more dispersed in the manufacturing sector suggesting that there is some substitutability between the two factors of production (1x and2x). This coefficient (a12) is near-zero in the service sector suggesting a near-Leontief type of technology in which labour and capital combine in fixed proportions. This may be so due also to the fact that manufacturing sector is more capital intensive, while service sector is more workforce intensive, needing less capital (machinery, etc). That is why there is little room for substitution of the one factor for the other. The parameter b in the manufacturing sector is positive (against negative b in the service sector), which leads to the conclusion that the manufacturing sector has increasing returns to scale, while the service sector has decreasing returns to scale. Higher value of v in the manufacturing sector further strengthens the conclusion that manufacturing sector has increasing returns to scale. A larger value of c for the manufacturing sector also suggests that 'value-added' is larger in this sector and it increases with the scale of production, which is reflected in the profit.

Table-4: Estimated Parameters of Profit Function of MSEs in Manufacturing vs. Service sectors in National Capital Region, India				
[Manufacturing: n = 197, R^2 = 0.959]; [Service: n = 202, R^2 = 0.979]				
Parameter	**Estimate**	**SEE**	**LB**	**UB**
h(manufacturing)	0.466	0.020	0.414	0.492
h(service)	0.951	0.058	0.876	1.163
a_{11}(manufacturing)	0.000	0.015	0.000	0.065
a_{11}(service)	0.002	0.002	0.002	0.002
a_{22}(manufacturing)	0.911	0.051	0.788	0.992
a_{22}(service)	0.998	0.014	0.954	1.000
a_{12}(manufacturing)	0.089	0.054	0.000	0.212
a_{12}(service)	0.000	0.001	0.000	0.002
b(manufacturing)	0.772	0.373	-0.338	1.129
b(service)	-0.091	0.064	-0.229	-0.003
v(manufacturing)	2.767	0.393	1.764	3.215
v(service)	1.788	0.162	1.412	2.028
c(manufacturing)	2.183	0.089	1.977	2.346
c(service)	0.933	0.071	0.696	1.027
Note: LB and UB are lower and upper bonds for 95% trimmed range; SEE is the Standard Error of Estimate of the parameters.				

As presented in Fig.4, the MVFA-normalized profits in the manufacturing sector vary from near-zero to a little less than 14 times of MVFA. However, in case of the service sector it varies from near-zero to about 21 times MVFA. Further, most of the enterprises in the manufacturing sector earn larger profits (with respect to the value of fixed assets) while the service sector enterprises are mostly swarming around the NPR.

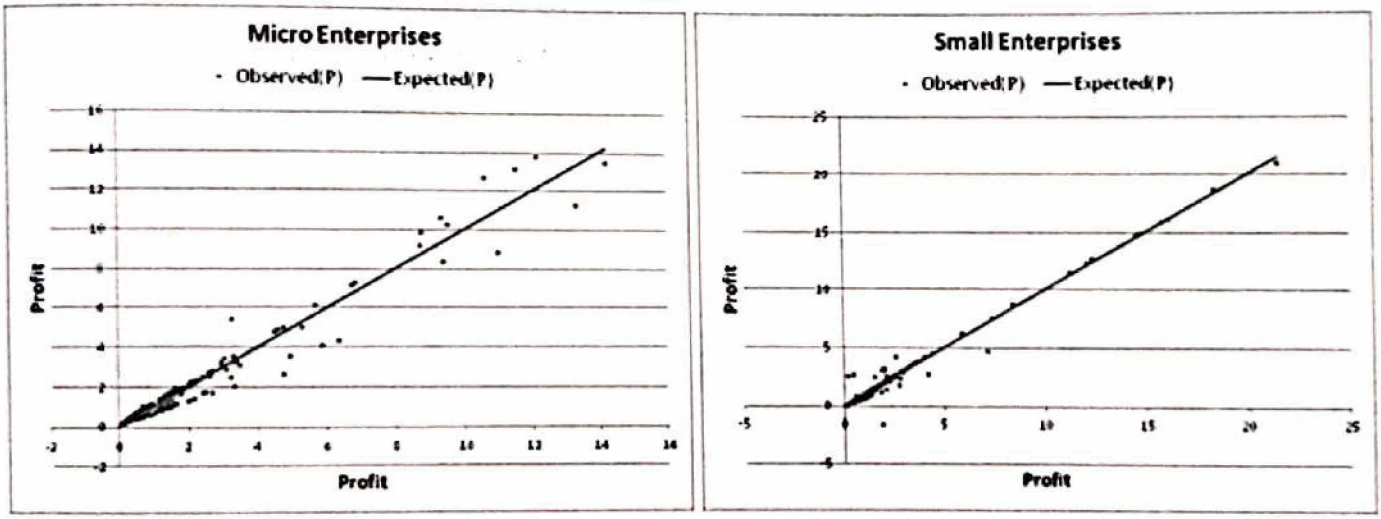
Fig.4: Profit Rates (as % to Value of Fixed Assets) of MSEs in the NCR, India (Sector-wise)



Profit functions of micro and small enterprises: Micro enterprises exhibit more substitutability between labour and capital than the small enterprises do (Table-5). Also, micro enterprises are experiencing more pronounced and increasing returns to scale while small enterprises are experiencing decreasing returns to scale. Micro enterprises also show up higher 'value-addition' than the small enterprises. As Fig.5 suggests, micro enterprises are more scattered in the profit range, while small enterprises are mostly concentrated in the NPR and have fewer outliers.

Table-5. Estimated Parameters of Profit Function of Micro and Small MSEs in National Capital Region, India				
[Micro: n = 188; R^2 = 0.959]; [Small: n=211; R^2 = 0.979]				
Parameter	**Estimate**	**SEE**	**LB**	**UB**
h(micro)	0.466	0.020	0.410	0.494
h(small)	0.951	0.069	0.891	1.207
a_{11}(micro)	0.000	0.009	0.000	0.016
a_{11}(small)	0.002	0.014	0.000	0.053
a_{22}(micro)	0.911	0.052	0.794	1.000
a_{22}(small)	0.998	0.014	0.947	1.000
a_{12}(micro)	0.089	0.053	0.000	0.206
a_{12}(small)	0.000	0.001	0.000	0.002
b(micro)	0.772	0.362	-0.237	1.187
b(small)	-0.091	0.065	-0.240	-0.006
v(micro)	2.767	0.389	1.816	3.318
v(small)	1.788	0.177	1.351	2.005
c(micro)	2.183	0.091	1.988	2.325
c(small)	0.933	0.082	0.655	1.002
Note: LB and UB are lower and upper bonds for 95% trimmed range; SEE is the Standard Error of Estimate of the parameters.				

Fig.5: Profit Rates (as % to Value of Fixed Assets) of Micro and Small Enterprises in the NCR, India

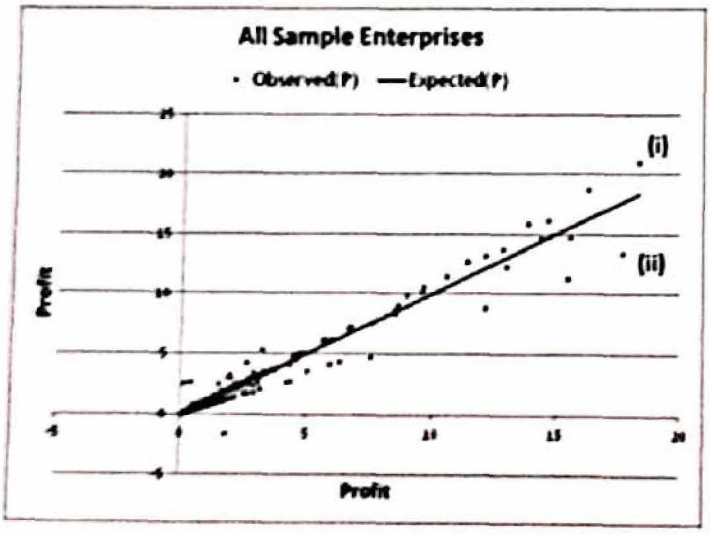


Profit function of all sample enterprises: Overall, the sample enterprises show up higher profitability for larger non-wage expenses and little addition to profitability due to workforce they employ (Table-6). Yet, there is some evidence of substitutability between the two types of inputs. These enterprises are operating with increasing returns to scale and a majority of them operate in the NPR. Two distinct rays of profitability line (i and ii) are observed (Fig.6). The majority of enterprises cluster around ray (i) while quite a few are on the ray (ii). They are mostly manufacturing enterprises.

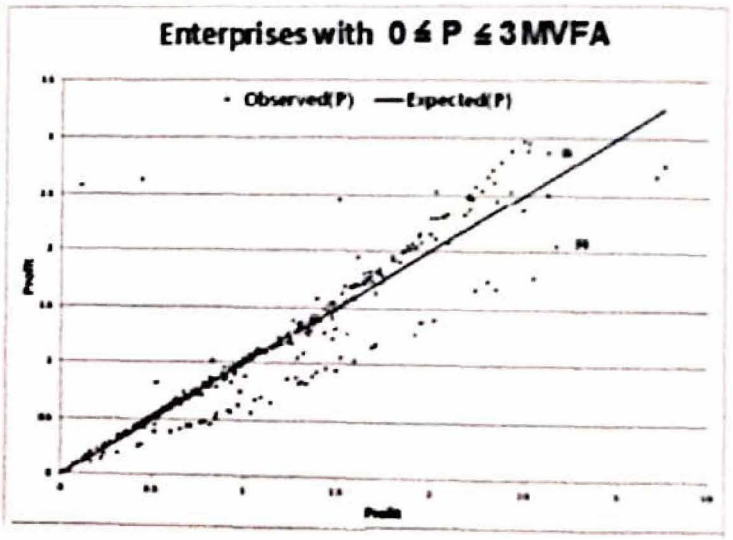
Table-6. Estimated Parameters of Profit Function of All and Outlier-Censored MSEs in National Capital Region, India				
[All: n = 399; R^2 = 0.956]; [Censored: n=341; R^2 = 0.843]; P (0 ≤ P ≤ 3 MVFA)				
Parameter	**Estimate**	**SEE**	**LB**	**UB**
h(all)	0.704	0.042	0.665	0.841
h(censored)	0.363	0.035	0.274	0.422
a_{11}(all)	0.000	0.028	0.000	0.101
a_{11}(censored)	0.074	0.059	0.000	0.190
a_{22}(all)	0.963	0.027	0.889	0.999
a_{22}(censored)	0.926	0.053	0.810	1.000
a_{12}(all)	0.037	0.026	0.000	0.099
a_{12}(censored)	0.000	0.025	0.000	0.088
b(all)	0.102	0.163	-0.198	0.430
b(censored)	2.144	1.058	-1.397	3.000
v(all)	2.114	0.267	1.648	2.678
v(censored)	2.825	0.495	1.373	3.414
c(all)	1.341	0.100	1.063	1.447
c(censored)	3.490	0.314	2.820	3.747
Note: LB and UB are lower and upper bonds for 95% trimmed range; SEE is the Standard Error of Estimate of the parameters. All for all 399 enterprises; Censored for censored data on enterprises ($0 \leq P \leq 3$ times the MVFA).				

Fig-6. Observed and Estimated Profit Function of MSEs in the National Capital Region, India

All (399) Enterprises



Enterprises with $0 \leq P \leq 3$ MVFA



It has already been observed (Table-2) that in most cases the enterprises swarm in the NPR. As noted earlier, the distribution of profits is highly skewed (coefficient of skewness = 3.518). Fifty percent of the enterprises have P < 1.113 times their MVFA. Seventy five percent of the enterprises have P < 2.025 times MVFA. Only 10 percent of the enterprises have P ≥ 3.81 times MVFA. The median P is 1.113 and mean P is 2.013 with standard deviation = 2.904.

In view of this, it is considered desirable if profit function is estimated for the enterprises in NPR only. To reiterate, we found that normal profit is earned by bottom 85% of the sample enterprises. Viewed as such, 341 enterprises

have profit, P ≤ 3 times MVFA. The estimated parameters of the profit function (eqn. 3) are presented in Table-6. It is observed that those enterprises (with 0 ≤ P ≤ 3 times the MVFA), too, exhibit increasing returns to scale, but with increased role of manpower (enhanced a11 and reduced a22) and decreased substitutability (reduced a12) between manpower and non-manpower inputs. The estimated values of b, v and c (by using 341 enterprises in the NPR) are all larger than those estimated by using all (399) enterprises. In general, the findings of the analysis obtained by using all (399) enterprises remain un-contradicted by the findings based on the enterprises in the NPR.

Profit function of enterprises in the widened NPR: It has been discusses earlier that we have defined the NPR by the criterion 0 ≤ P ≤ 3. In so doing, we abandoned the Rousseeuw-Croux criteria which suggested the NPR as 0 ≤ P ≤ 3.23875.

Table-7. Estimated Parameters and Profit Function of Enterprises with Censored P (0 ≤ P ≤ 3.23875 MVFA)

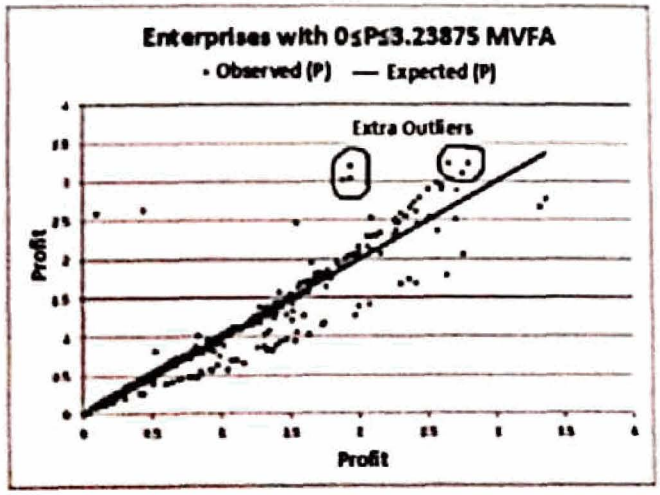
[xxx: n=347; R^2 = 0.836]; P (0 ≤ P ≤ 3.23875 MVFA)

Parameter	Estimate	SEE	LB	UB
h(xxx)	0.869	0.088	0.627	0.957
a_{11}(xxx)	0.079	0.055	0.000	0.174
a_{22}(xxx)	0.921	0.048	0.825	1.000
a_{12}(xxx)	0.000	0.032	0.000	0.109
b(xxx)	0.958	0.529	-0.438	1.431
v(xxx)	2.947	0.543	1.583	3.595
c(xxx)	1.472	0.140	1.200	1.642

Note: LB, UB and SEE defined as in preceding Tables. xxx for censored data on 347 enterprises (0 ≤ P ≤ 3.23875 times the MVFA).

In Table-7 we have presented the estimated parameters for the enterprises that lay in the widened NPR defined as 0 ≤ P ≤ 3.23875. There are 347 enterprises falling in this range. The result is that more outliers enter the range (Fig.7) as well as the R2 of the fit (of the model to the data) deteriorates from 0.846 (Table-6 for n=341) to 0.836 (Table-7 for n=347). Of the seven enterprises included in 0 ≤ P ≤ 3.23875 range (which were not there in 0 ≤ P ≤ 3 range), six turn out to be outliers (Fig.7). Thus, we conclude that the NPR defined by 0 ≤ P ≤ 3 is better than the NPR based on Rousseeuw-Croux criteria.

Fig-7. Observed and Estimated Profit Function of MSEs in the Extended Normal Profit Range



Concluding remarks: The analysis reveals that about 85% of MSEs earn normal profit in the range of 0-3 times the market value of fixed assets, mostly running with the increasing returns to scale and near-zero coefficient of substitution between human and non-human resources. These characteristics are more pronounced in case of the manufacturing sector and micro enterprises. Profits mostly respond to the size of non-human resources employed by the enterprises and it is more so in case of small enterprises. These tendencies indicate that the MSE sector is attractive to entrepreneurs and the expansion of this sector is likely in future due to entry of new enterprises, especially the micro ones. Employment generation will be mostly on account of this expansion rather than growth of the existing enterprises that prefer to increase capital rather than labour inputs.

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