Exploring the Reasons for Low Productivity and Low Technical Efficiency in Unincorporated Manufacturing Industry in India: Stochastic Frontier Analysis with Firm Level Data

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Manufacturing industry has a greater contribution to economic growth of a country compared to other industries. Manufacturing is the driving force for growth, prosperity and sustainable development of the Indian Economy. Although unorganised manufacturing sector accounts for 80% of the total manufacturing sector, it generates only 33% of the total income generated from the total manufacturing sector in India. Therefore, it is the need of the hour to search the reasons behind low productivity of unorganised manufacturing industry in India and make necessary corrections. This study tries to measure the productivity and technical efficiency of the enterprises of unorganised manufacturing industry in India and to find out significant reasons behind the low technical efficiency of these enterprises during the period from 2010-11 to 2015-16. In this study, we have used pooled cross-sectional unit level data of unincorporated manufacturing enterprises from 67th and 73rd round survey of unincorporated non-agricultural enterprises (excluding construction) by the National Sample Survey Office (NSSO), Government of India . We have used a semi-log stochastic frontier production function, in which gross value added is assumed to be the output and labour and capital are considered to be the inputs. To capture the effect of time on output, we have incorporated time dummy variable in our production function. Technical inefficiency has been assumed to be a function of working hours, severe problems of erratic power supply, shortage of skilled labour, insufficient demand and unavailable credit, government subsidy, type, location and sector of the enterprises. Our empirical results reveal that although both labour and capital had positive and significant effects on gross value added, contribution of capital on output was very small compared to that of labour on it. Our empirical result proves that problems of erratic power supply, unavailability of skilled labour, non-availability of credit and shrinkage of demand significantly reduced technical efficiency of the enterprises. We have also shown that government subsidy can reduce the technical inefficiency significantly. Mean efficiency scores for all the groups were very small during the period of our study.

Keywords: Stochastic frontier, Efficiency, Unincorporated Enterprises, Manufacturing
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1. Introduction

Manufacturing industry has a greater contribution to economic growth of a country compared to other industries. Manufacturing not only has the potential to have increasing returns to scale but also the faster the rate of growth of output in manufacturing, the faster the rate of growth of economy-wide productivity (Kaldor, 1966). This is why manufacturing serves as the "engine of economic growth". Manufacturing is the driving force for growth, prosperity and sustainable development of the Indian Economy. After the economic reform policies adopted by the Government of India in the year 1991, trade and manufacturing sectors have experienced structural changes through removal of restrictions on export, import and investment (foreign and domestic) in order to achieve economic efficiency. The entire economy was thrown into a highly competitive global world where demand for skilled workers has been generated. The size of the unorganized sector has grown substantially as unskilled or semi-skilled workforce tended towards unorganized sector for their livelihood options. With rising labour force, the role of unorganized manufacturing sector has become more prominent towards employment generation. Although unorganised manufacturing sector accounts for 80% of the total manufacturing sector, it generates only 33% of the total income generated from the total manufacturing sector in India.[1] Hence, there exists a lot of opportunity to make this sector to produce effectively in order to make India a manufacturing hub to compete globally. Therefore, it is the need of the hour to search the reasons behind low productivity of unorganised manufacturing industry in India and make necessary corrections.

The classical microeconomic textbook considers firms to be homogeneous units. Accordingly, all firms are assumed to operate at the same level of productivity or technical efficiency. However, empirical studies frequently showed that in the real world some firms are more efficient than others (Caves 1989). While some firms operate at the technological frontier and potentially earn high profits, others lag considerably behind and are barely able to survive. It is highly plausible to expect that a high level of competition will enhance the efficiency of firms (see Lovell 1993). Therefore, efficiency and competitiveness is the slogan in the new regime. There is a plethora of literature where authors have studied the technical efficiency of Indian

[1] Tripathi, R. and Iftaqar Ahmad (2015)

manufacturing sector, e.g. Ferrantino, 1992; Mamgain and Awasthi, 2001; Kathuria, 2002; GOI, 2006, Joshi and Little, 1996; Agarwal, 2001; Forbes, 2001; Mitra et al, 2002; Rajan and Sen, 2002; Ray, 2002; Driffield and Kambhampati, 2003; Kambhampati ,2003; Mukherjee and Ray, 2004; Mukherjee and Majumder, 2008 and Majumder and Mukherjee, 2014. Most of these studies have been on the efficiency of registered manufacturing sector of India. However, there is as such no study on the technical efficiency of unincorporated manufacturing in India over a long period of time.

Under this backdrop, this study tries to measure the productivity and technical efficiency of the enterprises of unorganised manufacturing industry in India and to find out significant reasons behind the low technical efficiency of these enterprises during the period from 2010-11 to 2015-16. In this study, we have used pooled cross-sectional unit level data of unincorporated manufacturing enterprises from 67th (2010-11) and 73rd (2015-16) round survey of unincorporated non-agricultural enterprises (excluding construction) by the National Sample Survey Office of the Government of India. Technical efficiency has been estimated in this study by applying stochastic frontier approach with firm level data. We have employed stochastic production frontier model developed in Battese and Coelli (1992). Efficiency increases when firms move closer to the best practice production frontier. Clearly, factor productivity of a firm goes up due to improvement in technical efficiency.

Section 2 of this study gives an overview of the unincorporated manufacturing enterprises in India during the period from 2010-11 to 2015-16. Section 3 describes the data and methodology. Section 4 interprets empirical results. Section 5 concludes.

2. An overview of the unincorporated manufacturing enterprises in India: 2010-11 to 2015-16

Unincorporated enterprises, as defined in the 17th International Conference of Labour Statisticians (ICLS 2003), are those which are not constituted as separate legal entities independently of their owners. In India, these enterprises are not registered under the Companies Act, 1956, and are not covered under Sections 2m(i) and 2m(ii) of the Factories Act, 1948. Unincorporated enterprises cover both own account enterprises and establishments. An enterprise, which is run without any hired worker employed on a fairly regular basis, is termed as an own account enterprise. An enterprise which is employing at least one hired worker on a fairly regular

basis is termed as establishment. Paid or unpaid apprentices, paid household member/servant/resident worker in an enterprise are considered as hired workers.

During 2010-11, out of the estimated 5.77 crore unincorporated non-agricultural enterprises (excluding construction) of India, 30 percent were engaged in manufacturing, 36 percent were in trading and 34 percent were in service sector. While about 54 percent of such enterprises were located in rural areas, 46 percent were located in urban areas. Out of all manufacturing enterprises, 84 percent were own account enterprises and remaining 16 per cent were establishments. During 2010-11, about 10.8 crore workers were engaged in unincorporated non-agricultural enterprise activities excluding construction. While about 51 percent of workers were located in urban areas, 49 per cent were located in rural areas. During 2015-16, out of the estimated 6.34 crore unincorporated non-agricultural enterprises (excluding construction) of India, 31 percent were engaged in manufacturing, 36.3 percent were in trading and 32.6 percent were in other services sector. Out of all such enterprises 51.3 percent were in rural areas and the remaining 48.7 percent were in urban areas. Out of all manufacturing enterprises, 85.5 percent were own account enterprises and remaining 14.5 percent were establishments. During 2015-16, about 111.3 million workers were engaged in unincorporated non-agricultural enterprises (excluding construction) in the country. Among the workers, 55 percent worked in urban areas and 45 percent worked in rural areas.

Table 1 shows mean value of gross value added (at constant price) by different unincorporated manufacturing enterprises of India during 2010-11 and 2015-16. It is evident that except rural manufacturing establishments outside household premises, gross value added increased in all types of manufacturing enterprises during the period of our analysis. However, GVA by all types of manufacturing establishments were much higher than GVA by all types of own account manufacturing enterprises. Table 1 also shows that GVA by urban manufacturing enterprises were higher than GVA by rural enterprises.

Table 1 Mean Value of Gross Value Added (deflated by WPI for Manufactured Products with Base:2011-12=100) by Unincorporated Manufacturing Enterprises in India (Excluding Construction) in 2010-11 and 2015-16

Unincorporated Manufacturing Enterprises	Mean GVA (in Rupees)	
	2010-11	2015-16
Urban establishment outside household premises	27185	50234
Urban establishment within household premises	20713	34338
Rural establishment outside household premises	50957	43138
Rural establishment within household premises	16238	26573
Urban OAE outside household premises	7696	12615
Urban OAE within household premises	5867	6298
Rural OAE outside household premises	6085	9467
Rural OAE within household premises	4288	5044

Source: Author's calculation from NSSO 67th and 73rd Round Survey

Table 2 shows average number of workers employed in different unincorporated manufacturing enterprises of India during 2010-11 and 2015-16. While average number of workers increased in urban manufacturing establishments outside household premises, it declined in rural manufacturing establishments within and outside household premises and rural own account manufacturing enterprises outside household premises. However, number of workers remained the same in all the other manufacturing enterprises during the period of our analysis. In all types of own account manufacturing enterprises, only the owner was the worker during 2015-16.

Table 2 Average Number of Workers Employed by Unincorporated Manufacturing Enterprises in India in 2010-11 and 2015-16

Unincorporated Manufacturing Enterprises	Average Number of Workers	
	2010-11	2015-16
Urban establishment outside household premises	2	3
Urban establishment within household premises	2	2
Rural establishment outside household premises	5	3
Rural establishment within household premises	3	2
Urban OAE outside household premises	1	1
Urban OAE within household premises	1	1
Rural OAE outside household premises	2	1
Rural OAE within household premises	1	1

Source: Same as in Table -1.

Table 3 shows mean working hours of different unincorporated manufacturing enterprises of India during 2010-11 and 2015-16. It is clear that workers worked for slightly more than nine hours per day in all manufacturing establishments, whereas they worked for slightly more than eight hours per day in urban own account manufacturing enterprises within or outside household premises and for slightly more than seven hours per day in rural own account manufacturing enterprises within or outside household premises during 2010-11. On the other hand, during 2015-16, workers worked for slightly more than nine hours per day in both urban and rural manufacturing establishments outside household premises, whereas workers of all the other enterprises worked for slightly more than eight hours per day excepting the case of rural own account manufacturing enterprises where workers worked for slightly more than six hours per day. Working hours increased in urban own account manufacturing enterprises within household premises and remained almost same in both urban and rural own account manufacturing enterprises outside household premises. Working hours declined considerably in all the other manufacturing enterprises.

Table 3 Mean Working Hours of Unincorporated Manufacturing Enterprises in India in 2010-11 and 2015-16

Unincorporated Manufacturing Enterprises	Mean Working hours	
	2010-11	2015-16
Urban establishment outside household premises	9.42	9.38
Urban establishment within household premises	9.20	8.84
Rural establishment outside household premises	9.76	9.17
Rural establishment within household premises	9.01	8.72
Urban OAE outside household premises	8.87	8.84
Urban OAE within household premises	7.69	8.38
Rural OAE outside household premises	8.15	8.17
Rural OAE within household premises	7.67	6.87

Source: Same as in Table -1.

Table 4 shows severe problems faced by different unincorporated manufacturing enterprises of India during 2010-11 and 2015-16. Out of all enterprises, 59 percent reported that they did not face any severe problem in 2010-11. During the same period, 10.6 percent faced the problem of erratic power supply or power cuts, 7.76 percent faced problem of non-availability of labour as and when needed and 5.01 percent faced the problem of shrinkage or fall of demand for

their products. Out of all enterprises, 48.76 percent reported that they did not face any severe problem in 2015-16. During the same year, 13.2 percent faced the problem of shrinkage or fall in demand for their products, 11.2 percent faced the problem of erratic power supply or power cuts and 7.56 percent faced the problem of non-availability of labour as and when needed. Therefore, it is clear that percentage share of enterprises facing the problem of shrinkage of demand has been more than doubled and problem of non-availability of credit also increased considerably during the period of our analysis. Percentage shares of enterprises facing other problems have increased during the same period except the cases of labour disputes and related problems and non-availability of labour as and when needed, in which the percentage shares declined over the years.

Table 4 Severe Problems Faced by Unincorporated Manufacturing Enterprises in India in 2010-11 and 2015-16

Nature of Problem Faced	Percentage Share of Enterprises	
	2010-11	2015-16
No problem	59.07	48.76
Erratic power supply/ power cuts	10.6	11.2
Shortage of raw materials	3.38	3.63
Shrinkage /fall of demand	5.01	13.2
Non-availability / high cost of credit	3.85	5.39
Non-recovery of financial dues	4.52	5.68
Non-availability of labour as and when needed	7.76	7.56
Labour disputes and related problems	1.59	0.18
Others(specific)	4.23	4.4

Source: Same as in Table -1.

Table 5 Government Assistance Received by Unincorporated Manufacturing Enterprises in India in 2010-11 and 2015-16

Nature of Government Assistance Received	Percentage Share of Enterprises	
	2010-11	2015-16
No Assistance	96.15	96.94
Financial Loan	2.37	1.34
subsidy	1.25	1.36
Machinery/Equipment	0.02	0.17
Training	0.01	0.02
Marketing	0.06	0
Raw Material	0	0.01
Others	0.16	0.16

Source: Same as in Table -1.

Table 5 shows the percentage shares of unincorporated manufacturing enterprises of India which received different types of government assistances during 2010-11 and 2015-16. It is quite clear than in both the years, almost 97 percent of all manufacturing enterprises did not receive any government assistance, which is a quite alarming picture. Out of all manufacturing enterprises, only 2.37 percent received financial loan from government during 2010-11, which declined to 1.34 percent during 2015-16 and only 1.25 percent received some subsidy from government during 2010-11 which marginally increased to 1.36 percent during 2015-16. Other assistances were so small that they are unmentionable.

3. Data and Methodology

This study uses 67th (2010-11) and 73rd (2015-16) surv ey of unincorporated non-agricultural enterprises (excluding construction) by the NSSO. The 73rd round survey is a repeat survey with the same sample design on same topic conducted during 2010-11 in the 67th round survey. It covers all unorganised manufacturing units and enterprises which are not covered by the Annual Survey of Industries (ASI), enterprise units engaged in trading, and services activities other than trade excluding construction. Both in rural and urban areas, all enterprises are grouped into two categories: establishments and own accounts enterprises. Both the surveys were designed to generate estimates of various operational and economic characteristics of the unincorporated non-agricultural enterprises in manufacturing, trade and other services (excluding construction) at a disaggregated activity category level. We have not used the earlier surveys of NSS on Unorganised Manufacturing - Non-Directory Establishments and Own-Account Enterprises since the estimates obtained from those sources are not directly comparable those obtained from 67th and 73rd round surveys due to some differences in coverage and concepts and definitions adopted.

One way of measuring productivity is the estimation of a neoclassical production function, assuming that producers are operating exactly on the production function, implying that they are perfectly efficient in maximising output by the use of available inputs. In many cases, however, firms are likely to produce not on but inside the production frontier in output space implying the presence of inefficiency while conducting the production process. In Farrell (1957), the ratio between actual and potential output is conventionally defined as the level of technical inefficiency. If a firm's actual production point lies on the frontier it is perfectly technically efficient. If it lies below the production frontier then it is technically inefficient. Farrell’s work led to the

development of two principal methods to compute efficiency scores, namely, stochastic frontiers (SF), based on econometric methods, and data envelopment analysis (DEA), relying on mathematical programming.

In this paper, stochastic production frontier model developed in Battese and Coelli (1992) has been employed under the assumption that efficiency is time invariant with unit level data from ASI. They defined technical efficiency as the ratio of a firm's mean production to the corresponding mean production if the firm utilised its level of inputs efficiently. Different industries or firms in a particular industry may use different technologies. In such a case estimating a common frontier function for all industries by applying a deterministic approach may not be the right step. Estimation of stochastic frontier production functions also rests on the assumption that the underlying production technology is common to all producers and inefficiency for individual producing units is estimated from the frontier based on all observations. But the stochastic character of the frontier can capture some heterogeneous behaviour of producing units across industry groups.

Since a major percentage of enterprises in our study are own account enterprises, which have only one owner-cum-worker, we cannot use Cobb Douglas or Translog stochastic frontier production function. Therefore, we have used semi-logarithmic stochastic frontier production function. To capture the change in sampling distributions of a single random sample over time we allow the intercept to change over time by introducing time dummy variable in the estimating model. The year dummy can be interpreted as the change in the effect of control variables on the dependent variable.

The semilogarithmic stochastic frontier production function of this paper is:

$$lnY_i=\beta_0+\beta_L L_i + \beta_K K_i + \beta_T T + v_i - u_i \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where Y_i, L_i and K_i are respectively the gross value added, labour input, and capital input for the aggregate manufacturing industry in industry ith firm in the aggregate unincorporated manufacturing industry. T is the time dummy variable which captures the effect of change in time on gross value added. v_i is the white noise error term and assumed to be independently and identically distributed (i.i.d) as $N\left(0,\sigma_v^2\right)$, and u_i is asymmetric non-negative random variable

distributed independently and identically as $N(\mu, \sigma_u^2)$ and is truncated at zero from below. The former captures the idiosyncratic heterogeneity among firms as well as the variation in output that results from random factors, while the latter takes into account technical inefficiency.

Once the parameters of the frontier function are estimated, the next step is to obtain the estimates of firm specific efficiency scores. The estimation of the unobserved inefficiency requires some special econometric techniques. Deterministic specification does not incorporate random shocks. But any particular firm faces its own production frontier which should be randomly placed by a collection of stochastic elements and thus stochastic components might enter into the model.

In the stochastic frontier model, there are two types of random errors:

$$\varepsilon_{it} = v_{it} - u_{it},$$

v_{it} is the white noise error term and assumed to be independently and identically distributed (i.i.d) as $N(0, \sigma_v^2)$, and u_{it} is asymmetric non-negative random variable distributed independently and identically as $N(\mu, \sigma_u^2)$ and is truncated at zero from below. The former captures the idiosyncratic heterogeneity among firms as well as the variation in output that results from random factors, while the latter takes into account technical inefficiency.

We can estimates ε_i from equation (2), but it is a composite error. Thus we need to estimate $\hat{u}_i$ on the basis of given values of ε_i. Given the distributional assumptions of u_i and v_i, the estimates of firm specific inefficiency can be calculated from the conditional distribution of u_i given ε_i. μ, σ and λ are obtained from the MLE estimates of the variance parameters and the residuals of equation (2). Here, $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\lambda = \frac{\sigma_u}{\sigma_v}$. In Battese and Coelli (1992) $\gamma = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}$ is used in place of λ.

By using the point estimate of the conditional mean of u_i given ε_i, firm specific technical efficiency is calculated as

$$TE_i = \exp\{-E(u_i / \varepsilon_i)\} \qquad (2)$$

After identifying the presence of inefficiency, we need to examine the factors responsible for inefficiency and to find the effect of external shocks, if any, on the productive efficiency of manufacturing industries. For this purpose, we have used the model proposed by Battese and Coelli (1995). In this model, the inefficiency term is distributed $N(\mu, \sigma_u^2)$, where μ can be estimated by taking average of μ_i:

$$\mu_i = b' z_i + w_i \qquad (3)$$

z_i is a vector of exogenous variables likely to affect productive inefficiency of industry i, b is the associated coefficient vector, and w_i is a random component defined by the truncation of the normal distribution with mean zero and variance, σ^2. Variations of technical inefficiency across enterprises may depend upon many factors[2]. In this study, we assume that severe problems faced by the enterprises may increase technical inefficiency of the enterprise, whereas government assistance may have reduced the technical inefficiency. Further, we assume than own account enterprises may have higher technical inefficiency than establishments and enterprises in rural areas and homebased enterprises (within household premises) may have higher technical inefficiency than urban ones. Based on all these assumptions, our technical inefficiency equation is:

$$\mu_i = b_0 + b_1 working\_hour_i + b_2 OAE_i + b_3 rural_i + b_4 home\_based_i + \sum_{j=1}^{7} b_{ij} problem_{ij} + \sum_{k=1}^{7} b_{ik} assistance_{ik} + w_i \qquad (4)$$

Since all unincorporated enterprises are labour intensive, working hours of workers can be considered as a significant explanatory factor of technical efficiency. Hence, we have included working hours of a labourer in any enterprise or establishment as an explanatory variable. Dummy variable OAE is 1 for all own account enterprises, 0 otherwise. Dummy variable rural is 1 for all rural enterprises, 0 for all urban enterprises. Dummy variable home_based is 1 for all home-based enterprises, 0 for all other enterprises. We have included seven dummy variables for problems faced by the enterprises, viz. erratic power supply/ power cuts, shortage of raw materials, shrinkage /fall of demand, non-availability / high cost of credit, non-recovery of financial dues, non-

[2] Caves (1992) classified the factors explaining inter-industry differences in efficiency into five different groups: market conditions, organization of an industry, and structural heterogeneity among industries, dynamic factors and government regulations.

availability of skilled labour as and when needed and other specific problems. In order to test whether assistance received from the government reduces technical inefficiency, we have included six dummy variables for government assistance, viz. financial loan, subsidy, machinery/equipment, skill development, raw material and others. All the parameters of the semi-log production frontier are estimated by the MLE technique. The maximum likelihood estimates (MLE) of the parameters in equation (1) and (4) are calculated by using Stata 14 econometric software.

4. Empirical results

The contributions of labour, capital and time to output growth in unincorporated manufacturing enterprises of India are estimated by using the semi-logarithmic production function specified above in equation (1) by applying maximum likelihood method (MLE) with the available firm level data pooled from 67th and 73rd survey of unincorporated non-agricultural enterprises (excluding construction) by the NSSO as shown in Table 6 during the period 2010-11 to 2015-16. To capture the effect of time on production, we have incorporated the time dummy variable in our production function. The use of unit level data captures technological heterogeneity by firms and thus provides more robust result than the use of aggregative data. Table 6 provides the maximum likelihood estimates of the semi-log production frontier specified in equation (1) and the estimates of the technical inefficiency equation (2).

Table 6 Estimated Coefficients of Semi-log Production Function and Inefficiency Function

Semi-log Production Function:				
	Coefficient	**standard error**	**z**	**P>|z|**
constant	9.993232	.0097496	1024.99	0.000
labour	.0432903	.0006061	71.43	0.000
capital	0.0000000206	0.000000000897	22.93	0.000
year_2016	.3904303	.0076824	50.82	0.000
Inefficiency Equation:				
	Coefficient	**standard error**	**z**	**P>|z|**
constant	0.1205891	0.0426132	2.83	0.005
working_hrs	-0.12502	0.003505	-35.67	0.000
OAE	2.782069	0.025895	107.44	0.000
rural	0.403318	0.013505	29.86	0.000
homebased	0.462257	0.014018	32.98	0.000
problem				

erratic power supply/ power cuts	0.287153	0.031528	9.11	0.000
shortage of raw materials	0.058021	0.03947	1.47	0.142
shrinkage /fall of demand	0.15935	0.019536	8.16	0.000
non-availability / high cost of credit	0.166119	0.028621	5.8	0.000
non-recovery of financial dues	0.002417	0.029171	0.08	0.934
non-availability of skilled labour as and when needed	0.726972	0.129395	5.62	0.000
others	0.177944	0.027499	6.47	0.000
assistance				
financial loan	0.032141	0.066737	0.48	0.630
subsidy	-0.40849	0.134772	-3.03	0.002
machinery/equipment	-0.09039	0.176569	-0.51	0.609
skill development	0.319274	0.233068	1.37	0.171
raw material	0.694242	0.467407	1.49	0.137
others	-0.72121	0.239817	3.01	0.003
δ_u	.9314979	.0089933	103.58	0.000
δ_v	.7343688	.0042703	171.97	0.000
λ	1.268433	.0121336	104.54	0.000
Log Likelihood		-99283.402		

Source: Author's estimate based on data as for Table 1

From the maximum likelihood estimates, it is clear that although both labour and capital had positive and significant effects on gross value added, contribution of labour on output was much higher than that of capital on gross value added. It is also clear that there had been a positive and highly significant increase in gross value added during the period from 2011 to 2016. Our empirical result also shows that in all unincorporated enterprises, production is primarily dependent on labour and therefore as working hour decreases, technical inefficiency increases significantly in all these enterprises. Own account enterprises were significantly more inefficient than establishments. Rural enterprises were significantly more inefficient than urban enterprises. Home-based enterprises are found to be less technically efficient than non-home-based enterprises. Our empirical results also show that erratic power supply/ power cuts, problem of shrinkage in demand for product, non-availability / high cost of credit and non-availability of skilled labour as and when needed had a highly significant and positive effect on technical inefficiency of any enterprise. On the other hand, government subsidy and firm-specific assistance had significantly dampening effect on technical inefficiency.

Table 7 Mean Efficiency Scores of Unincorporated Manufacturing Enterprises

Unincorporated Manufacturing Enterprises	Mean Efficiency Score	
	2011	**2016**
Urban establishment outside household premises	0.285	0.475
Rural establishment outside household premises	0.298	0.427
Urban establishment within household premises	0.208	0.346
Rural establishment within household premises	0.192	0.321
Urban OAE outside household premises	0.169	0.151
Rural OAE outside household premises	0.174	0.138
Urban OAE within household premises	0.195	0.127
Rural OAE within household premises	0.169	0.170

Source: Author's estimate based on data as for Table 1

The estimates of productive efficiencies for every firm at each time period can be utilised to look at the behaviour of manufacturing group-specific mean efficiency. Table 7 presents the mean efficiency scores of the unincorporated manufacturing enterprises across different groups of enterprises over two different years. In both the years, mean efficiencies for all the groups are much less than unity. This implies that the production points of the firms of most of the sectors lie much below the production frontier, i.e. they are technically highly inefficient. Mean efficiency scores declined in case of urban and rural own account manufacturing enterprises outside household premises and urban own account manufacturing enterprises within household premises, whereas mean efficiency scores increased for all the unincorporated manufacturing enterprises. Mean efficiency score was highest in case of urban manufacturing establishments outside household premises followed by rural manufacturing establishments outside household premises in 2015-16.

5. Conclusions

This study examines technical efficiency of unincorporated manufacturing enterprises in India with firm level data from pooled from 67th and 73rd survey of unincorporated non-agricultural enterprises (excluding construction) by the NSSO. First, we have given a brief overview of unincorporated during the period from 2010-11 to 2015-16. We have used the stochastic frontier

approach to evaluate the contributions of labour and capital as well as the level of technical efficiency of the unincorporated manufacturing enterprises. The contributions of labour, capital and time to output growth are estimated by using the semi-logarithmic type production function. To find out enterprise-specific technical efficiency, stochastic production frontier model developed in Battese and Coelli (1992) has been employed.

Our study reveals that except urban own account manufacturing enterprises within household premises, gross value added increased in all types of manufacturing enterprises during the period of our analysis. However, GVA by all types of manufacturing establishments were much higher than GVA by all types of own account manufacturing enterprises. The data also shows that GVA by all urban manufacturing enterprises was higher than GVA by all rural manufacturing enterprises. Data also reveals that mean working hours remained eight to nine hours per day in all the manufacturing enterprises throughout the whole period. It is also clear from the data that percentage share of manufacturing enterprises facing the problem of shrinkage of demand more than doubled and problem of non-availability of credit also increased considerably during the period of our analysis. It is also evident from the data that almost 97 percent of all manufacturing enterprises did not receive any government assistance, which is a quite alarming picture. However, there was an increase in percentage of manufacturing enterprises which received government subsidies.

From the maximum likelihood estimates, it is clear that although both labour and capital had positive and significant effects on gross value added, contribution of capital on output was very small compared to that of labour on gross value added. This is quite understandable since all these unincorporated manufacturing enterprises produce traditional products based on labour-intensive technology and they have severe shortage of capital.

Our empirical result shows that own account enterprises are technically less efficient than the establishments. Enterprises in rural areas are found to be less technically efficient than those which are operated in urban areas. We also reveal that home-based enterprises are less technically efficient that those which are operated from outside the household premises. Our result further proves that problem of non-availability of credit significantly reduces technical efficiency of the enterprises. Our empirical result also shows that shrinkage of demand for product has significantly reduced the efficiency of the manufacturing enterprises during the period of our

analysis. During the post Globalisation period, traditional products produced by the small unincorporated manufacturing enterprises are increasingly facing competition from foreign products especially the cheap manufactured products from China. Suddenly the small manufacturers are discovering the decline in the demand for their traditional products in the market. This problem is reducing their technical efficiency. Many states in India face shortage of electricity. Furthermore, most of the small and marginal firms steal electricity by hooking to avoid the huge electricity bill. As a result, erratic power supply/ power cuts is one of the major problems faced by the unincorporated enterprises. Workers in unincorporated enterprises in India are highly unskilled; they do not have any technical education and rarely get any training organised by the government. Hence, problem of shortage of skilled labour is one of the major problems faced by these enterprises. Our result has revealed that government subsidy can reduce the technical inefficiency significantly. Therefore, government should try to make provisions for subsidy to these enterprises.

Own account enterprises are found to have lower efficiency scores than establishments, whereas urban enterprises had higher efficiency scores than rural ones. In both the years, mean efficiency scores for all the groups were very small. However, it is clear from our result that both rural and urban manufacturing establishments outside household premises had comparatively higher efficiency scores.

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