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SUB-CONTRACTING AND EFFICIENCY OF THE INFORMAL SECTOR IN INDIA

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ABSTRACT

Firms operating on production linkages through vertical integration with other firms are generally expected to possess a secured market for their output and better accessibility to inputs. We test the hypothesis whether or not the informal firms operating on contracts with formal firms/agencies/contractors are more efficient in terms of technical efficiency vis-à-vis other firms. To test the hypothesis, the paper analyzes the efficiency performance of the informal enterprises in India across enterprises of two states (selected on the basis of level of development) using two stage Data Envelopment Analysis technique. The paper uses the large sample enterprise level data of National Sample Survey Organisation. It is observed that in the developed state (Delhi) firms on contracts are less efficient, while they are more efficient in the less developed state (Orissa). The results further reveal that enforcement of regulations makes the firms more inefficient.

JEL Classification: O17, E26

Key Words: Informal Sector, Sub-contracting, Determinants of Efficiency, Developed and Developing States

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INTRODUCTION

The informal sector, since time immemorial, has been making a significant contribution to the employment generation and gross domestic product of the developing economies in general, and the Indian economy, in particular. Given its substantial contribution to the over all economic growth, it is important to understand the significance of the informal sector in terms of its efficiency performance. In India, efficiency of informal sector is linked to the efficiency of a whole economy because the informal sector contributes about 86 percent to the total employment generation (NSSO, 2005) and about 60 percent to the Net Domestic Product (CSO, 2008). In the context of a globally competitive market, efficiency of the enterprises lies in terms of ability to survive and maintain their market share. Further, an understanding of the relative performance of enterprises in the informal sector assumes greater significance in view of the current policy interventions.

Studies on the micro, small and medium enterprises are not mutually exclusive with the studies on informal enterprises. Schooling and job training are the main determining factor of efficiency dispersions among micro-enterprises (Gokcekus, Anyane-Ntow and Richmond, 2001). Hence, education policy that would encourage operators of these enterprises in the country to undergo literacy and training programmes would lead to substantial increase in efficiency of production and hence in the volume of output at the current level of technology (Ajibefun and Daramola, 2010). Further, studies find that the technology and capital are other important variables for improving the efficiency and productivity of the micro-enterprises. For instance, Chapelle and Plane

(2005) measure the technical efficiency of Ivorian manufacturing firms and argue that not only formal activities prove to be more efficient in scaling their production but also, they greatly benefit from their modern technology. Using stochastic frontier production function on firm level data from Mexico's National Survey of Microenterprises, Hernández-Trill, Pagán and Paxton (2002) estimate inefficiency effects related to the main sources of start-up capital. Li, Liu and Yun (2007) show technical progress is the main contributor to productivity growth and the scale of economy became important in recent years, but technical efficiency has edged downwards.

In Indian context, Unni, Lalitha and Rani (2001) provide a comparative analysis of all-India with one of the most industrially developed states (Gujarat) and argue that Gujarat's strategy of physical infrastructure development, leading to industrialization, has been the main reason for the growth and efficiency of the state's manufacturing sector. Likewise, Sharma and Sharma (2010) find that the states are operating at decreasing returns to scale, which signifies the scope for investment and further employment generation. Technical efficiency and productivity performance of the unorganized manufacturing enterprises using National Sample Survey data are estimated at the state level (Natarajan and Rajesh, 2007; Rajesh and Duraisamy, 2007), national level (Rajesh and Duraisamy, 2007) and relates with economic reforms (Rajesh, 2007). Using stochastic frontier approach, Dimitriu and Savu (2010) measure technical efficiency of the formal and informal manufacturing sector in India and argued that the results are against realities on ground-level from a socio-economic perspective. Kathuria, Raj and Sen (2011) argue that any inference on productivity growth in India since the economic reforms of 1991 is conditional on the method of measurement used, and that there is no unambiguous picture emerging on the direction of change in total factor productivity growth in post-reform India. Regarding the sustainability of growth of manufacturing sector, Trivedi, Lakshmanan, Jain and Gupta (2011) argue that intra-sectoral disparity between the organized and unorganized sector are getting more widening and that should be the major policy concern. While on the basis of a comparative analysis, Bhaskaran (2011) concluded that the manufacturing enterprises has performed well in compared to service enterprises in micro, small and medium enterprises in one Indian state (Tamil Nadu).

In the economics literature, several schools of thought have developed regarding the formal and informal sectors' relationship. According to one school, the informal sector is an autonomous segment of the economy producing mainly for consumption within the sector, while another school argues that the informal sector shares a dependent relationship with the formal sector and it is exploited by the formal sector. According to the yet another school, the informal sector is integrated with the rest of the economy through complementary linkages (ILO, 1991). In India, complementary linkage between the formal and informal sectors takes place mainly through sub-contracting which promotes informal sector's growth (Bairagya, 2008). There is an existing debate on whether or not the vertical linkages among the firms through sub-contracting improve efficiency of the enterprises. Yang and Chen (2009) and Le and Harvie (2010) show that sub-contracting is significantly related with efficiency of the small and medium enterprises in Taiwan's electronics industry and Vietnam's manufacturing sector, respectively, whereas Natarajan and Rajesh (2007) find the coefficients of sub-contracting are significant only in wood industry group in the manufacturing sector in an

Indian state (Kerala). Moreover, Majumdar and Subrahmanya (2009) argue that vertical integration is a major contributor to both technical efficiency change and technological progress and it is necessary to promote vertical integration through subcontracting small and medium enterprises with the large enterprises. Unlike in the past, a large number of informal enterprises in recent years are producing their products by receiving direct contracts from the formal firms/agencies/contractors. The contracts relate to the sale of outputs and supply of inputs (raw materials, equipments and design specification). In this context, one can hypothesize that firms having contracts for the supply of inputs may be more efficient because of their better accessibility to inputs vis-à-vis other firms. Moreover, firms with contracts for sale of outputs are, to some extent, free from the risk of market uncertainty of their products. The existing studies on efficiency of informal sector have ignored this issue.

Thus, the objective of this paper is to analyze the efficiency performance of the non-agricultural informal sector in India and identify the determinants of inefficiency. This estimation also tests the hypothesis whether or not the firms operating on contracts with formal firms/agencies/contractors would be more efficient in terms of output oriented technical efficiency vis-à-vis other firms.

The paper is organized as follows. Section-2 outlines the methodology for efficiency measurement. Results of efficiency analysis and its determinants are discussed in sections-3 and 4. Section-5 includes concluding remarks.

METHODOLOGY FOR EFFICIENCY ANALYSIS

Methodology: Data Envelopment Analysis

“The technical efficiency of a firm is a comparative measure of how well it actually processes inputs to achieve its outputs, as compared to its maximum potential for doing so, as represented by its production possibility frontier” (Barros and Mascarenhas 2005). A firm is said to be technically inefficient when it operates below the frontier. Technical efficiency scores can be computed either by using output oriented measure or input oriented measure i.e., either by output expansion or by input conservation. However, output oriented efficiency has been computed in this study. In an output oriented approach, given inputs, the expansion of output to the maximum extent possible is estimated.

The estimation of frontier function and measuring efficiency of production can be done either by using Data Envelopment Analysis (DEA) and Stochastic Frontiers Analysis (SFA). DEA is based on linear programming, whereas SFA involve the use of econometric methods. Both the methods have their strengths and limitations. In fact, Lovell (1993) argues that “neither approach strictly dominates the other”. Thus, the selection of the method should be on the basis of the sector and objectives of the study. In this paper, the DEA methodology is used for computing technical efficiency because of following advantages. (i) In case of cross-sectional econometric regressions, the stochastic model relies on relatively limited information to separate the random error term in the normal disturbance and the inefficiency component (Lovell 1993). However, there is no need for selecting a distributional form for inefficiency effects in DEA. (ii) It is not required to specify either the production function or the weights of inputs and

outputs in DEA. However, DEA is also not free from limitations. It assumes all deviations from the frontier are because of inefficiency. Coelli, Rao, and Battese (1998) suggest that when random influences are less of an issue the DEA approach may often be the optimal choice.

Farrell (1957) first introduced the measurement of efficiency using a non-parametric frontier approach as a relative distance from the frontier. Later this methodology is extended by Charnes, Cooper and Rhodes (1978) and named as Data Envelopment Analysis (DEA). Data Envelopment Analysis (DEA) is a mathematical programming and a non-econometric method. Banker (1993) provides a formal statistical basis for the efficiency evaluation technique of DEA and proves that while the best practice frontier estimator is biased below the theoretical frontier for a finite sample size, the bias approaches zero for large samples. The DEA estimators exhibit the desirable asymptotic property of consistency. Further, Banker and Nataranjan (2008) compare the performance of two-stage DEA with one-stage and two-stage parametric approaches using Monte Carlo simulations. Simulation results indicate that DEA-based procedures with OLS, maximum likelihood or even Tobit estimation in the second stage perform as good as the parametric methods in the estimation of the impact of contextual variables on productivity. The only condition requires that the contextual variables to be independent of the input variables, but the contextual variables may be correlated to each other.

DEA solves a linear programming problem. A two stage DEA methodology is used in this study. In the first stage, the technical efficiency scores of informal enterprises are computed, and in the second part, Tobit censored regression model is used for identifying the determinants of technical efficiency scores.

Stage-I

Following Ray (2004) linear programming, the problem is set to compute the efficiency scores, written as:

Max Φ

Subject to $\sum_{i=1}^n \lambda_i A_i \geq \Phi A_i$

$$\sum_{i=1}^n \lambda_i C_i \leq C_i$$

$$\sum_{i=1}^n \lambda_i L_i \leq L_i$$

$$\sum_{i=1}^n \lambda_i = 1$$

$$\lambda_i \geq 0 \quad (1)$$

where, n = Number of enterprises.

Φ = Factor by which the output bundle can be expanded relative to the frontier constructed with input-output bundle of other best performing firm. $1/\Phi$ represents efficiency.

λ_i 's are constants.

A_i = Gross value added of enterprise i .

C_i = Capital of enterprise i .

L_i = Labour of enterprise i .

Stage-II

Tobit censored regression model is used to estimate the determinants of efficiency. Efficiency score equal to zero implies zero output or the firm is not engaged in the production process. Since the efficiency score of the best performing unit is equal to unity, $(1-TE_i)$ represents the inefficiency score of i^{th} firm. Therefore, the DEA efficiency scores can be transformed into inefficiency scores by censoring them at zero. The inefficiency score (y_i) is used as a dependent variable in the regression equation.

$$y_i = (1-TE_i) \quad (2)$$

Equation (2) shows that the best performing unit with an efficiency score 1 is transformed into an inefficiency score zero and firms with efficiency scores less than 1, exhibit positive values greater than zero but less than one i.e., $0 \leq y_i < 1$.

The standard Tobit model for the estimation purpose can be formulated as follows:

$$\begin{aligned} y_i^* &= \beta x_i + \varepsilon_i \\ y_i &= y^* \text{ if } y^* > 0, \text{ and} \\ y_i &= 0, \text{ otherwise} \end{aligned} \quad (3)$$

Where $\varepsilon_i \sim N(0, \sigma^2)$, and x_i and β are vectors of explanatory variables and coefficients respectively. y_i^* is a latent variable and y_i is the DEA inefficiency score.

Choice of Developed and Underdeveloped States

Two states, one developed and the other underdeveloped have been chosen for computing the efficiency scores across enterprises and also for identifying the determinants of inefficiency, besides testing the hypothesis whether the determinants of efficiency are the same or different for the developed and developing states. The states have been chosen on the basis of level of development (Human Development Index), population density, and urban share in total population. Apart from HDI, urban share in total population is considered as it provides a comparative analysis of the urban and rural informal sector. Table-1A in the appendix presents the values and ranks of the states based on Human Development Index, population density, urban share in total population and gender empowerment measure. Delhi is taken as a representative of the developed states since it accounts for the higher side on the basis of all the categories, while Orissa stands in bottom pile on the basis and, thus, it has taken as a representative of underdeveloped state.

Variables, measurements and data source

The efficiency analysis has been carried out for the year 1999-2000 because this is the only year so far in which a large number of sample survey for the whole non-agricultural informal sector in India was carried out by NSSO (2001). Table-1 presents the variables, measurements and their definitions for estimation of the efficiency performance of the informal sector.

TABLE 1. VARIABLES, MEASUREMENT AND DATA SOURCE ON EFFICIENCY PERFORMANCE OF THE INFORMAL SECTOR

Variables	Measurement	Definition
Output	Gross Value added	Differences between the annual receipts and expenses.
Capital	Gross fixed assets	Capital is sum of the market value of owned land and building, plant and machinery, transport equipment, other fixed assets, net additions to fixed assets during last 365 days, market value of hired assets like land and building, plant and machinery, transport equipment, other fixed asset.
Labour	Number of workers	Working owner + hired workers + other workers / helpers.

ESTIMATED RESULTS

Nature of Informal Sector across States in India

The informal sector is classified in terms of their locations and enterprise types. In order to measure the size informal sector on the basis of location by states, percentages share of total number of enterprises located in urban and rural areas by states are estimated. NSSO classifies the firms into own account enterprises (OAE) and establishment. OAE includes enterprises not employing any hired worker and it is run by household labour, whereas establishment includes enterprises employing at least one hired worker. Since establishment incorporates the enterprises with at least one hired worker, the sizes of these units are larger than OAE. Due to its large size, it avails the advantages of economies of scale which, in turn, can make the units more efficient in terms of technical efficiency. Thus, one can argue that relatively modern informal sector confines in the category of establishment. Table-2 presents the percentage share of OAE and establishment in total number of estimated enterprises along with the rural urban share.

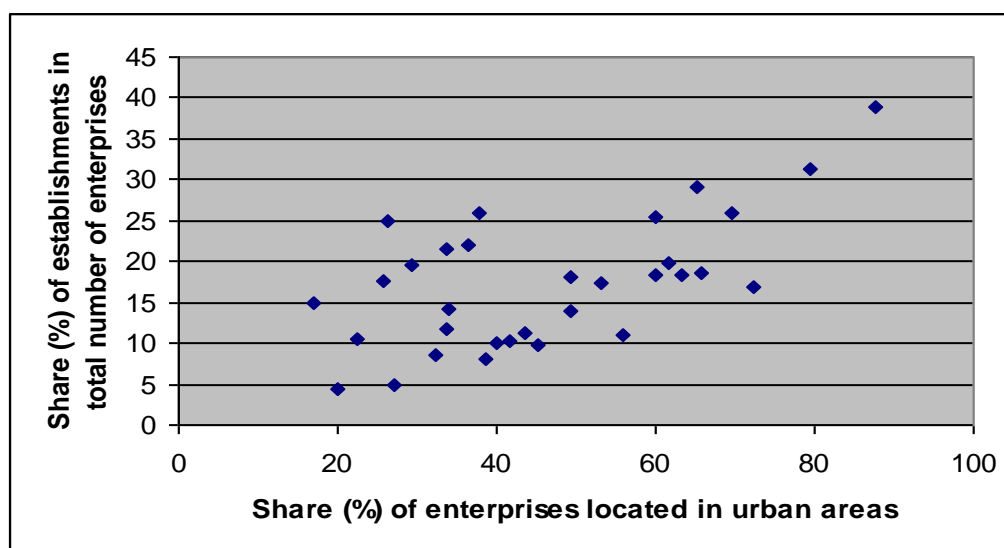
TABLE 2. PERCENTAGE SHARE OF ENTERPRISES BY LOCATION OF THE ENTERPRISES AND ENTERPRISES TYPES ACROSS INDIAN STATES/UTS

State/UT	Location of the enterprises		Enterprise types	
	Urban (%)	Rural (%)	OAE (%)	Establishment (%)
Andhra Pradesh	43.47	56.53	88.67	11.33
Arunachal Pradesh	37.89	62.11	74.18	25.82
Assam	22.38	77.62	89.42	10.58
Bihar	27.21	72.79	95.08	4.92
Goa	65.29	34.71	71.01	28.99
Gujarat	63.18	36.82	81.66	18.34
Haryana	55.91	44.09	89.01	10.99
Himachal Pradesh	16.94	83.06	85.11	14.89
Jammu & Kashmir	33.75	66.25	88.34	11.66
Karnataka	49.27	50.73	81.95	18.05
Kerala	36.49	63.51	78.04	21.96
Madhya Pradesh	45.07	54.93	90.23	9.77
Maharashtra	61.73	38.27	80.31	19.69
Manipur	40.09	59.91	89.93	10.07
Meghalaya	26.21	73.79	75.07	24.93
Mizoram	65.77	34.23	81.37	18.63
Nagaland	49.3	50.7	86	14
Orissa	20.05	79.95	95.57	4.43
Punjab	60	40	81.75	18.25
Rajasthan	41.78	58.22	89.84	10.16
Sikkim	25.74	74.26	82.48	17.52
Tamil Nadu	53.05	46.95	82.57	17.43
Tripura	33.85	66.15	85.88	14.12
Uttar Pradesh	38.63	61.37	91.99	8.01
West Bengal	32.41	67.59	91.55	8.45
A & N Islands	33.74	66.26	78.42	21.58
Chandigarh	79.55	20.45	68.59	31.41
Dadra & Nagar	29.33	70.67	80.53	19.47
Daman & Diu	59.88	40.12	74.46	25.54
Delhi	87.57	12.43	61.13	38.87
Lakshadweep	72.27	27.73	83.19	16.81
Pondicherry	69.46	30.54	74	26
mean	43.56	56.44	87.36	12.64

Source: Author's estimation using NSSO (2001).

Above table illustrates that the remarkable variability across the states in terms of the location of the enterprises and enterprise types. Delhi accounts for the highest share of urban informal sector, while Orissa stands in second lowest in this category. This also supports the argument that Delhi represents the urban informal sector, while Orissa can be taken as a representative of the rural informal sector in India. Moreover, since establishment include the larger production unit in comparison to the OAE, the states owning large number of establishment having more developed informal sector than other states. It is also seen that the highest percentage of establishment is located in Delhi, while lowest percentages are located in Orissa. Since the status of informal sector is more developed in Delhi than Orissa, the comparative analysis between these two states will provide the efficiency and its determinants by the status of informal sector. Moreover, the urban share in total number of the enterprises is highly correlated with the share of establishment (figure-1) which, in turn, implies that relatively modern informal sector is concentrated in the urban areas.

FIGURE 1. CORRELATION BETWEEN SHARE OF ESTABLISHMENT IN TOTAL NUMBER OF ENTERPRISES AND SHARE OF ENTERPRISES LOCATED IN URBAN AREAS



Source: Author's estimation using NSSO (2001).

In addition, labour productivity can be another criteria to classify the informal sector into modern and traditional (Ranis and Stewart, 1999). In order to estimate the performance of informal sector, GVA per worker and the computed efficiency scores across Indian states/UTs are presented in table-3.

TABLE 3. GROSS VALUE ADDED (GVA) PER WORKER AND TECHNICAL EFFICIENCY SCORES OF THE INFORMAL ENTERPRISES BY STATES/UTS

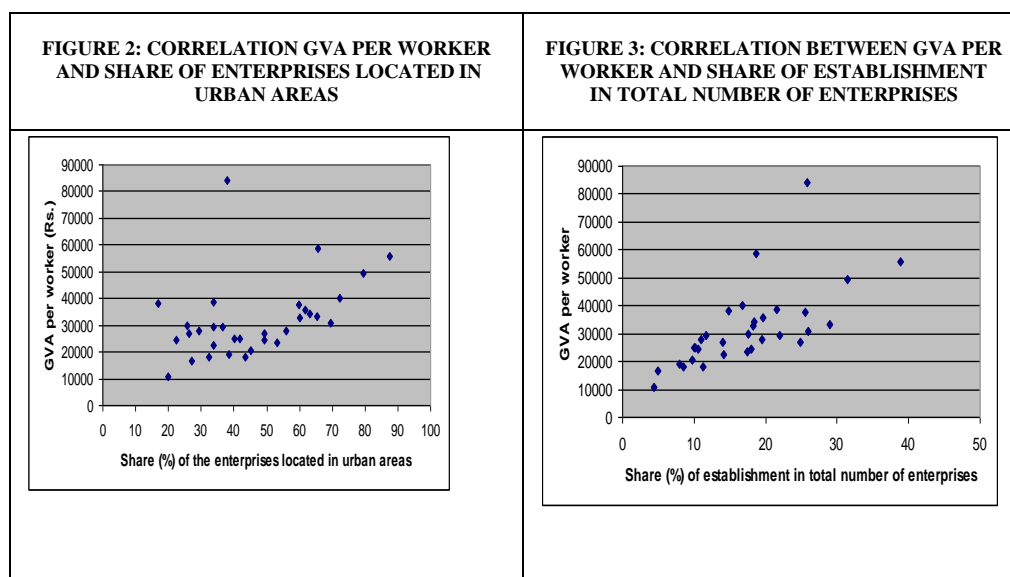
State/UT	GVA per worker (in Rs.)	GVA worker- `Rank	per Technical Efficiency
Andhra Pradesh	18247	29	0.495
Arunachal Pradesh	84319	1	1
Assam	24647	23	0.439
Bihar	16486	31	0.403
Goa	33423	11	0.566
Gujarat	34241	10	0.798
Haryana	27683	18	0.493
Himachal Pradesh	37915	7	0.662
Jammu & Kashmir	29215	16	0.515
Karnataka	24397	24	0.584
Kerala	29272	15	0.587
Madhya Pradesh	20448	27	0.47
Maharashtra	35777	9	1
Manipur	25167	21	0.422
Meghalaya	26847	20	0.443
Mizoram	58677	2	1
Nagaland	27130	19	0.377
Orissa	10999	32	0.226
Punjab	32872	12	0.587
Rajasthan	25066	22	0.682
Sikkim	30048	14	0.397
Tamil Nadu	23327	25	0.631
Tripura	22634	26	0.385
Uttar Pradesh	18841	28	0.859
West Bengal	17908	30	1
A & N Islands	38519	6	0.465
Chandigarh	49532	4	1
Dadra & Nagar	27688	17	0.362
Daman & Diu	37838	8	0.454
Delhi	56000	3	1
Lakshadweep	39979	5	1
Pondicherry	30712	13	0.51
			0.619

Note: For measuring efficiency scores across states, inter-firm heterogeneity is not considered.

Source: Author's estimation using NSSO (2001).

Considerable variability across states is observed in terms of the GVA per worker. Table-3 shows that GVA per worker is highest in Arunachal Pradesh and followed by Meghalaya. Delhi stands in third position in this category, while Orissa accounts for lowest GVA per worker among the aforementioned 32 states/UTs. Thus, the enterprise level analysis of Delhi and Orissa provide a comparative analysis between the more productive and less productive informal sector. Moreover, the urban share in total number of the enterprises and the share of establishments are highly correlated with GVA per enterprise (figure-2 and 3) which, in turn, implies that establishments and urban informal sector are more productive in terms of labour productivity than that of the OAE and rural informal sector, respectively. Thus, these three criteria (urban, establishment and labour productivity) provide similar ranking of the states in terms of the owning modern informal sector.

Large disparity is also observed among the states/UTs in terms of the technical efficiencies. The states/UTs with technical efficiency score equal to 1 is treated as efficient and the state/UT's efficiency scores less than 1 is treated as relatively inefficient. Among the 32 states/UTs, eight states have efficiency score equal to 1 and are considered as efficient states. The other 24 states are relatively inefficient i.e., they can reduce their inefficiency by expanding output level using the same amount of inputs of capital and labour. The technical efficiency scores among the inefficient states range from 0.226 for Orissa to 0.859 for Uttar Pradesh. Thus, for instance, Orissa can potentially expand its output level 77.4% to reach efficiency level.



Technical Efficiency of Developed and Underdeveloped States

One developed (Delhi) and one underdeveloped state (Orissa) are chosen for computing the efficiency scores across enterprises and for estimation of the determinants of

inefficiency, besides testing the hypothesis whether or not the nature and extent of determinants of efficiency are the same between the developed and developing states.

After removing the outliers, the sample size of Delhi comes to 1689 while that of Orissa to 3000. In this context, it is important to examine policy implications with respect to which sub-sector(s) in the informal sector is performing better. The computation of efficiency scores across sub-sectors in the informal sector has been carried out by considering the important characteristics of the informal sector that mostly uses the labour intensive technology. Unlike the formal sector, there is not much heterogeneity prevailing among the sub-sectors in terms of the technology used. Table-4 presents the technical efficiency scores of the sub-sectors (covered in the enterprise survey of NSSO (2001)).

TABLE 4. TECHNICAL EFFICIENCY SCORES BY SUB-SECTORS OF DELHI AND ORISSA

Sector	Delhi			Orissa		
	No. of firms	Average efficiency score	Rank	No. of firms	Average efficiency score	Rank
Manufacturing	499	0.166	6	1058	0.504	5
Construction	42	0.442	1	21	0.604	1
Trade and repair services	538	0.198	4	1090	0.549	3
Hotels and restaurants	140	0.210	3	283	0.587	2
Transport, storage and communication	168	0.261	2	166	0.445	6
Other service sector	302	0.176	5	382	0.519	4
All Sectors	1689	0.198		3000	0.528	

Source: Author's calculation using NSSO enterprise level data.

Considering the fact that Delhi and Orissa lie in different frontiers, it is not possible to compare one particular sub-sector's efficiency score between the two states. More specifically, the efficiency scores of enterprises in Delhi are computed in comparison with the best performing firm in Delhi while efficiency scores of the enterprises in Orissa are computed in comparison with the best performing firm in Orissa. However, one can compare the rank of sub-sectors with the two states/UTs. The comparison of ranks reveals that the construction sector is the best performing sector in respect of both Delhi and Orissa, while manufacturing is the least performing sector in case of Delhi and second lowest in Orissa.

We have already mentioned in section-1 that in India the complementary linkage between the formal and informal sectors is taking place through sub-contracting. Unlike in the past, a large number of the informal sector's firms in recent years have been found producing their products by receiving direct contracts from the formal firms/agencies/contractors. The proportion of enterprises operating on contracts is presented in table-5.

**TABLE 5. THE PROPORTION OF ENTERPRISES OPERATING
ON CONTRACTS**

Sector/Sub-sector	Percentage of units operating on contracts		
	Delhi	Orissa	India
1) Manufacturing	23.1	6.9	28.8
2) Construction	18.4	4.6	18.7
3) Trade and repair services	0.6	3.6	0.8
4) Hotels and restaurants	2.2	4.2	1.0
5) Transport, storage and communication	2.7	4.2	3.0
6) Other service sector	4.3	4.1	2.8
All Sectors	7.2	6	10.9

Source: Author's calculation using NSSO enterprise level data.

Above table depicts that the highest percentage of sub-contracting is found in the least performing sector i.e., manufacturing, while the second highest percentage of sub-contracting is found in the best performing sector i.e., construction. Based on this result it can not be concluded whether sub-contracting is making the informal firms more efficient or inefficient. In fact, it requires a deeper analysis. The sub-contracting takes place both in terms of supply of inputs and sale of outputs. The input contracts relate to 1) supply of equipments; 2) supply of raw materials; and 3) specification of design. Thus, to test the hypothesis whether or not the firms operating on contracts with the formal firms/agencies/ contractors are more efficient because of their better accessibility to inputs vis-à-vis the other firms, it is necessary to find out the efficiency scores of the firms on contracts and firms not on contract on the basis of the different types of contracts separately. Efficiency scores of the firms by different types of contracts are presented in table-6.

In terms of sources of raw materials, the above table highlights that self procured firms are most efficient in Delhi, while the 3rd group (i.e., raw materials are self-procured and also supplied by the master unit/contractor) is most efficient in Orissa. So the firms operating on earlier contracts with regard to the supply of raw materials are found less efficient in Delhi but more efficient in Orissa.

TABLE 6. COMPARISONS OF THE AVERAGE EFFICIENCY SCORES OF FIRMS BY DIFFERENT TYPES OF CONTRACTS IN DELHI AND ORISSA

Categories	Delhi No. of firms	Average efficiency	Orissa No. of firms	Average efficiency
Source of raw materials				
a) Self procured	44	0.214	25	0.460
b) Supplied by master unit/ contractor	118	0.186	112	0.469
c) Both self-procured and also supplied by master unit/ contractor	24	0.137	27	0.492
d) missing	3		3	
Source of equipments				
a) Self procured	148	0.187	114	0.458
b) Supplied by master unit/ contractor	26	0.196	48	0.497
c) Both self-procured and also supplied by master unit/ contractor	12	0.149	2	0.653
d) missing	3		3	
Design specification				
a) Specified by the contractor	149	0.175	143	0.477
b) Not specified by the contractor	38	0.228	23	0.433
c) missing	2		1	
Sale of outputs				
a) working solely for the enterprise or contractor	103	0.178	78	0.487
b) mainly for contract but also for other customers	43	0.161	12	0.497
c) mainly for customers but also on contracts	25	0.238	18	0.458
d) solely for customers	17	0.214	57	0.452
e) missing	1		2	

Source: Author's calculation using NSSO enterprise level data.

The firms with equipment supplied by master unit/contractor are found to be most efficient in Delhi, while the 3rd group (i.e., equipment is self-procured and also supplied by the master unit/contractor) is most efficient in Orissa. Based on the results, it can be concluded that in terms of the source of equipment, those firms operating on contract with the master unit/ contractor are more efficient vis-à-vis the other firms in both the states.

In terms of the design specification, it is seen that the firms with the design not specified by the contractor are more efficient in Delhi, while the firms with the design specified by the contractor are more efficient in Orissa.

The firms operating on contract with respect to sale of outputs are, to some extent, free from the risk of market uncertainty of their products. The above table depicts that the firms producing mainly for customers are most efficient while the firms producing solely for customers find themselves in the second position in Delhi. The other groups of firms (i.e., firms working solely for the enterprises or contractors and firms working mainly for contract but also for other customers) are less efficient. So it can be concluded that the firms on contracts are less efficient in Delhi, whereas the results are completely opposite in the case of Orissa. In Orissa, firms working mainly on contract as well as for other customers are most efficient and firms working solely for an enterprise

or a contractor are in second position. So, unlike in Delhi, firms on contracts are more efficient in Orissa.

Thus, based on the descriptive analysis, it can be concluded that the results of Delhi and Orissa contrast each other. In Delhi, the empirical analysis supports the fact that firms on contracts are less efficient, while firms on contracts are more efficient in Orissa. So it is very difficult to conclude whether contracts make the informal firms more efficient or inefficient. However, for one interested in knowing why the relationship between sub-contracting and efficiency is opposite for the two states, it could be said that the relationship may depend on other important factors. Thus, in order to draw a robust conclusion, it is very much important to identify the determinants of efficiency by incorporating the other relevant variables.

DETERMINANTS OF INEFFICIENCY OF THE INFORMAL ENTERPRISES

Considering the characteristics of the informal sector in India, the explanatory variables considered in the Tobit model for estimating the determinants of inefficiency of the informal sector's enterprises are described in table-7.

TABLE 7. DESCRIPTION OF VARIABLES FOR THE ESTIMATION OF THE DETERMINANTS OF INEFFICIENCY OF THE INFORMAL SECTOR

Variables	Description	Expected Sign	Economic interpretation
1) Interest cost on loans	Total interest paid on loans taken by an enterprise in a year.	Negative	A firm may pay higher interest charges if it borrows more than other firms. Higher borrowing implies higher investment and growth.
2) Nature of operation (perennial, seasonal and casual)	D1= 1, perennial =0, otherwise	Negative	Perennial firms possess better experience since they are permanently involved in their production process and considerable to be less inefficient.
3) Problems faced	D2= 1, lack of market / competition from larger units =0, otherwise	Positive	The firms which are unable to compete with larger units and face the problem of lack of market are more inefficient.
4) Contracting	D3= 1, working on contract basis = 0, otherwise	Negative	Firms on contracts are more efficient because of their better accessibility to inputs and market certainty for their output.
5) Size of the enterprise	D4= 1, large = 0, otherwise	Negative	Large firms tend to be more efficient due to economies of scale.
6) Enforcement of regulation	D5= 1, registered under any act/ authority = 0, otherwise	Negative	Registered firms are more efficient due to more accessibility of resources, information and government support.
7) Location of the enterprises	D6= 1, within household premises = 0, otherwise	Negative	The firms producing their products within the household premises are more efficient as the units are efficiently supervised by the household members.

The estimated results of the Tobit model for Delhi and Orissa are presented in tables-8 and 9 respectively.

TABLE 8. ESTIMATED RESULTS OF THE DETERMINANTS OF INEFFICIENCY OF THE INFORMAL SECTOR IN DELHI

Inefficiency	Coefficient	Standard Error
Loan	-7.08E-07**	3.04E-07
D1	-0.036	0.04
D2	0.022***	0.009
D3	0.017	0.013
D4	-0.042***	0.009
D5	0.01	0.012
D6	0.026***	0.009
Constant	0.831***	0.04
sigma	0.166	0.003

No. of observation

*Note: *** and ** indicate 1% and 5% level of significance respectively.*

Source: Author's calculation using NSSO enterprise level data.

The estimated results for Delhi show that as we have expected, Loan is significant and negatively related to inefficiency implying that firms paying a higher interest cost of loan are less inefficient. The possible reason for this could be the firms having better accessibility to loans are able to utilize their resources properly and perform better which ultimately helps to earn a higher rate of return on capital. Moreover, D1 is negatively related to inefficiency which implies that perennial firms are less inefficient than casual and seasonal firms. The positive sign of D2 implies that lack of market or competition with larger units makes firms more inefficient. Surprisingly, the sign of D3 is positive, but the coefficient is statistically insignificant. Moreover, D4 is significant and is negatively related to inefficiency which implies that large firms are less inefficient due to economies of scale. Although D5 is insignificant, the positive sign positive implies that registered firms are more inefficient due to the extra cost of regulation. Unexpectedly, the sign of D6 is positive which implies that firms producing their product within household premises are more inefficient than outside household premises. The possible reason for this could be the informal enterprises operating within the household premises are traditional in nature producing mainly consumer goods and enjoy a relatively low share of market surplus, while the enterprises functioning outside the household premises are relatively more modern and bigger in sizes which produce both consumer and capital goods.

**TABLE 9. ESTIMATED RESULTS OF THE DETERMINANTS OF
INEFFICIENCY OF THE INFORMAL SECTOR IN ORISSA**

Inefficiency	Coefficient	Standard Error
Loan	4.18E-08	5.61E-07
D1	0.003	0.019
D2	0.024***	0.009
D3	0.059***	0.019
D4	-0.014	0.011
D5	0.092***	0.017
D6	0.012	0.009
Constant	0.448***	0.02
sigma	0.232	0.003

No. of observation

*Note: *** indicates 1% level of significance respectively.*

Source: Author's calculation using NSSO 55th round unit level data on informal enterprises.

In the case of Orissa, the coefficient of loan is insignificant. D1 have a positive effect on inefficiency which implies that perennial firms are more inefficient than casual or seasonal firms. The possible reason could be the firms operating on seasonal and casual basis are less inefficient than perennial firms because perennial firms produce their products both in the peak and lean seasons, while seasonal and casual firms produce their products only in the peak season when labour and raw materials are available cheap and there is a high demand for their outputs. Although the variable D3 is insignificant in Delhi, it is significant in Orissa; this implies that the firms on contracts are less inefficient because of their better accessibility to inputs and market certainty for their output in developing regions. The coefficients of D4 and D6 are statistically insignificant. Interestingly, D5 is significant and positive implying that the registered firms are less efficient due to the extra cost of regulation.

CONCLUSIONS

Results of efficiency analysis of developed state (Delhi) and underdeveloped state (Orissa) contrast each other. In Delhi, the empirical analysis supports that firms operating on contracts are less efficient, while they are more efficient in Orissa. The amount of loan is significant and is negatively related to inefficiency in Delhi, while it is significant in Orissa. The reason for this could be the more productive firms in the developed regions having better accessibility to loans are able to utilize their resources properly and perform better which ultimately helps to earn a higher rate of return on capital. But, in an underdeveloped region like Orissa, the firms paying a higher interest cost are more inefficient because their cost of production is higher due to extra interest cost. Moreover, in Orissa, firms operating on seasonal and casual basis are less inefficient than perennial firms because perennial firms produce their products both in the peak and lean seasons,

while seasonal and casual firms produce their products only in the peak season when labour and raw materials are available cheap and there is a high demand for their outputs. But, urban informal firms in a developed region like Delhi might be able to find a better market for their products through out the year i.e., both in peak and lean seasons.

Three common factors, namely, lack of markets or competition from larger units, enterprises operating within the household premises and enforcement of regulation are positively related to inefficiency in both the states. First, the informal firms face the problem of competition with larger units for capturing a market share. Further, the enterprises operating within the household premises are traditional in nature producing mainly consumer goods and enjoy a relatively low share of market surplus, while the enterprises functioning outside the household premises are relatively more modern and bigger in sizes which produce both consumer and capital goods. Moreover, enforcement of regulation makes the firms more inefficient due to the extra cost of regulation. In fact, enforcement of regulation making firms more inefficient, throws up a question, is the formalization of informal sector through enforcement of regulations really helpful for the informal enterprises as well as for the entire economy?

On the basis of our empirical analysis the policies for informal workers are derived as follows:

- 1) From the analysis it is seen that the firms belongs in underdeveloped regions are less productive in terms of labour productivity. Thus, state intervention is required to enhance the productivity growth of the informal enterprises in the undeveloped regions through technological transfers, education and training of the informal sector's workers which, in turn, will enhance the competitiveness of the enterprises.
- 2) Lack of market and competition from larger units is making the firms more inefficient in both developed and developing regions. Thus, a promotional policy needs to be implemented for better marketing facilities for the informal enterprises.
- 3) Sub-contracting make the informal firms more efficient in underdeveloped region. Thus, policy should focus on strengthening the linkages between the formal and informal sectors.
- 4) Firms producing their products within the household premises are more inefficient than the ones operating outside the household premises. Since household premises are traditional in nature producing mainly consumer goods and enjoy a relatively low share of market surplus, a promotional policy needs to be implemented in terms of credit for start-up and expansion capital and skill formation of these enterprises.
- 5) Result shows that informal enterprises are inefficient due to extra cost of regulation. Since the informal sector is the last resort of the working poor in the developing country like India, any discouragement of the production of these enterprises will lead to high unemployment, poverty and income inequality. Thus, the regulations should be imposed in such a way that it should not be burdensome of the enterprises.

APPENDIX

TABLE 1A. VALUES AND RANKS OF THE INDIAN STATES ON THE BASIS OF DIFFERENT PARAMETERS OF LEVEL OF DEVELOPMENT

States/UTs	HDI-Value	HDI-Rank	Population Density (per KM-square)	Population density-Rank	Urban Share in total population	Urban share in population-Rank
Andhra Pradesh	0.585	28	308	20	27.3	16
Arunachal Pradesh	0.647	20	17	35	20.75	26
Assam	0.595	26	397	15	12.9	32
Bihar	0.507	35	1102	6	10.46	34
Delhi	0.74	4	9,340	1	93.18	1
Goa	0.764	2	394	16	49.76	4
Gujarat	0.634	23	308	21	37.36	9
Haryana	0.643	21	573	11	28.92	14
Himachal Pradesh	0.667	15	123	28	9.8	35
Jammu & Kashmir	0.59	27	56	32	24.81	21
Karnataka	0.622	25	319	19	33.99	11
Kerala	0.764	2	859	8	25.96	18
Madhya Pradesh	0.529	33	236	23	26.46	17
Maharashtra	0.689	11	365	17	42.43	8
Manipur	0.702	7	122	29	25.11	20
Meghalaya	0.629	24	132	27	19.58	28
Mizoram	0.688	12	52	33	49.63	5
Nagaland	0.7	8	119	30	17.23	29
Orissa	0.537	32	269	22	14.99	31
Punjab	0.668	14	550	13	33.92	12
Rajasthan	0.541	31	201	24	23.39	22
Sikkim	0.665	17	86	31	11.07	33
Tamil Nadu	0.666	16	555	12	44.04	7
Tripura	0.663	18	350	18	17.06	30

Uttar Pradesh	0.528	34	828	9	20.78	25
West Bengal	0.642	22	1029	7	27.97	15
Chattisgarh	0.549	30	189	25	20.09	27
Jharkhand	0.574	29	414	14	22.24	24
Uttarakhand	0.652	19	189	26	25.67	19
A & N Islands	0.708	6	46	34	32.63	13
Chandigarh	0.784	1	9,252	2	89.77	2
Dadra & Nagar	0.677	13	698	10	22.89	23
Daman & Diu	0.7	9	2,169	4	36.25	10
Lakshadweep	0.697	10	2,013	5	44.46	6
Pondicherry	0.725	5	2,598	3	66.57	3

Source: Ministry of Women and Child Development, Government of India (2009), *Statistical Abstract in India and Census of India, Government of India (2001)*.

ENDNOTES

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¹ Union Territory (UT).

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