Distinction between Informal and Unorganized Sector: A Study of Total Factor Productivity Growth for Manufacturing Sector in India

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Abstract: Since its very onset, the concept and definition of the informal sector has been a subject of debate both at the national and international levels. Existing literature uses the terms 'informal sector' and 'unorganized sector' interchangeably. However, in India, the characteristics of enterprises in the informal and non-informal unorganized manufacturing sectors are different and, thus, it is not justifiable to consider the informal and unorganized sector interchangeably for the manufacturing sector. Thus, the objective of this paper is to test the hypothesis on whether or not the total factor productivity growth (TFPG) of the informal manufacturing sector is different from the non-informal unorganized manufacturing sector. TFPG is decomposed into technical efficiency change and technological change. Later, technical efficiency change is further decomposed by pure efficiency change and scale efficiency change. Results show that the average TFPG of the non-informal sector is higher than the informal sector. The informal sector heavily concentrates in own account small enterprises, whereas the non-informal unorganized sector concentrates only in directory manufacturing enterprises (DME). Due to large in size, DME avails the advantages of economies of scale, which, in turn, helps the units for more growth in terms of total factor productivity growth. The main reason for productivity decrease of the enterprises, besides technology regress and the lack of adequate investments, is the limitation of activities and scale along with the optimal allocation of resources. This study provides a basis on how policies can be designed for enhancing the total factor productivity growth of the informal sector.

Key Words: *Informal Sector, Non-informal Sector, Unorganized Manufacturing Sector, Total Factor Productivity Growth*

1. Introduction

Since its very onset, the concept and definition of informal sector has been a subject of debate both at the national and international levels. Hart (1970) first introduced this sector as unregulated economic enterprises. Followed by International Labour Office (1972) came with an official definition based on certain characteristics of the enterprises. Even though most of the international studies have used the term "informal sector", Central Statistical Organization (CSO) in India introduces this sector as "unorganized sector" in its report on National Accounts Statistics. An explicit definition of the informal sector in the Indian context distinguishing between unorganized and informal sector is provided by National Sample Survey Organization (2000). According to it, the informal sector incorporates the unincorporated proprietorships or partnership enterprises of the Annual Survey of Industries (ASI). In the unorganized sector, in addition to the unincorporated proprietorships or partnership enterprises, enterprises run by cooperative societies, trusts, private and limited companies are also included. The informal sector can, therefore, be considered as a sub-set of the unorganized sector. According to NCEUS (2008), the informal sector consists of all unincorporated private enterprises owned by individuals and households engaged in the sale and production of goods and services operated on a proprietary or partnership basis and with less than ten total workers.

Thus, for analytical purposes, the unorganized sector should also be distinguished from the informal sector. Specifically, the unorganized sector can be divided into the informal and non-informal unorganized sector. Empirically, Kolli and Hazra (2005) estimated the share of informal sector to unorganized sector using the definition of less than or equal to five workers employing enterprises as informal enterprises (with some corrections like registration under Companies Act). As per their estimation, the contribution of the informal sector to the net domestic product (NDP) was 47.7 percent for the year 2001-02, while that of unorganized sector was 58.5 percent in the same year. This implies that the informal sector constitutes about 81.54 percent of the unorganized sector's NDP. In addition, Raveendran (2006) estimated the share of informal sector to unorganized sector using a comparable method followed by Kolli and Hazra (2005) with the revised employment size of less than or equal to 9

workers to define the informal enterprise. As per his estimation, informal sector represents about 93.74 percent of the unorganized sector. However, this figure varies significantly across sub-sectors at the disaggregate level. In the Sub-sectors- I (agriculture, forestry and fishing), II (mining and quarrying), III (electricity, gas & water supply) and IV (construction) informal sector represents almost 100 percent of the unorganized sector, while the share of the informal sector in the unorganized manufacturing and service sectors are relatively less. Thus, it is not justifiable to consider informal and unorganized sector interchangeably for these two sectors.

Studies on the measurement of the efficiency and productivity of the informal manufacturing sector are not mutually exclusive with the studies on the micro, small and medium enterprises. Existing studies find that the technology and capital are most important factor for improving the efficiency and productivity of the micro-enterprises. For instance, using stochastic frontier production function on firm level data from Mexico's National Survey of Microenterprises, Hernández-Trill, Pagán and Paxton (2002) argue that deficiency of start-up capital is the main reason for inefficiency of the firms. In Ivorian economy, small manufacturing firms prove to be more efficient in scaling their production but also, they greatly benefit from their modern technology (Chapelle and Plane, 2005). Further, 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 the context of India, Unni, Lalitha and Rani (2001) argue that most industrially developed state's (Gujarat) strategy of physical infrastructure development, leading to industrialisation, has been the main reason for the growth and efficiency of the state's manufacturing sector. In a similar way, 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 and analyzed at the state level of disaggregate (Natarajan and Rajesh, 2007), at the national level (Rajesh and Duraisamy, 2007) and the analysis relates with economic reforms (Rajesh, 2007). Similarly, the total factor productivity growth in the unorganized manufacturing sector in India based on the several rounds of the large scale National Sample Survey state-level data for 15 major Indian states for the period 1978-79 to 2000-01 has been estimated by Rajesh and Duraisamy (2007). 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.

Aforementioned studies on the measurement of productivity of the unorganized manufacturing sector in India have considered the informal and unorganized sectors synonymously. However, the performance of the informal sector and non-informal unorganized sectors may not be the same. Thus, the main objective of this paper is to test the hypothesis on whether or not the total factor productivity growth of the informal sector is different from the non-informal sector in unorganized manufacturing sector. In addition, we have decomposed the total factor productivity growth into technical efficiency change and technological change. Later, technical efficiency change is further decomposed into pure efficiency change and scale efficiency change. The chapter is organized as follows. Section 2 outlines the methodology for measurement of total factor productivity growth and its decomposition. Data and variables are described in section 3. Section 4 presents the share of informal and non-informal sector in unorganized manufacturing sector. Section 5 discusses the estimation results. Section 6 presents summary of the chapter.

2. Methodology

The familiar methodology of measuring productivity is the index number technique. However, this method has several drawbacks, such as, it requires data on prices and quantities, it requires assumptions concerning the behaviour of producers and the structure of technology and it cannot be decomposed into technical efficiency change and technological change. In sharp contrast, Malmquist productivity index introduced by Caves, Christensen and Diewert (1982) is a normative measure that constructs a production frontier representing the technology and uses the corresponding distance functions evaluated at different input-output combinations for productivity comparison (Ray, 2004). Thus, in this chapter we

have used Malmquist total factor productivity index to estimate the total factor productivity of the informal and non-informal unorganized manufacturing enterprises. The Malmquist TFP change index measures the TFP change between two data points by calculating the ratio of the distances of each data point relative to a common technology (Coelli et al., 1998). Färe, Grosskoff, Lindgren and Roos (1992); Färe et al. (1992 and 1994) defined the Malmquist (output oriented) TFP change index between period s (base period) and period t as

$$m(x^t, y^t, x^s, y^s) = \left[\frac{d^s(x^t, y^t)}{d^s(x^s, y^s)} \times \frac{d^t(x^t, y^t)}{d^t(x^s, y^s)} \right]^{1/2} \quad (1)$$

where the notation $d^s(x^t, y^t)$ represents the distance from the period t observation to the period s technology. A value of m greater than one indicates positive TFP growth from period s to period t while a value less than one indicates TFP decline. Färe et al. (1992) shows that this index is equivalent to:

$$m(x^t, y^t, x^s, y^s) = \frac{d^t(x^t, y^t)}{d^s(x^s, y^s)} \times \left[\frac{d^s(x^t, y^t)}{d^t(x^t, y^t)} \times \frac{d^t(x^s, y^s)}{d^s(x^s, y^s)} \right]^{1/2} \quad (2)$$

where the ratio outside the third bracket indicates technical efficiency change between the period s and t . The geometric mean of the two ratios inside the third brackets indicates the technology change between the two periods.

The required distances can be calculated using DEA-like linear programs (Färe et al., 1994). Following Ray (2004) and Coelli et al. (1998), the following linear programming problems are formulated.

$$[d^t(L^t, C^t, A^t)]^{-1} = \text{Max } \Phi$$

$$\begin{aligned} \text{Subject to } & \sum_{i=1}^n \lambda_i A_{it} \geq \Phi A_{it} \\ & \sum_{i=1}^n \lambda_i C_{it} \leq C_{it} \\ & \sum_{i=1}^n \lambda_i L_{it} \leq L_{it} \\ & \sum_{i=1}^n \lambda_i = 1 \\ & \lambda_i \geq 0 \end{aligned} \quad (3)$$

$$[d^s(L^s, C^s, A^s)]^{-1} = \text{Max } \Phi$$

$$\begin{aligned} \text{Subject to } & \sum_{i=1}^n \lambda_i A_{is} \geq \Phi A_{is} \\ & \sum_{i=1}^n \lambda_i C_{is} \leq C_{is} \\ & \sum_{i=1}^n \lambda_i L_{is} \leq L_{is} \\ & \sum_{i=1}^n \lambda_i = 1 \\ & \lambda_i \geq 0 \end{aligned} \quad (4)$$

$$[d^t(L^s, C^s, A^s)]^{-1} = \text{Max } \Phi$$

$$\begin{aligned} \text{Subject to } & \sum_{i=1}^n \lambda_i A_{it} \geq \Phi A_{is} \\ & \sum_{i=1}^n \lambda_i C_{it} \leq C_{is} \\ & \sum_{i=1}^n \lambda_i L_{it} \leq L_{it} \\ & \sum_{i=1}^n \lambda_i = 1 \\ & \lambda_i \geq 0 \end{aligned} \quad (5)$$

$$[d^s(L^t, C^t, A^t)]^{-1} = \text{Max } \Phi$$

$$\begin{aligned} \text{Subject to } & \sum_{i=1}^n \lambda_i A_{is} \geq \Phi A_{it} \\ & \sum_{i=1}^n \lambda_i C_{is} \leq C_{it} \\ & \sum_{i=1}^n \lambda_i L_{it} \leq L_{it} \\ & \sum_{i=1}^n \lambda_i = 1 \\ & \lambda_i \geq 0 \end{aligned} \quad (6)$$

where, n = No. 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.

λ_i 's are constants.

A_i = Output of enterprise i.

C_i = Capital of enterprise i.

L_i = Labour of enterprise i.

Data and Variables Descriptions: Table-1 presents the variables, measurements and data sources for estimation of the total factor productivity growth of the informal and non-informal unorganized manufacturing sectors. Like efficiency analysis of the previous chapter, gross value added (GVA-production) is taken as a measurement of output of the enterprise. Capital is measured by the market value of all fixed assets, hired assets and net additions to fixed assets during last 365 days. Labour includes working owner, hired workers and other workers/helpers.

The owner who personally works in the proprietary or partnership enterprises on a fairly regular basis is called working owner. A person employed directly or through any agency on payment of regular wage / salary in cash or kind is treated as hired workers. In addition, paid household workers, servants and resident workers of the enterprise are also to be considered as hired workers. Other workers / helpers include all persons belonging to the household of the proprietor or households of the partners who are working in or for the enterprise without regular salary or wages. Persons working as exchange labourer in the enterprise without salary or wages and all unpaid household workers / helpers who are associated with the activities of the enterprise during the reference month are also covered in this category.

Table-1: Variables, measurements and data sources

Variables	Measurement	Definition	Data source
Output	Gross Value added	Difference between annual receipts and annual expenses]	NSSO (2001 and 2006)
Capital	Gross fixed assets	Capital is sum of the market value of owned land and building (a1), plant and machinery (a2), transport equipment (a3), other fixed assets (a4), net additions to fixed assets during last 365 days (b1), market value of hired assets like land and building (c1), plant and machinery (c2), transport equipment (c3), other fixed asset (c4).	NSSO (2001 and 2006)
Labour	Number of workers	Working owner + hired workers + other workers / helpers	NSSO (2001 and 2006)

Note: All data refer to unit/enterprise level.

Share of informal and non-informal sector: The definition of the informal sector given by NCEUS (2008) and the definition followed by Raveendran (2006) are essentially same. Thus, we have also followed this definition of informal sector for the subsequent analysis of this paper. To test the hypothesis whether or not the total factor productivity growth of the informal sector is less than that of the non-informal unorganized manufacturing sector, our analysis starts with the estimation of percentage share of the informal and non-informal unorganized manufacturing sector in GVA, employment and capital used (figure 7.1). All data have been converted into the constant prices (1999-00 base year) using GDP deflator for GVA and GFCF deflator for capital provided by NAS.

Figure-1: Share of informal and non-informal unorganized manufacturing sector in GVA, employment and capital.

Figure 1 illustrates that the percentage share of the informal sector to GVA, employment and capital has decreased during 2000-01 to 2005-06, while the share of the non-informal sector has increased. The share of the informal sector in GVA has substantially decreased from 84.16 percent in 2000-01 to 55.36 percent in 2005-06, whereas the share of it in employment and output has slightly decreased from 90.89 and 85.83 in 2000-01 to 88.6 and 81.69 in 2005-06, respectively.

National Sample Survey Organization (2001) 56th round survey on unorganized manufacturing sector has incorporated directory manufacturing enterprises (DME) along with the own account manufacturing enterprises (OAME¹) and non-directory manufacturing enterprises (NDME). Incorporation of DME is very important for our analysis due to the following reasons. First, the share of the non-informal unorganized sector is significant only in DME and second, any estimation excluding DME represents a partial picture of the unorganized manufacturing sector. The share of the informal and non-informal unorganized manufacturing sectors in GVA, worker and capital by enterprise type are presented in figure 2.

¹ OAME includes enterprises not employing any hired worker, whereas NDME and DME include enterprises employing total of five or less workers and six or more workers, respectively.

Figure-2: Share of informal and non-informal unorganized manufacturing sector in GVA, worker and capital by enterprise type.

From the above figure, it is clear that the share of the non-informal sector is heavily concentrated only in DME for all the three variables GVA, worker and capital. Since DME incorporates the enterprises with six or more workers, it is expected that the size of these units are larger than OAME and NDME. Due to its larger size, it can avail the advantages of economies of scale which, in turn, can make the units more productive in terms of total factor productivity. Thus, the subsequent analysis also estimates the TFPG of the informal and non-informal unorganized sectors by enterprise type (OAME, NDME and DME).

TFPG of informal and non-informal sector: This section reports that the results of the analysis of total factor productivity growth. Besides testing the hypothesis whether or not the total factor productivity growth of the informal sector is different from the non-informal unorganized manufacturing sectors, we have estimated the total factor productivity change of informal and non-informal unorganized manufacturing sector by states/UTs. In order to know the sources of TFPG, it is divided into efficiency change and technological change. Efficiency change is further decomposed into pure efficiency change and scale change. Total factor productivity growth and its components by states/ UTs are presented in table-2.

Table-2: Total factor productivity change and its components of informal and non-informal unorganized manufacturing sector by states/UTs

State/UT	Informal manufacturing					Non-informal unorganized manufacturing				
	TFP Change	Components of TFPG		Components of Technical Efficiency Change		TFP Change	Components of TFPG		Components of Technical Efficiency Change	
		efficiency change	Technological change	PE change	SE change		efficiency change	Technological change	PE change	SE change
Andhra Pradesh	0.069	0.064	1.071	0.131	0.49	0.122	0.11	1.112	0.26	0.421
Arunachal Pradesh	0.558	0.478	1.168	0.475	1.005	1.083	0.969	1.118	0.978	0.99
Assam	0.069	0.071	0.966	0.211	0.339	0.495	0.42	1.177	0.971	0.433
Bihar	0.067	0.07	0.966	0.142	0.49	0.192	0.198	0.969	0.297	0.667
Delhi	0.164	0.118	1.394	0.129	0.908	0.281	0.201	1.398	0.309	0.651
Goa	0.088	0.067	1.316	0.156	0.428	0.734	0.521	1.408	0.818	0.637
Gujarat	0.147	0.115	1.275	0.194	0.593	0.281	0.241	1.167	0.589	0.409
Haryana	0.052	0.041	1.269	0.157	0.258	0.99	0.702	1.409	1.415	0.496
Himachal Pradesh	0.069	0.055	1.246	0.102	0.541	0.657	0.479	1.37	0.969	0.495
Jammu & Kashmir	0.08	0.066	1.214	0.144	0.459	0.485	0.394	1.231	0.672	0.586
Karnataka	0.269	0.234	1.152	0.414	0.564	0.226	0.186	1.219	0.399	0.465

Kerala	0.099	0.082	1.196	0.135	0.611	0.135	0.104	1.3	0.199	0.521
Madhya Pradesh	0.105	0.103	1.029	0.189	0.543	0.779	0.634	1.229	1.295	0.489
Maharashtra	0.375	0.289	1.297	0.94	0.307	0.972	0.724	1.342	1.01	0.717
Manipur	0.082	0.075	1.091	0.172	0.439	0.089	0.089	0.999	0.08	1.111
Meghalaya	0.1	0.103	0.971	0.24	0.428	0.312	0.295	1.055	0.45	0.657
Mizoram	0.073	0.059	1.251	0.097	0.601	0.07	0.052	1.331	0.063	0.827
Nagaland	0.117	0.101	1.157	0.2	0.506	0.061	0.045	1.349	0.056	0.806
Orissa	0.099	0.103	0.966	0.241	0.427	0.171	0.159	1.077	0.381	0.416
Punjab	0.12	0.088	1.355	0.104	0.853	0.351	0.253	1.384	0.463	0.548
Rajasthan	0.108	0.089	1.224	0.134	0.663	0.285	0.234	1.217	0.415	0.565
Sikkim	0.102	0.085	1.194	0.158	0.541	1.159	1	1.159	1	1
Tamil Nadu	0.09	0.075	1.192	0.185	0.406	0.151	0.115	1.312	0.172	0.673
Tripura	0.087	0.089	0.978	0.23	0.386	1.511	1.565	0.966	1.292	1.211
Uttar Pradesh	0.09	0.082	1.097	0.238	0.346	0.511	0.448	1.142	0.962	0.465
West Bengal	0.078	0.081	0.966	0.208	0.389	0.386	0.328	1.176	0.694	0.473
A & N Islands	0.102	0.081	1.262	0.121	0.666	0.1	0.075	1.34	0.076	0.989
Chandigarh	0.114	0.099	1.152	0.044	2.281	1.484	1.58	0.939	0.487	3.248
Dadra & Nagar	0.118	0.096	1.226	0.085	1.124	0.746	0.576	1.295	0.629	0.916
Daman & Diu	0.117	0.093	1.258	0.109	0.849	0.061	0.047	1.297	0.112	0.421
Lakshadweep	0.059	0.049	1.198	0.048	1.025	0.087	0.066	1.33	1	0.066
Pondicherry	0.219	0.164	1.335	0.306	0.537	0.168	0.125	1.338	0.2	0.627
Mean	0.128	0.108	1.17	0.201	0.625	0.473	0.404	1.224	0.585	0.719

Source: Author's Estimation using NSSO (2001 and 2006) unit level data

Above table shows that the average (of all states) TFPG of the non-informal sector is higher as compared to the informal sector. Since a value of greater than 1 indicates positive TFP growth from 2000-01 to 2005-06, none of the states accounts for positive TFP growth in the informal manufacturing sector, while four states (Arunachal Pradesh, Sikkim, Tripura and Chandigarh) account for positive TFP growth in the non-informal manufacturing sector. The mean technical efficiency change and technological change are also higher in the non-informal sector than those of the informal sector. Technological change component, i.e., a shift of the frontier technology, exhibits a major contribution in TFPG for both the informal and non-informal sectors, which supports Li, Liu and Yun (2007) who argued technical progress is the main contributor to productivity growth of the microenterprises. Among the 32 states/UTs, Delhi showed the highest technological progress in the informal sector, while Orissa stands lowest in this category. Haryana showed highest technological progress in the non-informal sector and Delhi stands in third position in this category. As compared to technological change, change in efficiency is quite low for both the sectors. Moreover, pure efficiency change and scale efficiency change are also much higher in the non-informal sector. Moreover, the pure efficiency change and scale efficiency change are also much higher in the non-informal sector than the informal sector.

Having the analysis of TFPG and its components across states/UTs, one developed (Delhi) and one underdeveloped state (Orissa) are chosen in this for estimation of TFPG and its components of the informal and non-informal unorganized manufacturing sectors on the basis of different characteristics of the enterprises. The states are chosen on the basis of the Human Development Index (HDI). In order to compare among the states/UTs in terms of values and ranks of human development index for a particular year, data has been taken from "Gendering Human Development Indices: Recasting the Gender Development Index and Gender Empowerment Measure for India", Ministry of Women and Child Development, Government of India, 2009.

Table-1A in the appendix presents the values and ranks of Human Development Index-2006 of the Indian states/UTs and table-2A presents the Categorising of states/UTs on the basis of HDI score-2006. Delhi is taken as a representative of developed state since it is in the category-1 on the basis of Human Development and Orissa is representing the underdeveloped since it is in the category-3 on the basis of the Human Development Index. We have already discussed in section 4 that the non-informal sector is heavily concentrated in DME i.e., it is prominent mainly in large scale production units. Figure 3 presents the TFPG by enterprise type (OAME, NDME and DME).

Figure-3: Total factor productivity change of informal and non-informal unorganized manufacturing sector by enterprise type

Considering figure 3, among the three enterprise types, the lowest productivity growth is observed for the own account manufacturing enterprises (OAME). In this context, it is important to note that the informal sector is mostly concentrated in the OAME and accounting for the worst performance in terms of total factor productivity growth. While the growth of DME is highest for Delhi and all India, it is lower than the growth of NDME in Orissa. Moreover, the growth of the non-informal sector than the informal sector is much higher for DME in all the states. On the other hand, except Orissa, the informal sector's TFPG is higher for OAME and NDME than the non-informal sector. In order to know the sources of productivity growth, besides the estimation of TFPG, we have also estimated the components of it by enterprise type (table-3).

Table-3: Components of total factor productivity growth and efficiency change of informal and non-informal unorganized manufacturing sector by enterprise type.

	Informal manufacturing				Non-informal unorganized manufacturing			
	Components of TFPG		Components of Technical Efficiency Change		Components of TFPG		Components of Technical Efficiency Change	
	efficiency change	Techno logical change	PE change	SE change	efficiency change	Technologi cal change	PE change	SE change
All India								
OAME	0.302	0.249	0.309	0.978	0.29	0.226	0.29	1
NDME	0.352	0.479	0.435	0.81	0.364	0.384	0.363	1
DME	0.673	0.446	0.627	1.075	1	0.482	1	1
Delhi								
OAME	0.228	0.3	0.202	1.13	--	--	--	--
NDME	0.306	0.322	0.251	1.221	0.175	0.246	0.594	0.294
DME	0.473	0.368	0.473	1	0.885	0.331	0.891	0.993
Orissa								
OAME	0.681	0.15	0.42	1.622	0.874	0.056	1	0.874
NDME	0.303	0.381	0.303	1	1.367	0.285	4.539	0.301
DME	0.21	0.424	0.211	0.998	0.613	0.315	0.614	1

Source: Author's Estimation using NSSO (2001 and 2006) unit level data

Above table shows that the all India level technical efficiency changes in DME and technological change are higher in non-informal sector than that of informal sector. Based on the analysis of the components of this index, it is seen that efficiency scale has remained unchanged most of the time at the all India level, therefore productivity changes is resulting from technological changes and managerial efficiency change. Although efficiency change in DME in Delhi and Orissa is higher for non-informal sector, but informal sector is higher in terms of technological change. In the case of OAME, efficiency change and technological change are higher at the all India level. As for NDME, efficiency change and technological change are higher in the informal sector for Delhi, while it is lower with regard to Orissa. As per the National Sample Survey Organization, 28.8 percent informal manufacturing units in 1999-2000 are operating on contracts and in case of unorganized sector the figure is 30.7 percent in 2000-01 and 31.7 percent in 2005-06 (NSSO, 2001; 2006). The contracts relate to the sale of outputs and supply of inputs (raw materials, equipments and design specification). To test the hypothesis on whether or not the firms operating on contracts have higher TFPG because of their better accessibility to inputs vis-à-vis the other firms, we have estimated TFPG of the firms on contracts and firms not on contract and these are presented in figure 4.

Figure-4: Total factor productivity change of informal and non-informal unorganized manufacturing sector by work contract

Above figure shows that TFPG is higher (except Delhi) in the non-informal sector irrespective of the enterprises work on contract or does not work on contract. In Delhi, the firms work on contract in the informal sector is accounted for higher TFPG than the firms work on contract in non-informal sector. To find the sources of TFPG of the firms on contract and not on contract, TFPG is divided into its components.

Table-4: Components of total factor productivity growth and efficiency change of informal and non-informal unorganized manufacturing sector by work contract.

	Informal manufacturing				Non-informal unorganized manufacturing			
	Components of TFPG		Components of Technical Efficiency Change		Components of TFPG		Components of Technical Efficiency Change	
	efficiency change	Technological change	PE change	SE change	efficiency change	Technological change	PE change	SE change
All India								
Work on contract basis	0.31	0.343	0.281	1.104	0.755	0.494	0.755	1.001
Does not work on contract basis	0.421	0.387	1	0.421	1.002	0.496	1	1.002
Delhi								
Work on contract basis	0.358	0.462	0.274	1.304	0.292	0.456	0.292	0.998
Does not work on contract basis	0.301	0.45	0.292	1.031	1	0.631	1	1
Orissa								
Work on contract basis	0.387	0.27	0.332	1.168	1.298	0.27	1	1.298

Does not work on contract basis	0.377	0.27	0.331	1.137	0.569	0.31	0.572	0.994
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Source: Author's Estimation using NSSO (2001 and 2006) unit level data

Based on contracts, the firms working on contract exhibit lower efficiency change and technological change at the all India level. However, it is noticeable that in most of the cases, scale efficiency either increases or remains the same. This fact indicates that decline in TFPG is either due to decline in managerial efficiency or technological regress. For the informal sector, both Delhi and Orissa show that decline in managerial efficiency coupled with technological regress results in TFPG decline. However, in the case of the non-informal manufacturing sector, pure technical efficiency (managerial efficiency) remains the same in the enterprises operating on contract basis in Delhi and those not on contracts in Orissa. This implies that TFPG decline in the enterprises operating on contract basis in Delhi and those not on contracts in Orissa is mainly due to technological revert.

Since the onset of the debate regarding the concepts and definitions of the informal sector, regulation has been considered as one of the main criteria to define it. The enterprises are not regulated under any statutory act generally considered as informal enterprises. A number of studies have argued in favour of the enforcement of regulation of the informal enterprises. The regulations are of different types, such as, sales tax act, establishments act, minimum wage act, provident fund act and other social security benefits of workers etc. In order to test the hypothesis on whether or not the enforcement of such regulations are really good for the enterprises and as well as the economy, we have estimated the TFPG for registered and unregistered firms and these are presented in figure 5.

Figure-5: Total factor productivity change of informal and non-informal unorganized manufacturing sector by registration of the enterprises.

Above figure illustrates that the registered firms' TFPG is higher than the non-registered firms for all states. However, none of the category shows TFPG more than one, which indicates that TFPG has declined for all the categories. Moreover, the non-informal sector shows a higher (excepting Orissa) TFPG irrespective of the status (registered or unregistered) of firms. In the case of Orissa, the informal unregistered firms have higher TFPG than the non-informal unregistered firms. Table-5 presents the decomposition of TFPG of the informal and non-informal unorganized sector by registration of the enterprises.

Table-5 portrays that the registered firms show higher efficiency change and technology change with respect to both the informal and non-informal sectors for Delhi and at all India level. However, in case of Orissa, the registered firms have higher efficiency change and technological change with regard to the informal sector, while these are lower in respect of the non-informal sector. On the basis of the decomposition analysis, it is noticeable that both the managerial efficiency decline and technological regress result in TFPG decline in the informal sector across both the categories (registered and non-registered) for Delhi and Orissa. However, in the case of the non-informal manufacturing sector, the registered enterprises possessing technical efficiency remains the same (since the value equal to 1). This implies that TFPG decline across the registered enterprises in Delhi is mainly due to technological regress.

A disaggregate analysis of TFPG by economic activities (sub-sectors) of the informal and non-informal unorganized sector is described in figure 6. The industry classification is followed the NIC-2 digit codes. The details of the industrial classification are presented in the table-3A in the appendix.

Table-5: Components of total factor productivity growth and efficiency change of informal and non-informal unorganized manufacturing sector by registration of the enterprises.

	Informal manufacturing				Non-informal unorganized manufacturing			
	Components of TFPG		Components of Technical Efficiency Change		Components of TFPG		Components of Technical Efficiency Change	
	efficiency change	Technological change	PE change	SE change	efficiency change	Technological change	PE change	SE change
All India								
Registered	0.476	0.614	0.847	0.562	1	0.582	1	1
Unregistered	0.276	0.299	0.513	0.539	0.471	0.346	0.418	1.127
Delhi								
Registered	0.69	0.499	0.696	0.99	1	0.661	1	1
Unregistered	0.168	0.581	0.125	1.349	0.354	0.54	0.368	0.96
Orissa								
Registered	0.155	0.595	0.294	0.526	0.648	0.418	0.728	0.89
Unregistered	0.543	0.193	0.343	1.584	0.375	0.193	1	0.375

Source: Author's Estimation using NSSO (2001 and 2006) unit level data

Figure-6: Total factor productivity change of informal and non-informal unorganized manufacturing sector by economic activity (NIC 2 digit code).

Results of the disaggregate analysis show that TFPG of the informal sector is higher as compared to the non-informal sector across all economic activities (excepting industry codes-33 and 37). Among 23 economic activities, activity-33 (i.e., manufacture of medical, precision and optical instruments, watches and clocks) accounts for a positive TFP growth rate in the informal sector, while activities-28, 29, 32 and 34 account for a positive TFP growth in the non-informal sector. The sources of TFPG by its components are described in table-6.

Table-6: Components of total factor productivity growth and efficiency change of informal and non-informal unorganized manufacturing sector by economic activity.

NIC-2 DIGIT CODE	Informal manufacturing				Non-informal unorganized manufacturing			
	Components of TFPG		Components of Technical Efficiency Change		Components of TFPG		Components of Technical Efficiency Change	
	efficiency change	Technological change	PE change	SE change	efficiency change	Technological change	PE change	SE change
15	0.207	0.772	0.763	0.271	0.381	0.788	0.639	0.596
16	0.07	0.772	0.164	0.428	0.54	0.772	0.492	1.098
17	0.107	0.772	0.321	0.333	0.241	0.901	0.463	0.521
18	0.118	0.772	0.346	0.34	0.481	0.917	0.43	1.118
19	0.137	0.775	0.145	0.939	0.248	0.826	0.231	1.072
20	0.118	0.772	0.32	0.369	0.746	0.998	0.605	1.232
21	0.157	0.84	0.153	1.027	0.743	0.986	0.642	1.157
22	0.133	0.995	0.146	0.91	0.721	0.933	0.733	0.984
23	0.094	0.916	0.079	1.192	0.744	0.936	1.357	0.548
24	0.23	0.772	0.274	0.839	0.761	0.91	0.746	1.021
25	0.222	0.988	0.231	0.962	0.423	0.98	0.335	1.263
26	0.17	0.772	0.318	0.534	0.411	0.772	0.471	0.872
27	0.142	0.956	0.111	1.28	1	0.995	1	1
28	0.16	0.925	0.345	0.464	1.139	0.981	1.22	0.934
29	0.207	0.981	0.331	0.624	1.583	0.958	1.222	1.295
30	0.179	0.946	1.612	0.111	1	0.836	1	1
31	0.163	0.958	0.181	0.901	0.542	0.987	0.435	1.247
32	0.113	0.973	0.101	1.117	2.11	0.957	2.27	0.93
33	1.592	0.968	1.444	1.103	0.663	0.957	0.92	0.721
34	0.282	0.936	0.335	0.84	1.133	0.955	1.393	0.814
35	0.075	0.99	0.064	1.161	0.207	0.978	0.2	1.036
36	0.408	0.861	1	0.408	0.782	0.772	1	0.782
37	0.157	0.944	0.114	1.378	0.067	0.863	0.076	0.889
Mean	0.228	0.885	0.387	0.762	0.725	0.911	0.777	0.962

Source: Author's Estimation using NSSO (2001 and 2006) unit level data

Above table portrays that the mean efficiency change in the non-informal sector is much higher than that of the informal sector, whereas mean technological change in the non-informal sector is slightly higher than that of the informal sector. Among the 23 economic activities, activities-16 (manufacture of tobacco products) and 26 (manufacture of other non-metallic mineral products) have lowest technological progress for both in the informal and non-informal sectors. Considering the total productivity elements, this analysis indicates that the activity-33 (highest TFP growth rate in informal sector) results in due to major positive efficiency change (1.592). Again, considering technical efficiency elements, the management efficiency and efficiency scale have increased 1.444 and 1.103 respectively. Among the four economic activities (activities-27, 28, 29, 32 and 34) with positive TFP growth in the non-informal sector, all the activities have positive efficiency change (i.e., 1.139, 1.583, 2.11 and 1.133 respectively). Among these technical efficiency changes of the four activities, the management efficiency has increased (1.22, 1.222, 2.27 and 1.393 respectively), while efficiency scale has decreased intensively 0.934, 0.93 and 0.814 for activities- 28, 32 and 34 respectively. This could be the result of insufficient activities of the enterprises, productivity and selling scale limitations. Following Sharma and Sharma (2010), our analysis also suggests the scope for investment and further employment generation.

3. Conclusion

The average TFPG of the non-informal sector is higher as compared to the informal sector. The mean technical efficiency change and technological change are also higher in the non-informal sector than those of the informal sector. Technological change exhibits a major contribution to TFPG in respect of both the informal and non-informal sectors. As compared to technological change, change in efficiency is quite low for both the sectors. Moreover, pure efficiency change and scale efficiency change are also much higher in the non-informal sector. The informal sector heavily is concentrated in own account small enterprises, whereas the non-informal unorganized sector is concentrated only in directory manufacturing enterprises (DME). Due to larger size, DME avails the advantages of economies of scale which, in turn, helps the units for more growth in terms of total factor productivity growth. Results of the disaggregate analysis by industry show that TFPG of the informal sector is higher as compared to the non-informal sector across all economic activities (excepting industry codes-33 and 37). Results of the disaggregate analysis show that TFPG of the informal sector is higher as compared to the non-informal sector across all economic activities (excepting industry codes-33 and 37). Among 23 economic activities, activity-33 (i.e., manufacture of medical, precision and optical instruments, watches and clocks) accounts for a positive TFP growth rate in the informal sector, while activities-28, 29, 32 and 34 account for a positive TFP growth in the non-informal sector.

Among these technical efficiency changes of the four activities, management efficiency has increased, while efficiency scale has decreased intensively for activities- 28, 32 and 34. This result is attributable to insufficient activities of the enterprises, productivity and selling scale limitations. In other words the main reason for productivity decrease of the enterprises, besides technology regress and the lack of adequate investments, is the limitation of activities and scale along with the optimal allocation of resources. Thus, state intervention is required to enhance the productivity growth through technological progress and reducing cost, which, in turn, will enhance the competitiveness of the enterprises. One can extend the analysis further by finding the determinants of TFPG differences between the informal and non-informal unorganized manufacturing sector. Moreover, it is possible to have a similar analysis for the other economic activities for enhancing the productivity and competitiveness.

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Appendix

Table-1A: Values and ranks of Human Development Index-2006 of the Indian states

States/Uts	Value	Rank
Andhra Pradesh	0.585	28
Arunachal Pradesh	0.647	20
Assam	0.595	26
Bihar	0.507	35
Delhi	0.74	4
Goa	0.764	2
Gujarat	0.634	23
Haryana	0.643	21
Himachal Pradesh	0.667	15
Jammu & Kashmir	0.59	27
Karnataka	0.622	25
Kerala	0.764	2
Madhya Pradesh	0.529	33
Maharashtra	0.689	11
Manipur	0.702	7
Meghalaya	0.629	24
Mizoram	0.688	12
Nagaland	0.7	8
Orissa	0.537	32

Table-1A Continued:

States/Uts	Value	Rank
Punjab	0.668	14
Rajasthan	0.541	31
Sikkim	0.665	17
Tamil Nadu	0.666	16
Tripura	0.663	18
Uttar Pradesh	0.528	34
West Bengal	0.642	22
Chattisgarh	0.549	30
Jharkhand	0.574	29
Uttarakhand	0.652	19
A & N Islands	0.708	6
Chandigarh	0.784	1
Dadra & Nagar	0.677	13
Daman & Diu	0.7	9
Lakshadweep	0.697	10
Pondicherry	0.725	5

Source: Government of India (2009)

Table-2A: Categorising States/UTs on the basis of HDI score-2006.

Category	States/UTs
Category-1 (0.701 and above)	Chandigarh, Goa, Kerala, Delhi, Pondicherry, A & N Islands, Manipur
Category-2 (0.601 to 0.700)	Nagaland, Daman & Diu, Lakshadweep, Maharashtra, Mizoram, Dadra & Nagar, Punjab, Himachal Pradesh, Tamil Nadu, Sikkim, Tripura, Uttarakhand, Arunachal Pradesh, Haryana, West Bengal, Gujarat, Meghalaya, Karnataka.
Category-3 (below 0.600)	Assam, Jammu & Kashmir, Andhra Pradesh, Jharkhand, Chattisgarh, Rajasthan, Orissa, Madhya Pradesh, Uttar Pradesh, Bihar.

Source: Government of India (2009)

Table-3A: NIC-2 digit code (1998 divisions) of the activities of manufacturing sector.

NIC-2 DIGIT CODE	Activity
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plating materials
21	Manufacture of paper and paper products
22	Publishing, printing and reproduction of recorded medi
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment
30	Manufacture of office, accounting and computing machinery
31	Manufacture of electrical machinery and apparatus
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport e quipmen
36	Manufacture of furniture; manufacturing
37	Recycling

Source: NSSO (2001)