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**Structural Change and
Labour Productivity
Growth in India:
Role of Informal Workers**

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STRUCTURAL CHANGE AND LABOUR PRODUCTIVITY GROWTH IN INDIA: ROLE OF INFORMAL WORKERS

Rosa Abraham*

Abstract

Labour productivity in an economy or industry may increase due to intrinsic increase in productivity (due to capital deepening or TFP growth) or due to the reallocation of workers to more productive sectors (structural change). Recent trends in the labour force indicate that workers are increasingly being engaged informally, in what may potentially be productivity-dampening activities. In this context, this paper examines the productivity implications of the increasing informalisation of the Indian labour force by examining labour productivity by type of worker. The results show that although the movement of workers has been in the direction of relatively higher productivity sectors, the allocation of workers in employment types has not been towards the most productive activity/jobs in that new sector, instead, it has been towards relatively less productive informal activities. The increase in labour productivity from structural change is dampened as workers who move out of agriculture are employed in low productive activities in the non-agricultural sector.

Introduction

In India, the 'informal sector' or 'informal enterprises' includes all unincorporated proprietary and partnership enterprises (NSSO, 1999). These enterprises account for more than half (55 per cent) of Gross Value Added (GVA) in the economy (NCEUS, 2008). Informal *employment*, on the other hand, includes those individuals "...working in the unorganised enterprises or households, excluding regular workers with social security benefits, and the workers in the formal sector without any employment/social security benefits provided by the employers" (NCEUS, 2008: 27). Depending on the definition of social security benefits adopted, the informal workforce in India accounts for 60-90% of total employment (Unni & Naik, 2013; NCEUS, 2008; Charmes, 2012).

The majority of the informal workers are self-employed or engaged in informal enterprises (Institute for Human Development, 2014) although in recent years there has been an increase in the informal workers working in formal enterprises which include private limited companies and public sector institutions. The agricultural sector employs the majority of informal workers, in the form of agricultural labourers. The movement of workers from this sector towards the secondary and tertiary is an intrinsic part of an economy's growth path (Lewis, 1954). Typically, the sectoral reallocation of factors of production is also accompanied by the redistribution in the sectoral contribution to output in a similar direction. When workers who were previously employed in low-productivity sectors (typically agriculture) move into sectors which better utilise their productive capacities (as in the secondary or tertiary sectors), the consequent result is a surge in economic output and productivity levels.

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In India, however, the process of structural change in terms of employment has lagged behind the structural change in terms of output. For instance, in 1970-71, the agricultural sector accounted for almost three-quarters (72 per cent) of the total net domestic product of the economy, and employed an equivalent proportion of the labour force. By 2011-12 however, it accounted for only 15 per cent of output while continuing to employ almost half the labour force (Planning Commission, 2011). Clearly, the movement of labour across sectors was not commensurate with the distribution of output, implying huge disparities in the productivity levels between the sectors.

Therefore in India, there is a great potential to increase overall labour productivity through reallocation of workers to more productive sectors. This source of labour productivity growth is referred to as the 'between' or structural change effect, since it captures the growth due to the movement of workers *between* sectors (McMillan, Rodrik & Verduzco-Gallo, 2014). The other source of labour productivity growth is through an increase in the intrinsic productive capacities of workers due to capital deepening, or an increase in total factor productivity, or technological improvement. This is referred to as the 'within' effect. In India, since the majority of workers are engaged in sectors that contribute among the least to overall economic output (Hasan, Lamba & Sen, 2013), there is immense productivity-enhancing potential through the reallocation of workers from low productivity agriculture to relatively higher productivity non-agricultural activities.

However, though a reallocation can move labour to relatively more productive activities, it may not always be to the *most* productive activities. This may happen when the workers who move out of agriculture are engaged in activities, which though more productive than their employment in agriculture, is not the *most* productive activity in that sector. In this context, the extent of contribution to productivity growth from structural change may be severely stifled. In India, this is likely to be a prominent factor. Many of the workers who move out of agriculture may be absorbed into relatively low-productive work in the secondary or tertiary sectors due to demand constraints as well as supply limitations including unskilled/uneducated labour force. de Vries *et al* (2012) confirm such a stifling of the contribution of structural change and point out that "India shows that growth-reducing structural change can go hand in hand with productivity improvements within particular industries". A similar process is alluded to by Aggarwal (2014: 23) who describes a "retrogression in the inter-temporal movement of labour" like the labour released from agriculture being absorbed in low productivity sectors. The high productivity sectors, according to Aggarwal (2014), have not grown rapidly enough to absorb the labour released, indicating a need to create employment opportunities in high productive activities.

Alongside the stagnation in sectoral reallocation of labour, there has been a growing phenomenon of an increase in the informalisation of the labour market, particularly by the formal enterprises. For formal enterprises, the employment of workers in these 'atypical' or informal arrangements is motivated by cost savings and the avoidance of inflexible labour regulations. It also offers flexibility and increases competitiveness by facilitating ease of adjustment to business cycles and demand changes (Bardazzi & Duranti, 2016). At the same time, it has been described as the low road to growth, increasing returns with minimal investment in labour (Sharma, 2006) consequently not facilitating skill development or labour productivity growth in the long term.

The consequence of sectoral labour reallocation within the context of a formal-informal dichotomy has been examined by de Vries *et al* (2012). They find that when reallocation analysis is further disaggregated between formal and informal enterprises, the contribution of structural change is reduced from 1.1 per cent to 0 per cent when the movement of workers between formal and informal sectors is accounted for. Therefore, in understanding the role of structural change to labour productivity growth, the level of disaggregation matters. In the context of the extensive informalisation of the labour force, a further level of disaggregation to the methodology of de Vries *et al* (2012) is introduced to examine the impact of a movement of workers not just between formal and informal enterprises but also between formal and informal employment. It is likely that besides the movement of workers from formal to informal enterprises, the movement from formal to informal employment may also further dampen productivity in the economy. This analysis seeks to highlight the productivity impact of increasing informalisation of the workforce in the formal sector.

The rest of the paper is organized as follows. The next section reviews the literature on labour productivity and its decomposition with focus on the informal labour force. Following this, the methodology to decompose labour productivity is detailed including its operationalisation and the description of the sources of data used. The empirical results and their analysis are presented in the next section and the final section concludes with explanations.

Review of Literature

The lower labour productivity in the informal sector vis-à-vis the formal sector in India has been fairly well established. The lower productivity is attributed to factors like the lack of capital per worker, restricted access to formal credit among other reasons (Kathuria, Raj & Sen, 2013; Marjit & Kar, 2011). For instance in 2000-01, real GVA per worker in formal enterprises was more than ten times that of workers in informal enterprises (Marjit & Kar, 2011). However, while these studies distinguish between labour productivity by enterprises (formal and informal), they overlook the productivity differences that are likely to emerge between workers in different employment categories.

Informal/atypical/nonstandard work and its implications on productivity has become a growing area of research internationally. Bardazzi and Duranti (2016) list four possible channels which have been suggested in the literature through which atypical work arrangements may ultimately influence productivity. Firstly, the hiring of informal labour is also symptomatic of a 'low road to growth' approach of firms, where firms attempt to increase returns not through innovation or productivity growth, but rather through cost-cutting. At the same time, atypical work allows for greater flux in the worker composition enabling more inflow of ideas and innovations. Secondly, informal arrangements disincentivise employee training and skill enhancement, thereby impeding productivity growth. Thirdly, atypical arrangements can influence employees' effort levels, though the direction of this impact depends on whether these arrangements are seen as stepping stones to more formal work contracts. Finally, these contracts can increase labour productivity by increasing firm flexibility and ease of response to demand changes. Therefore, the net impact of informal work status on labourers' productivity is ambiguous.

There have been limited studies in this direction in the Indian context. Chau and Soundaryarajan (2016) examine the impact of contract workers on total factor productivity (TFP) using a 13-year panel data (1999-2011) from Annual Survey of Industries (ASI). They find that in the short run, those firms with larger shares of contract workers had a significantly higher mean TFP and higher elasticity of productivity. However lagged productivity effects on TFP and elasticity were negative indicating the consequence of poor human capital accumulation and skill building among the workforce (Chau & Soundaryarajan, 2016). Similarly, Maiti, Dasgupta and Paul (2014) based on panel data from the ASI from 1998-2006 confirm that the output elasticity of contract workers as well as their productivity measured by efficiency parameter was less than that of the direct workers.

To measure the relative contribution of intrinsic labour productivity growth and reallocation of workers to overall labour productivity growth, decomposition analysis has been used. McMillan Rodrik and Verduzco-Gallo (2014) decomposes labour productivity growth in regions of the world between 1999 and 2005 and find that structural change has contributed positively to labour productivity growth in Asia unlike in Africa and Latin America. In particular, for India, the authors find that structural change has had a positive contribution to growth between the years 1990-2005, led largely by the movement of labour away from low productivity agriculture. However, when the analysis is disaggregated for 1990-1999 and 2000-2005, the relative contribution of structural change has declined over the years. Indeed, Aggarwal (2014), using a Shapley decomposition technique, confirms the declining role of structural change to labour productivity growth in India between 1973 and 2012. Between the years 1973-1983, structural change accounted for almost half the labour productivity growth. However, for the period between 2005 and 2012, its share had reduced to only 13 percent, with the contribution of intra-sectoral/within productivity growth accounting for the majority (87 per cent) of overall labour productivity growth. Similarly, Narayana (2014) undertakes a decomposition analysis using the National Transfer accounts methodology, with particular focus on the role of age structure transition in influencing productivity and thereby economic growth, while differentiating between formal and informal sectors. Change in labour productivity was the predominant factor for economic growth, while low growth rates in informal sector productivities were a drag on growth. Following the methodology of McMillan, Rodrik and Verduzco-Gallo (2014), Hasan, Lamba and Sen (2013) find that across all major states of India, within-sector productivity growth accounted for the majority of labour productivity growth between the years 1987-2009 rather than structural change.

De Vries *et al* (2012) arrives at a similar conclusion in their decomposition analysis of productivity growth in the BRIC nations, i.e., Brazil, China and India since the 1980s, using the canonical shift-share method. In India, between 1981 and 1991, overall labour productivity grew at 3 per cent p.a. Of this, labour productivity growth within sectors was 2 per cent per annum, while structural change accounted for the remaining. Between 1999 and 2008, while overall labour productivity growth increased to 4.7 per cent, the contribution of structural change remained unchanged. To test their contention that analyses at different levels of sectoral disaggregation can provide different insights into the nature of labour productivity growth, the authors disaggregate each sector into its formal and informal components and conduct a similar decomposition exercise. Therefore, productivity growth is decomposed into productivity growth in formal and informal sub-sectors (within

effect), the movement of labour between these informal-formal subsectors within sectors, and the movement of labour across sectors, the latter two together accounting for the new reallocation/structural change effect. For India, the authors find that when such an extended decomposition is undertaken, the contribution of structural change is dampened owing to the increasing reallocation of workers less productive activities in the informal sector.

In this paper, a methodology similar to de Vries *et al* (2012) is adopted. However, the analysis goes a step further by differentiating between employment types and decomposing the labour productivity growth by employment type. Therefore, besides disaggregating sectors into formal and informal enterprises, the employment type within each of these enterprises is further disaggregated into formal and informal. The following section details the methodology for the same and the sources of data used for the empirical analysis.

Methodology

Aggregate Framework

The decomposition of labour productivity growth disaggregates productivity into labour productivity growth in each sector (within effect), and productivity growth due to reallocation of labour between sectors (between/reallocation effect). But unlike other studies, each sector (agriculture, industry or services) is divided into its formal and informal component in this analysis, depending on the enterprise type, and, each employment type is also distinguished into formal or informal employment^d.

Let Y_i denote value added in industry i , and L_i employment in industry i . Each industry is comprised of informal (unorganised) enterprises, and formal (organised) enterprisesⁱⁱ. Let the enterprise type within each industry be represented by j where $j = 1,2$ representing the organised and unorganised enterprise sectors respectively. The subscript i represents the industry (agriculture, manufacturing, services), subscript j represents the enterprise type (organised/formal or unorganised/informal) and subscript m represents the employment type (formal or informal)

$$Y = \sum Y_i \dots (1) \quad \text{where,}$$

$$Y_i = \sum_j Y_{ij} = Y_{i1} + Y_{i2} \dots (1.1)$$

The total labour force is employed across the industries, where L_i represents the labour force in industry i . Within each industry, the labour force may be employed in the organised or unorganised sector, so

$$L_i = \sum_j L_{ij} = L_{i1} + L_{i2} \dots (2)$$

where L_{ij} represents the labour employed in sector j of industry i .

An individual may be employed informally (i.e. without basic social security benefits) or formally (with social security benefits) irrespective of the enterprise of employment. Now, within the employment in an enterprise (j) of an industry (i), i.e, L_{ij} , there may be different employment statuses (m), L_{ijm} such that $L_{ij} = \sum L_{ijm}$.

If enterprise j stood for informal enterprises, then the workers would include the informally employed in informal enterprises (IIE), the self-employed (SE), and formally employed in informal enterprises (FE in IE).

$$L_{ij} = L_{ij,IE} + L_{ij,SE} + L_{ij,FE} \dots (2.1)$$

If enterprise j stood for formal enterprises, then the workers would include the informally employed in formal enterprises (IFE), and the formally employed in formal enterprises (FE in FE). The self-employed are included in the informal enterprises and hence will not feature in the formal enterprises labour force.

$$L_{ij} = L_{ij,IE} + L_{ij,FE} \dots (2.2)$$

Decomposition of industry-wise labour productivity growth by employment type:

For each industry, therefore, there are two subsectors, j = 1, 2 representing the formal and informal enterprises.

$$Y_i = \sum_j Y_{ij} \dots (3)$$

So within, say manufacturing, there are formal and informal enterprises.

$$Y_M = Y_{M1} + Y_{M2} \dots (4)$$

Labour force, within the informal and formal enterprises is divided into the formally and informally employed and self-employed.

$$L_{M1} = L_{M1,IE} + L_{M1,SE} + L_{M1,FE} \dots (5)$$

$$L_{M2} = L_{M2,IE} + L_{M2,SE} + L_{M2,FE} \dots (6)$$

For instance, $L_{M1,IE}$ refers to informally employed in formal manufacturing. Similarly, $L_{M2,IE}$ refers to informally employed in informal manufacturing, and so on.

Now, productivity within the manufacturing sector is represented as below,

$$P_M = \frac{Y_M}{L_M} = \frac{Y_{M1} + Y_{M2}}{L_M} \dots (7)$$

$$= \frac{Y_{M1} + Y_{M2}}{L_{M1} + L_{M2}} \dots (8)$$

$$P_M = \frac{Y_{M1}}{L_{M1} + L_{M2}} + \frac{Y_{M2}}{L_{M1} + L_{M2}} \dots (9)$$

The output produced in each sector of an industry is further decomposed into the output attributable to each employment type. So,

$$P_M = \frac{Y_{M1,IE} + Y_{M1,FE} + Y_{M1,SE}}{L_{M1} + L_{M2}} + \frac{Y_{M2,IE} + Y_{M2,FE} + Y_{M2,SE}}{L_{M1} + L_{M2}} \dots (10)$$

$$= \frac{Y_{M1,IE}}{L_{M1} + L_{M2}} + \frac{Y_{M1,FE}}{L_{M1} + L_{M2}} + \frac{Y_{M1,SE}}{L_{M1} + L_{M2}} + \left(\frac{Y_{M2,IE} + Y_{M2,FE} + Y_{M2,SE}}{L_{M1} + L_{M2}} \right) \dots (11)$$

$$= \left(\frac{Y_{M1,IE}}{L_{M1,IE}} * \frac{L_{M1,IE}}{L_{M1} + L_{M2}} \right) + \left(\frac{Y_{M1,FE}}{L_{M1} + L_{M2}} \right) + \left(\frac{Y_{M1,SE}}{L_{M1} + L_{M2}} \right) + \left(\frac{Y_{M2,IE} + Y_{M2,FE} + Y_{M2,SE}}{L_{M1} + L_{M2}} \right) \dots (12)$$

The first term in the first expression in the brackets, i.e. $\frac{Y_{M1,IE}}{L_{M1,IE}}$ is labour productivity of informal workers (m=IE) in formal sector (j=1) of manufacturing (i=M). It is the output attributable to informal workers in formal sector of manufacturing, divided by number of those workers. In the same way, the subsequent terms may also be similarly interpreted. Therefore, the equation (12) may be alternatively represented as,

$$P_M = (P_{M1,IE} * \hat{s}_{M1,IE}) + (P_{M1,SE} * \hat{s}_{M1,SE}) + (P_{M1,FE} * \hat{s}_{M1,FE}) + (P_{M2,IE} * \hat{s}_{M2,IE}) + (P_{M2,FE} * \hat{s}_{M2,FE}) + (P_{M2,SE} * \hat{s}_{M2,SE}) \dots (13)$$

Where $P_{Mj,m}$ is the productivity of the worker in employment status m, in sector j of manufacturing industry, and $\hat{s}_{Mj,m}$ is the share of these workers in total employment in that industry. So, for any industry, i,

$$P_i = \sum_j \sum_m P_{ij,m} \hat{s}_{ij,m} \dots (14)$$

Now, representing time using superscripts, for t=T

$$P_i^T = \sum_j \sum_m P_{ij,m}^T \hat{s}_{ij,m}^T \dots (15)$$

Therefore, a change in productivity between years (initial year (t=0), and subsequent year (t=T)) can be derived as,

$$P_i^T - P_i^0 = \sum_j \sum_m \Delta P_{ij,m} * \hat{s}_{ij,m}^T + \sum_j \sum_m \Delta \hat{s}_{ij,m} * P_{ij,m}^0 \dots (16)$$

Or alternatively, as

$$P_i^T - P_i^0 = \sum_j \sum_m \Delta P_{ij,m} * \hat{s}_{ij,m}^0 + \sum_j \sum_m \Delta \hat{s}_{ij,m} * P_{ij,m}^T \dots (17)$$

Making the weights time-invariant by taking an average of the two time periods, as in Timmer and de Vries (2008), the above two equations may be written as,

$$P_i^T - P_i^0 = \sum_j \sum_m \Delta P_{ij,m} * \overline{\hat{s}_{ij,m}} + \sum_j \sum_m \Delta \hat{s}_{ij,m} * \overline{P_{ij,m}} \dots (18)$$

Where $\overline{\hat{s}_{ij,m}}$ represents the share of workers in employment status m, in sector i of industry j in total employment in industry i, averaged across time t=0 and t=T.

Based on de Vries *et al* (2012), a change in labour share terms is calculated as a residual. Therefore,

$$P_i^T - P_i^0 = \sum_j \sum_m \Delta P_{ij,m} * \overline{\hat{s}_{ij,m}} + R_i \dots (19)$$

In growth terms, equation (19) may be represented by,

$$\frac{P_i^T - P_i^0}{P_0} = \frac{\sum_j \sum_m \Delta P_{ij,m} * \overline{\hat{s}_{ij,m}}}{P_0} + \frac{R_i}{P_0} \dots (20)$$

Where R_i represents the changing shares of informal workers within the formal and informal sectors of industry i . The growth in labour productivity is decomposed into the (i) weighted growth in labour productivity of each employment type, and (ii) the change in labour productivity due to the changing shares of workers in different employment types, measured as a residual as per de Vries *et al* (2012).

Decomposition of Economy-wide Labour Productivity Growth by Sources of Growth

For the economy as a whole,

$$P = \frac{Y}{L} = \frac{\sum_i Y_i}{\sum_i L_i} \dots (21)$$

Assume there are only two industries in the economy, say manufacturing (M) and services (S). Then,

$$P = \frac{Y}{L} = \frac{Y_M + Y_S}{L} \dots (21.1)$$

$$= \frac{Y_M}{L} + \frac{Y_S}{L} \dots (21.2)$$

$$= \frac{Y_M L_M}{L_M L} + \frac{Y_S L_S}{L_S L} \dots (21.3)$$

$$P = P_M S_M + P_S S_S \dots (22)$$

Representing time with superscript, and taking the change in productivity between $t=0$ and $t=T$, then, change in labour productivity between the two time periods may be written as

$$P^T - P^0 = (P_M^T - P_M^0)S_M^T + (P_S^T - P_S^0)S_S^T + (S_S^T - S_S^0)P_S^0 + (S_M^T - S_M^0)P_M^0 \dots (23)$$

Or as,

$$P^T - P^0 = (P_M^T - P_M^0)S_M^0 + (P_S^T - P_S^0)S_S^0 + (S_S^T - S_S^0)P_S^T + (S_M^T - S_M^0)P_M^T \dots (24)$$

Alternatively, to make the decomposition base invariant, the weights may be taken as averages of the two years, then,

$$P^T - P^0 = \sum_i (P_i^T - P_i^0)\bar{S}_i + \sum_i (S_i^T - S_i^0)\bar{P}_i \dots (25)$$

The first term in the RHS represents the within effect, and the second the between/reallocation effect.

In de Vries *et al* (2012), the second term is treated as a residual. So,

$$\Delta P = \sum_i \Delta P_i \bar{S}_i + R \dots (26)$$

Where $\bar{S}_i = \frac{L_i}{L}$, and R represents the shift of workers between industries.

Now inserting equation (19) into equation (26)

$$\Delta P = \sum_i \left[\sum_j \sum_m \Delta P_{ij,m} * \overline{\hat{S}_{ij,m}} + R_i \right] \bar{S}_i + R \dots (27)$$

$$\Delta P = \sum_i \left[\sum_j \sum_m \Delta P_{ij,m} * \overline{\hat{S}_{ij,m}} * \bar{S}_i + R_i * \bar{S}_i \right] + R \dots (28)$$

Now, within the first expression, $\overline{\hat{S}_{ij,m}} * \bar{S}_i = \frac{L_{ij,m}}{L_i} * \frac{L_i}{L} = \frac{L_{ij,m}}{L}$

So, equation (28) becomes,

$$\Delta P = \sum_i \sum_j \sum_m \Delta P_{ij,m} * \bar{S}_{ij,m} + \sum_i R_i \bar{S}_i + R \dots (29)$$

Where $\bar{S}_{ij,IE} = \frac{L_{ij,IE}}{L}$, averaged over the two base years, \bar{S}_i is the average share of workers in industry i in total employment.

So here, overall labour productivity is decomposed into (a) the weighted change in productivity of workers in different employment statuses, in informal and formal enterprises separately, (b) the movement of workers within industries (RiSi) (across informal-formal sectors), i.e. intra-sectoral reallocation, and (c) the movement of workers across industries (R), i.e. inter-sectoral reallocation.

In growth terms, equation (29) may be expressed as,

$$\frac{\Delta P}{P_0} = \frac{\sum_i \sum_j \sum_m \Delta P_{ij,m} * \bar{S}_{ij,m}}{P_0} + \frac{\sum_i R_i \bar{S}_i}{P_0} + \frac{R}{P_0} \dots (30)$$

Variables and Data Descriptions

In order to operationalise the above methodology, a suitable measure of labour productivity is needed. Measuring labour productivity involves dividing the total output produced (measured as GVA or GDP) by the labour input (measured in terms of hours worked or head count of workers). Gross Value Added (GVA) is the preferred measure of output, although Net Value Added may also be used, as has been done in this study. As per the methodology of the National Accounts Statistics in India, in accordance with the System of National Accounts, GVA, measured using the income approach, includes compensation of employees (CE), consumption of fixed capital (CFC), operating surplus (OS) in the case of the organised sector and mixed income (MI) in the case of the unorganised sector. While the

National Accounts Statistics contains data on CE, OS/MI for the organised and unorganised sectors separately, information on CFC by unorganised and organised sector is available only from 2004. Therefore value-added net of CFC, i.e. NVA is taken as a measure of output for this analysis. For organised sector (NVA^{OS}), this includes the compensation to employees and operating surplus, while for the unorganised sector (NVA^{UOS}), this includes compensation to employees and mixed income.

$$\text{So, } NVA^{OS} = CE + OS$$

$$NVA^{UOS} = CE + MI.$$

In measuring labour input, the number of workers (by usual principal and subsidiary status) is used. This is sourced from the NSS Employment Unemployment Survey Rounds (55th (1999-2000) Round, and 61st (2004-05) Rounds), which is adjusted using Census population estimates.

Labour productivity is measured by ratio of net value added to total number of workers employed. However, the challenge is to identify labour productivity by type of worker, i.e., formal workers in formal enterprises and informal enterprises, informal workers in formal enterprises, and informal enterprises, and self-employed workers. Measuring labour productivity of each of these types of workers requires attributing a share of the output produced to each of these worker types. For this purpose, firstly, it is assumed that the mixed income (as given in the NAS for the unorganised sector) represents the value-added by the self-employed. Secondly, the compensation of employees (and operating surplus, in the case of the organised sector) is attributed to the wage workers in shares equivalent to their wage shares as derived from the NSS Employment Unemployment Surveys (EUS).

So, in the informal enterprises which will include the self-employed, formal workers and informal workers, the overall net value added is apportioned as follows:

$$NVA \text{ of Self Employed} = \text{Mixed Income}$$

$$NVA \text{ of Informal Workers in Informal Enterprises} = b * (\text{Compensation to Employees}), \text{ and}$$

$$NVA \text{ of formal workers in informal Enterprises} = (1-b) * (\text{Compensation to Employees})$$

where b is the share of wages in the informal enterprises that accrues to the informally employed computed from the NSS EUS unit-level data.

Similarly, in the formal enterprises comprising of formal workers and informal workers, the NVA is apportioned as

$$NVA \text{ of informal workers} = c * (\text{Compensation to Employees} + \text{Operating Surplus})$$

$$NVA \text{ of formal workers} = (1-c) * (\text{Compensation to Employees} + \text{Operating Surplus})$$

where c is the share of wage in the formal sector that accrues to the informally employed, computed from the NSS EUS unit-level data.

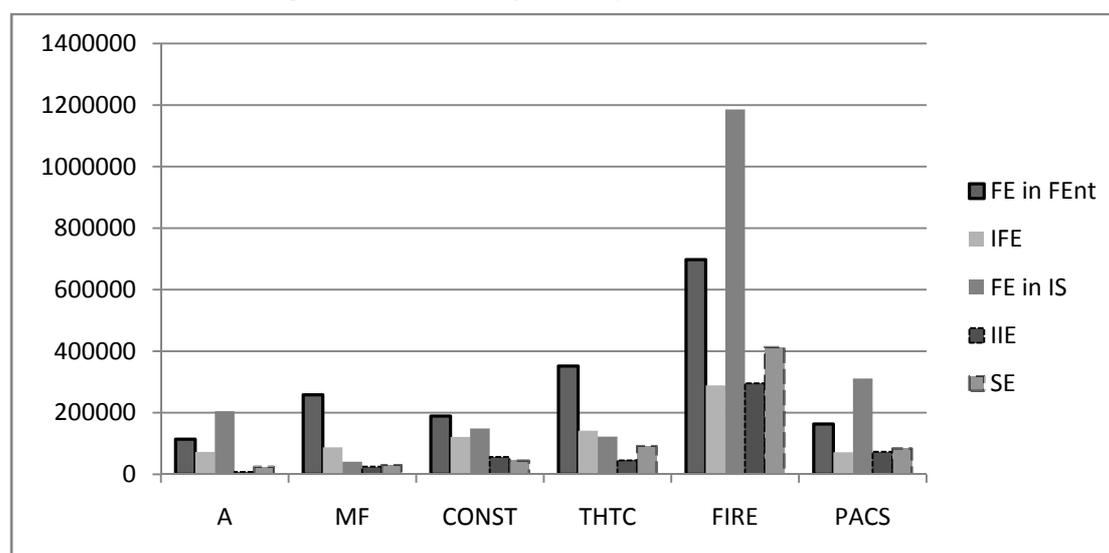
The industries of economic activity include (i) agriculture (A), (ii) manufacturing (MF), (iii) construction (CONST) (iv) trade, hotels, restaurants, transport and communication (THTC) (v) financial services, insurance, real estate and business activities (FIRE) and (vi) public administration, defence, education, social work and community services (PACS). The analysis is done for two time periods 1999-2000 and 2004-05 for which employment data is available. All values are in 1999-2000 prices. Net value

added for 2004-05 has been deflated using appropriate deflators for each sector - for agriculture, consumer price index (CPI) for agricultural labourers, for manufacturing and construction, CPI for industrial workers, and for all the services sectors, the CPI for urban non-manufacturing enterprises. Therefore, all NVA is at real prices, deflated to 1999-2000 values.

Results

A descriptive analysis of the Value Added per worker, disaggregated by employment type and industry using the methodology is given in Figure 1.

Figure 1: Productivity (NVA) per worker, 2004-05



Notes: A-Agriculture, MF- manufacturing, CONST- construction, THTC –trade, hotels, transport and communication, FIRE – Financial Services, Insurance and Real Estate, PACS-public administration and community services. FE in FEnt – formally employed in Formal Enterprises, IFE – informal employed in formal enterprises, FE in IE – formally employed in Informal enterprises, IIE – informally employed in informal enterprises, SE – self-employed.

Source: Information on value added is computed from National Accounts Statistics (2007).

In all sectors, the formal workers are the most productive. On the other hand, the informally employed in informal enterprise (IIE) are amongst the least productive. This is most likely because of their lower skill levels and their employment in smaller (mostly sick) enterprises with low capital. The informal workers in formal enterprises (IFE) however, are relatively more productive compared to their counterparts in the informal enterprises. The performance of the self-employed is mixed, but in general their productivity is higher than the IIE but less than the IFE in all sectors except FIRE.

Decomposition Analysis

Decomposing economy-wide labour productivity growth by sources of growth:

How do these different workers contribute to the overall labour productivity changes in the economy as a whole, and in each sector? Based on the equation (30), labour productivity change for the aggregate economy is decomposed into productivity changes for each worker type in each industry, an intra-sectoral labour reallocation component and the inter-sectoral reallocation (i.e., structural change) component. These results may be interpreted in terms of the contribution of each sector (Figure 2), or in terms of the contribution of each worker type to overall labour productivity change (Figure 3).

Between 1999-2000 and 2004-05, the overall labour productivity of the economy grew at a rate of 4.6% p.a. Examining the structural change components provides some interesting insights. The reallocation of workers (within and across sectors) together contributed to more than half (57%) of the growth in labour productivity (Figure 2). The conventional structural change component, i.e., the movement of workers across sectors, had a positive impact on labour productivity, and accounted for 86% of the overall labour productivity growth in the economy. This is reflective of the potential for labour productivity increase by moving workers from agriculture to the secondary and tertiary sectors.

As Table 1 shows, between 1999-2000 and 2004-05, inter-sectoral movement of labour has been out of agriculture, towards secondary and tertiary sectors, in particular manufacturing and construction. This inter-sectoral movement has enhanced labour productivity growth, as expected, and found elsewhere (Aggarwal 2014).

Table 1: Sectoral Distribution of Employment (in %), across and within sectors, 1999-2000 and 2004-05

Distribution of Labour Force		Agriculture		Manufacturing		Construction		THTC		FIRE		PACS	
		1999-2000	2004-2005	1999-2000	2004-2005	1999-2000	2004-2005	1999-2000	2004-2005	1999-2000	2004-2005	1999-2000	2004-2005
Sectoral Employment as % of total workforce		60.69	57.7	11.25	12.43	4.48	5.8	14.26	15.14	1.26	1.73	8.06	7.21
Sectoral Distribution of Employment Types (as % of workforce in that sector):	SE	53.7	61.0	47.1	49.6	16.9	17.6	63.1	67.1	32.5	37.2	22.6	27.1
	FE in FEnt	0.6	0.4	13.0	9.5	2.5	2.2	6.6	4.6	36.5	31.0	42.6	41.6
	IFE	0.9	0.8	16.0	19.8	16.7	18.0	4.6	5.3	10.5	16.0	13.0	22.3
	FE in IS	0.5	0.1	1.7	0.6	0.2	0.0	1.0	0.3	3.9	1.1	6.4	0.9
	IIE	44.4	37.7	22.2	20.5	63.8	62.2	24.8	22.7	16.8	14.7	15.4	8.1
	Total	100	100	100	100	100	100	100	100	100	100	100	100

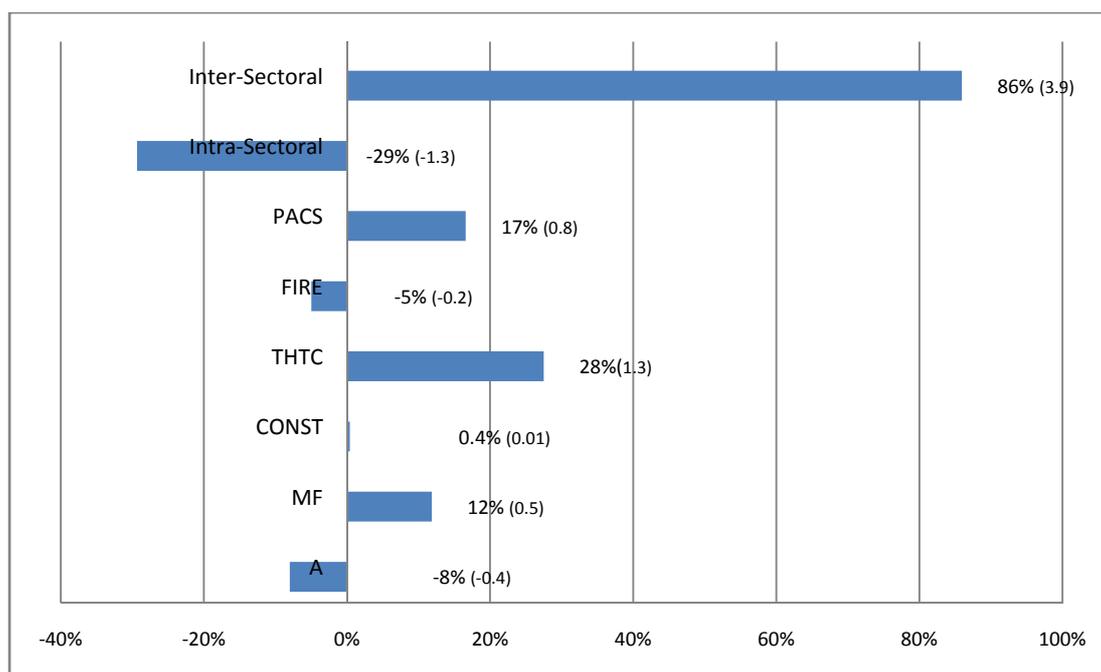
Notes: FE in FEnt – formally employed in Formal Enterprises, IFE – informally employed in formal enterprises, FE in IE – formally employed in Informal enterprises, IIE – informally employed in informal enterprises, SE – self-employed. THTC –trade, hotels, transport and communication, FIRE – Financial Services, Insurance and Real Estate, PACS-public administration and community services.

Sources: NSS Employment Unemployment Surveys 55th Round and 61st Round.

However, within each sector, the movement of workers was productivity dampening (to the extent of 29%) (Figure 2), indicating that workers were being engaged in low productivity forms of employment, dampening overall labour productivity growth. Table 1 confirms that within sectors, the movement of labour has indeed been towards informal employment. For all the non-agricultural sectors, the share of formal employment in that sector has fallen accompanied by an increase in informal employment, particularly, informal employment within formal enterprises. The negative contribution of intra-sectoral reallocation term towards productivity growth indicates that this movement towards informalisation has been productivity dampening. If the intra-sectoral component had not been included, then the structural change contribution may have been overestimated. But once the movement of labourers within sectors across employment forms is accounted for, the overall contribution of reallocation of workers is far less owing to the employment of workers in relatively low productive activities. This is similar to the findings of de Vries *et al* (2012) where the contribution of structural change is dampened when the movement of workers between formal and informal *enterprises* is accounted for. These findings go a step further by looking at the movement of workers between formal-informal enterprises, *and* formal-informal jobs.

With regard to the other components of aggregate labour productivity growth, the services sector, viz., trade, hotels, and communication, as well as public administration and social services accounted for almost half (46%) of this growth (Figure 2). Interestingly, the more dynamic services sector component, i.e., financial services, real estate and business activities had a negative contribution to labour productivity growth in the economy, and the labour productivity in this sector grew at a negative rate of -0.2% p.a., accounting for 5 per cent of the reduction in overall growth. This is further probed in this next section when analysing the sector-specific decomposition. Agriculture witnessed a decline in labour productivity (-0.4%) which contributed to the overall labour productivity decline. This is as expected given the surplus labour in the agricultural sector and the low levels of capital and stagnant technological progress. The manufacturing sector had a productivity enhancing impact on the economy as its labour productivity grew by 0.5% p.a., accounting for 12% of the overall labour productivity growth.

Figure 2: Decomposition of Labour Productivity Growth by Sectors, (% contribution)



Note(s): Figures in brackets represent the share-weighted absolute annual growth rate of productivity.

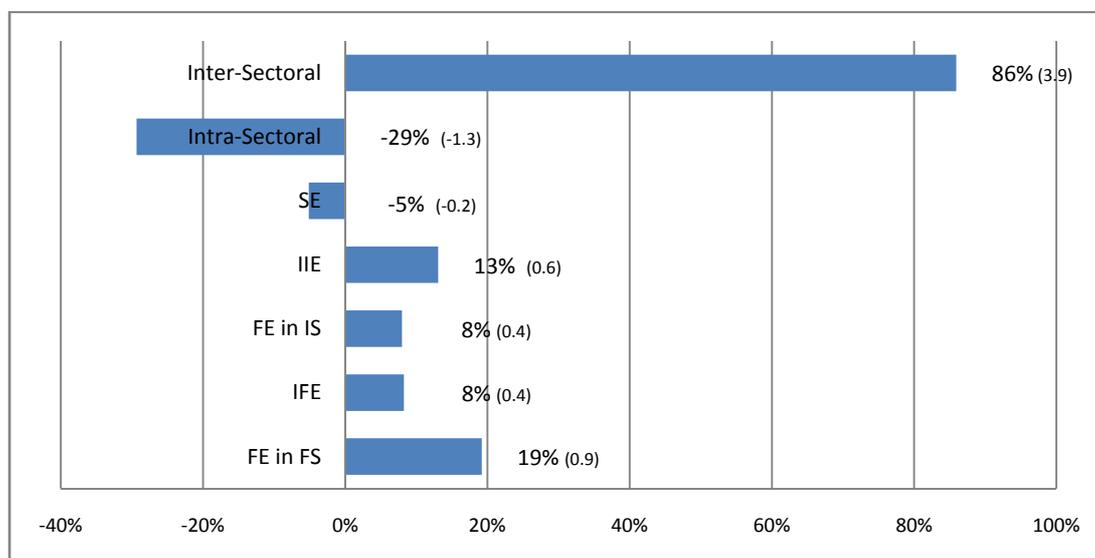
A – agriculture, MF – Manufacturing, Const – Construction, THTC – Trade, Hotels, Transport and Communication, FIRE – Financial Services, Insurance and Real Estate, PACS – Public Administration and Community Services.

Source: Author's calculation using equation (30) using NSS EUS unit-level data and National Accounts Statistics data for relevant years.

In terms of the contribution of the worker types (Figure 3), the enterprise-based informally employed (IFE & IIE) were significant drivers of labour productivity growth, reflecting the important contribution of these workers. They accounted for 21% of the growth in labour productivity between 1999-2000 and 2004-05. The labour productivity growth of these workers happened alongside a relative growth in the number of such workers (Table 1), making it all the more notable. Given the relatively lower absolute values of labour productivity of these workers (Figure 1), it is also likely that these workers have the greatest potential for further increases in productivity if their skill levels and accessibility to capital is further enhanced.

The formal workers, both in informal and formal enterprises, contributed most prominently to overall labour productivity growth. Their higher productivities are most likely a result of their higher skills/education, and access to more capital and technologies.

Figure 3: Decomposition of Labour Productivity Growth by Forms of Employment, (% contribution)



Notes: Figures in brackets represent the share-weighted absolute annual growth rate of productivity.

SE – self-employed, IIE – informally employed in informal enterprises, FE in IS – formally employed in informal enterprises, IFE – informally employed in formal enterprises, FE in FE – formally employed in formal enterprises.

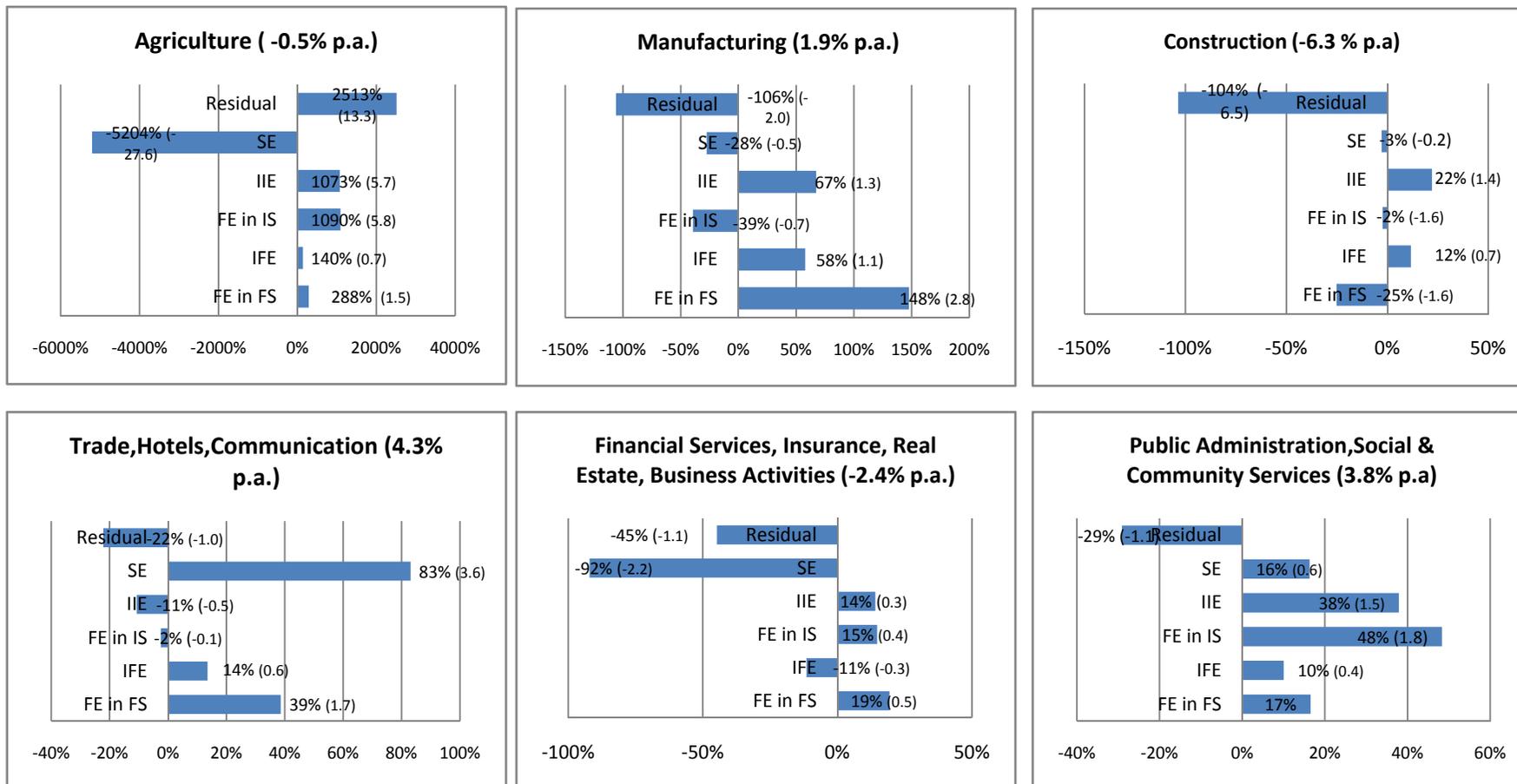
Sources: Author’s calculation using equation (30) using NSS EUS unit-level data and National Accounts Statistics data for relevant years.

Notably, the self-employed, who comprise a large section of India’s labour force, have a dampening impact on overall labour productivity as their labour productivity declined by 0.5% p.a. This perhaps reflects the lack of capital and the distress-driven nature of this employment

Decomposition of industry-wise labour productivity growth by employment type:

Labour productivity growth in each sector of the economy can also be decomposed into the ‘within’ and ‘between’ components. The ‘within’ component captures increase in productivity of labour due to capital deepening or TFP growth, while the ‘between’ component captures increase in productivity due to a reallocation of workers into more productive activities. The results of the sectoral decomposition as per equation (20) are shown in Figure (4).

Figure 4: Sectoral Decomposition of Growth in Labour Productivity (% contribution), 1999-2000 to 2004-2005



Notes: Figures in brackets represent the share-weighted absolute annual growth rate of productivity in that sector. Residual represents the labour productivity growth owing to intra-sectoral reallocation of labour.

Sources: Author's calculation using equation (20) using NSS EUS unit-level data and National Accounts Statistics data for relevant years.

Across all non-agricultural sectors, one consistent trend emerges (Figure 4). The intra-sectoral reallocation term is negative indicating that the movement of workers across various forms of employment has had a dampening influence on labour productivity growth. In all of the non-agricultural sectors, the movement of workers has been towards informality (Table 1) and this movement, as the decomposition shows, has contributed to a *decline* in overall labour productivity growth, indicating that workers are moving toward productivity-dampening jobs rather than productivity-enhancing jobs. Earlier, in Figure 3, it was seen that the overall intra-sectoral reallocation was labour productivity dampening. The cumulative experience in all the non-agricultural sectors explains the economy wide negative contribution of intra-sectoral reallocation.

If sectors are classified into positive and negative based on their experience in labour productivity growth, then agriculture, construction and FIRE sectors would constitute 'negative' sectors since their labour productivity fell (Table 1) between 1999-2000 and 2004-05. In all of these industries, the self-employed workers play a significant role in contributing to the overall decline in labour productivity, accounting. For these workers, who largely comprised own-account enterprise workers, the lack of economies of scale (in agriculture and construction) and the poor skill sets possessed and limited access to capital (in FIRE) may explain the decline in the productivity levels.

On the other hand, in the remaining 'positive' sectors (manufacturing, THTC, and PACS), productivity grew for almost all types of workers. The formal workers have been prominent drivers of growth in these industries (with the exception of the formal workers in informal sector in THTC, who constitute a small fraction of the workers). Additionally, the more recent form of informalisation, i.e. the informal workers in formal enterprises (IFE), have been drivers of growth in all these positive growth sectors. These informal workers, having access to more capital and better technologies by virtue of being employed in formal enterprises, have witnessed increase in their productivity levels. The trend of informalisation is set to continue as more and more formal firms are hiring informally through contract labour to avoid the restrictive labour regulations (Government of India, 2016). This has led to a reduction in their costs, benefitting the firms and providing workers with access to better production technologies and more capital. As these results show, in all sectors, with the exception of the financial services, insurance and real estate sectors, this trend has been productivity enhancing for that sector.

Conclusion

The decomposition analysis revealed the contribution of informal workers to sectoral and aggregate productivity changes. The results shows that while structural change, i.e. the reallocation of labour between sectors was growth enhancing, the movement of workers within sectors is growth inhibiting. So while across the sectors the movement of workers was in the direction of higher productivity, within each sector, workers were not always moving into the most productive jobs in that sector. This led to an overall dampening of labour productivity growth.

The more recent trend of contractualisation of work by formal firms has meant greater presence of informal workers in formal environments, i.e., the IFE. These workers have raised productivity levels in all the sectors (except financial services), reflecting their contribution to overall growth of the economy. While informal wage workers in most sectors contributed positively to labour

productivity growth, their absolute labour productivity level compared to that of the formal workers is significantly less. There could be a number of reasons for this difference, including better job motivation levels of formal workers, access to more capital and increased opportunities of job training and skill upgradation for formal workers. This provides further support for the need to create 'good jobs' – jobs that are secure as well as productive, so as to tap into the nation's demographic dividend and catalyse full productive capacity of its young population. However, as the sectoral analysis revealed, different forms of informal employment have differing contributions, and there is a need for sector-specific policy intervention. Moreover, as Ghose & Chandrasekhar (2015) suggest, these workers reflect the increasing trend of Indian industry's exploitative practices, i.e. despite their productivity contributions being significant, their employment benefits and wages are not commensurate with these levels. Hence, policy must focus on ensuring that they are paid in accordance with their significant productive contribution.

The analysis here has used the wage shares derived from the NSS EUS to divide the compensation of employees derived from the National Accounts Statistics. However, this rests on the assumption that the wages paid to workers are proportional to their productivity. It is likely that in a labour market like India with the high presence of informal and surplus labour, workers are underpaid. Therefore, the value added attributed to the informal workers may be below their true productive capabilities. However, since it is the ratio of wages, rather than absolute wages, the extent of underestimation may not be severe. However, it must be acknowledged that the value added derived as per this method, is at best, an approximate of workers' productivity. Alternative methods of estimating relative marginal productivities are also being explored. Recently, the Sub-Committee on Unorganised Manufacturing and Services Sectors for Compilation of National Accounts Statistics (Government of India, 2015) acknowledged the limitations in assuming homogeneity of all workers when computing Gross Value Added for each sector. In order to overcome this limitation, an Effective Labour Input Method was used which accounted for differences in productive capabilities by types of workers (owner, hired worker, unpaid workers). Using such an approach to arrive at relative productivity by worker type is being explored. Further, the analysis may also be extended to 2011-12 as data is available for this year. In this case, relative trends may be compared between the periods, 1999-2000 to 2004-05, and 2004-to 2011-12 to see whether contributions of different workers differ. Further, overall contributions of labour force to productivity growth in the last decade, 1999-2000 to 2011-2012, may also be explored.

Growth in labour productivity is just one component of overall economic growth. Along with population growth, and increase in the labour force, it influences the extent of per capita income growth in the economy. This analysis focused only on the labour productivity component of economic growth. Moreover, a growth accounting exercise "...cannot and (is not intended to) determine the fundamental causes of growth" (Bosworth & Collins, 2003: 115). Instead, it provides a framework for examining the proximate *sources* of growth. Therefore, the demand side, i.e., the shortage of jobs as well as the demand for skilled labour is not explicitly considered. However, the analysis provides an insight into the role of informal workers in the context of structural change and labour productivity growth.

Notes

- ⁱ Informal enterprises are defined as unincorporated proprietary or partnership enterprises, while public/private limited companies, government/public sector units and cooperatives comprise the formal enterprises. In the case of employment, any employment without the provision of PF is identified as informal employment, irrespective of the enterprise type. The choice of PF as the indicator of social security benefit is data-driven since this was the only employment benefit related information sought in the NSS 1999-2000 Employment Unemployment Surveys.
- ⁱⁱ NSSO defines the informal sector enterprises as comprising all unincorporated proprietary and partnership enterprises. However, National Accounts Statistics (NAS) defines the unorganised sector in addition to the unincorporated proprietaries or partnership enterprises, includes enterprises run by cooperative societies, trust, private and limited companies. The informal sector can therefore, be considered as a sub-set of the unorganised sector.

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