Subcontracting and Enterprise Development in India's Informal Manufacturing Sector

Abstract

Purpose – Subcontracting plays a pivotal role in characterising the Indian economy, especially in shaping its dualistic nature of informal and formal sector. With majority of the manufacturing enterprises in India being informal in nature with rising informal entrepreneurship, numerous scholars have expressed concerns related to enterprise development in India and formal-informal subcontracting linkages.

Design/methodology/approach – By constructing a panel data from two rounds of NSS Unincorporated Enterprise Survey Data (2010 and 2015), and employing a PSM-DID method, considering labour productivity and net retained earnings as two critical indicators of growth and development of the informal sector firms, this study has made some broad claims regarding the differences in immediate and long run performances between the subcontracted and non-subcontracted informal sector enterprises in India.

Findings – This study finds that subcontracted enterprises have not only been performing at a much lower level than the non-subcontracted enterprises, they are also growing much slowly than their counterparts. However, it has been observed that for the Establishments, who are capital abundant and also have a larger production capacity, subcontracting is showing the prospect for deriving sustainable gains.

Originality/value – This article contributes to the existing literature in following two ways. Firstly, it provides an *over-time* comparative analysis between the subcontracted and the non-subcontracted enterprises within the informal sector. Secondly, it brings to fore the contribution of subcontracting towards ensuring sustainability of the informal enterprises.

Keywords: Subcontracting, Informal Enterprises, Informal Entrepreneurship India, Propensity Score Matching, Difference in Difference.

Article Type: Research paper

1. Introduction

In the 1950s-60s there was a popular believe that with appropriate combination of economic growth, policy reforms and institutional aids, informal economy will get merged with the formal economy (Chen, 2012; Lewis, 1954). However, ILO (2018) reveals that the informal economy not only exists but is also thriving. Indian economy like many other developing economies is a vivid example in this regard.

Despite the remarkable economic growth experienced post-liberalization, the size of the Indian informal sector has not seen any decline as postulated by growth economists. In contrast, the informal sector has contributed significantly to the economy, not just in gross output terms but also as an absorber of periodic economic shocks by acting as the employer of last resort. Moreover, its products are available at a lower cost thereby serving people in lower-income groups and facilitating employment growth since small firms integrate vertically, thus raising employment to sales ratio (Williamson, 1975; Shekar, K. C., & Joseph, K. J., 2022). As per the Central Statistics Office, the share of MSME Gross value added (GVA) in GDP was 30.5% and 30%, respectively, for 2018-19 and 2019-20 at current prices (2011-12). The majority of these MSMEs are informal, employing about 110 million workers.

Among the many potential reasons behind this rise in informality is the 'structuralist' view which argues that the informal economy is intrinsically linked with the formal economy as a subordinate unit which grows in tandem with the expansion of the latter (Castells & Portes 1989). Until 1970s the Indian manufacturing sector has been largely identified as existing within the organised economy. This is driven by public sector enterprise and big corporate houses who were the primary producers in the economy and resembled predominantly the factory system of production. The period between the 1970s and 1990s was a transition phase for the Indian manufacturing sector which led to the emergence of inter-firm transactions and vertical disintegration of factories (Nagaraj, 1984). This observed emergence of inter-firm linkages between informal and formal sector in the post-reform period is characterised by subcontracting (Rani & Unni, 2004; Ramaswamy, 1999; Kundu, 1999).

The United Nations Industrial Development Organisation (UNIDO) has defined subcontracting as "A relationship [that] exists when a company (called a contractor) places an order with another company (called the subcontractee) for the production of parts, components, subassemblies or assemblies to be incorporated into a product sold by the contractor, such orders may include the processing, transformation, or finishing of materials or parts by the subcontractor at the request of the contractor." (UNIDO, quoted by Vepa, 1988).

To sum up, in subcontracting a part of the production activity is shared by an enterprise to another enterprise with certain contractual obligations. These obligations between the principal firm and the subcontracted firms are, among many things, related to supply of raw materials, capital, design and quality specification, mode of payment, and selling of products. Such collaborative relationships are, in most cases, quasi-permanent and seldom transitory or 'one-shot' affairs. In job work, the necessary raw materials, and sometimes the equipment, are provided by the parent firm, and the output of finished or semi-finished components is entirely supplied. In some cases, there may be technical guidance, and financial advances are made in some of the assignments. The International Labour Organisation (1961) has put forward three reasons for principle firms (contractors) to give out work to other firms (contractee). These are: (a) the principle firm may be working at total capacity and be unable to cope with all its orders; this might be called 'capacity ground" for subcontracting; (b) certain operations may require specialised

skill or equipment that cannot easily be obtained at reasonable cost in the area where the principle firm is located or that could not be continuously employed in the firm itself even if it could be bought or recruited; this may be referred to as the "specialisation" ground for subcontracting; (c) the contractee may enjoy other unique advantages that enable them to carry out certain operations at a lower cost than the principle firm (ILO, 1961).

These subcontracting activities led to an accelerated growth of informal manufacturing sector in the post-reform period in India in terms of number of enterprises, employment and gross value added (GVA) (see Appendix Figure 2). However, the share of informal manufacturing sector in total GVA has decreased from 29 percent in 1999-2000 to 23 per cent in 2017-18 while about 53 per cent of the GVA of 2017-18 was from the total informal sector according to the National Accounts Statistics 2019.

While the formal manufacturing sector, witnessed high growth rates immediately after the reforms, the informal manufacturing sector experienced low levels of productivity with an inability to generate surplus for self-sufficiently. Many studies based on this fact inferred that increase in subcontracting linkages between the formal and informal enterprises is becoming a prominent survivalist strategy for the enterprises in the informal manufacturing sector (Kathuria et al, 2010; Rani & Unni, 2004; Nouroz, 2001; Goldar, 2004; Shekar, K. C., & Joseph, K. J., 2022).

The predominantly explored reasons for subcontracting has been classified into two types by Monroy.et al (2014). First is to reduce the labour cost by subcontracting the labour-intensive jobs to the informal sector (Meagher 2010; Castells & Portes 1989). Second, along with the motivation to reduce the labour cost, the formal sector also wants to ensure that the quality of the service provided by the subcontractor is not compromised. Hence, the formal sector will target only the efficient and technologically advanced informal enterprises. This will ensure a modernisation in the informal sector, pushed by demands from the formal sector (Marjit, 2003; Ranis and Stewart, 1999).

Thus, the informal sector firms compete to get a contract with formal firms and ensure a market for their supply (Portes, 1994; Tokman, 1978). Consequently, formal sector firm effectively gain market power over informal firms. The returns to the workers and the value added by the informal sector declines, promoting a downward spiral in wages and creates vulnerability to the independent existence of informal firms. In other words, owing to asymmetry of market power between formal and informal firms, formal firms can push nearly entire weight of market volatility to informal firms via subcontracting.

Studies on interfirm linkages across the formal-informal divide originating from Bottom of the Pyramid (BOP) approach focuses on its strategic advantages (Kasturi Rangan et al. 2007; Hart and London 2005; London and Hart 2011; Yunus 2010; Shekar, K.C., 2021). These linkages are seen as providing access to the market potential of expanding informal economies and offering new solutions to failing aid-based development models that crowd out markets and reduce the poor to recipients of charity (Prahalad and Hart 2002; World Bank 2007). From the game theoretic approach, it can be shown that a long-term cooperative relationship between a principal firm and subcontractors can be developed based on the repeated game theory and reputation facet. So a successful farming-out relation can be formed if there is repeated interaction between principal firms and peripheral units in the long run (Kimura, 2001).

2. Research Questions

Considering the 'dualistic' economic structure of Indian economy, numerous scholars have expressed concerns related to performance and sustainability of informal enterprises in comparison to the formal enterprises (Trivedi.et al, 2011; Bhattacharya.et al, 2013; Basole.et al, 2015; Bhattacharya & Kesar, 2018). This article contributes to the existing literature in following two ways. Firstly, it provides an *over-time* comparative analysis between the subcontracted and the non-subcontracted enterprises within the informal sector. Secondly, it brings to fore the contribution of subcontracting towards ensuring sustainability of the informal enterprises. What role does subcontract linkages play in determining the performance of the informal manufacturing enterprises? Does subcontracted firms fare better in comparison to the non-subcontracted firms? These are the moot questions which this article is trying to address and add to the existing literature on subcontracting in India. Answer to these questions may shed some lights to the long-standing conundrum on how to make the labour abundant informal sector enterprises self-sustaining.

3. Theoretical Underpinning

In the Lewisian *'dual economy'* framework, as the economy develops, the surplus workforce moves from the traditional labor surplus (subsistence) sector to the capital surplus modern (capitalistic) sector (Lewis, 1954). India has also experienced similar trends in her history. As per the ILO estimates, the total share of the agricultural workforce has declined, and non-farm employment has increased over the years accommodating majority of the workforce in informal sector.

Policymakers in developing countries balance between supporting small firms and promoting big firms as there are potential advantages for both strategies (Glinyanova et al.,2021). Big firms benefit from economies of scale and scope, whereas small firms are more flexible and adaptable to volatile economic scenarios. Therefore, economics literature is ambiguous about the linkages between formal and informal sector and economic development (Shekar, K. C.,2021).

During the first half of the 20th century, large enterprises dominated industrial production worldwide. The tendency was to have a massive structure, huge investments, centralised decision-making processes and large-scale employment. They tried to derive the full advantages of the economics of scale. One attribute of such a system of industrial organisation was the in-house production of much of the product range. The practice of vertical integration might be mentioned as a distinct Anglo-American feature of the industry. After that, especially in the past three decades, the informal sector enterprises, small and micro firms continued to grow in various countries (Gamidullaeva et al., 2020). Moreover, informal enterprises serve as a breeding ground for the Micro, Small and Medium Enterprises and test-bed for many start-ups and thus facilitate the development of entrepreneurship and enterprise culture in India. A Peruvian economist Hernando De Soto advocates a central hypothesis that the cost of registration or formalization and business regulations are barriers to start-ups entrepreneurs, and thus the emergence of informal entrepreneurship in many developing economies (De Soto, 1989). As a result, a new sub-discipline of entrepreneurship research has emerged to better understand the nature of informal entrepreneurship (De Castro et al., 2014).

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Theoretically, in defining informal sector enterprises there are two mutually exclusive contesting views regarding informal sector. The *traditionalist,* Marxist and Dualist Schools, attributes the low productivity levels in the informal sector to economically inefficient allocation of resources mainly due to the small size of informal or unregistered firms (La Porta and Shleifer, 2014). This view defines informal sector as a source of exploitation of labor. The *emerging* view, Structuralist, Legalist, and Institutionalist Schools, consider the informal sector as an essential medium of production, present due to the socio-economic milieu where the coexistence of formal and informal sectors is necessary for economic development. More recent research establishes that many firms and workers voluntarily choose informality (Perry et al., 2007). Due to lower regulatory pressure, many entrepreneurs or business owners see the informal sector as a steppingstone to hone their skills before entering the formal sector. In many cases, workers from the formal sector also use their experience to set up informal enterprises (Hoyman, 1987). Thus, the opportunity-driven informal sector can be a means for capital accumulation.

Since there is no single agreed-upon definition of the informal sector in the literature, we broadly summarize different conceptualizations and definitions into two categories: Category 1 focuses on dualistic and segmented nature of the labor market, thereby defining informality based on firm characteristics and working conditions; Category 2 considers the legal status of economic activity, thereby defining informality as something legal but not legally recorded (ILO, 1993). However, our dataset follows the definition in Category 2 by identifying informal enterprises as unincorporated firms.

The NSSO Unorganised enterprise surveys reveals that the informal entrepreneurs are not only self-employed in nature but are predominantly operating with either unpaid family workers (own account enterprises) or recruiting less than six hired workers (no directory enterprise). Informal enterprise development literature asks whether the informal sector is a means of accumulation or exploitation (Maiti and Sen, 2010). The existence of informal sector creates a conundrum for policymakers as they need to choose between reducing the size of informal sector by relocating maximum possible workers from informal to the formal sector and supporting the inherent dynamism of informal firms, thus enhancing its vitality (Shekar, K.C., 2021). India liberalized trade and licensing policies during the 1990s. With liberalization, easy entry of firms increases competition. Informal firms operate in the same socioeconomic environment as the formal firms, and in a symbiotic relationship with them (Maiti, 2008). Following the trend of the latter, many have conceived informal entrepreneurship as a repository of local knowledge, creativity, and innovation (ILO, 2018; Shekar, K. C., & Joseph, K. J., 2022). However, subcontracting linkages with formal and large enterprises might drive the product development and capacity building in informal sector through the top-down diffusion of technical knowhow and market accessibility (Shekar, K.C., 2021). Roy (2019) highlights that the exclusive rights of knowledge inputs and innovation outcomes of the formal sector, through patenting and other property rights might hinder the informal entrepreneurs to reap the benefits of their innovation activities.

There is an ongoing argument in understanding the informal entrepreneurship and their establishment due to lack of alternative economic opportunities and hence reflecting a distress driven production endeavour as a survival strategy (Chaudhari and Banerjee, 2007; Nielson and Bruijn, 2005), or they reflect a rising entrepreneurial spirit among the skilled workers who aspires to have their own business and establish their independent enterprises and hence choose to not participate in waged labour (Cross and Morales, 2007; Llanes and Barbour, 2007). Further, Gurtoo and Williams (2009) argued that the notion of informal entrepreneurship as necessity driven rather than

signal of embracing entrepreneurial opportunity, is based on assumptions than evidence. However, critical works of sociologists such as Breman (2019), Harris-White (2002) has revealed that, informal entrepreneurship is at best an unsatisfactory resort to the otherwise distressed situation of employment.

3.1. Subcontracting Linkages between India's formal and Informal sector

Until the early 1960s, the practice of subcontracting in India was limited. Manufacturing plants, especially the large establishments, primarily produced within the confines of their own factories and relied heavily on vertically integrated production systems (Dhar, 1958; Fisher, 1968). However, the decade of late 1960s to late 1980s saw a significant restructuring of labour force in the Indian formal sector. Sandesara (1979) found that the proportion of factories employing less than 50 workers has gone up from 75 percent in 1953 to 82 percent in 1972. Correspondingly, the percentage of factories employing 50 to 499 workers has come down from 22 percent to 15 percent. Nag (1983) found no clear indication of an increase in the share of large business houses in the overall manufacturing sector in this time period. According to Nagaraj (1984), this decrease in large enterprises in parallel with the increase in small enterprises was a reflection of inter-firm linkages and vertical factory disintegration in the Indian manufacturing sector.

Lazerson (1990) states that over time subcontracting has arisen as a viable alternative to vertically integrated manufacturing in India due to shifting market dynamics. According to Ramaswamy (1999), subcontracting has been concentrated mostly in labour-intensive industries, industries producing non-durables consumer commodities, and in firms with low employment size. Uchikawa (2011), by focussing exclusively on the Indian informal sector, also finds that the frequency of subcontracting has risen over time and was mostly present in the large enterprises. On the contrary, Basole.et al (2015) observes that small enterprises are more likely to engage in subcontracting linkages than the medium and large enterprises in India's informal sector.

Comparing across states within India, Bairagya (2013) finds that subcontracted firms are technically more efficient in less developed regions like Orissa than in comparatively developed regions like Delhi. Nagraj (1984) suggests that a distinction should be made inter-firm transactions between firms with equal bargaining power and those with unequal bargaining power. Usually, subcontracting is carried out between large and small enterprises with small enterprises having a less bargaining power than the large formal enterprises. This hinders the growth of the former even if they have high technical efficiency, when they engage into subcontracting linkages.

Subcontracting in India has developed as a conventional "putting-out" system, which indicate a high degree of reliance on the principle enterprises by the subcontracting firm, lowering the former's negotiating power (NCEUS, 2008). Pressure to lower costs and maximise flexibility, along with labour regulations, provide strong incentives for the formal sector to subcontract activities to the informal enterprises. Lack of sufficient inputs, technology, access to markets, and low availability of credits are a few major reasons for the informal firms to enter into subcontracting linkages (Mazumdar & Sarkar, 2008; Siggel, 2010).

Ranis & Stewart (1999), Marjit (2003), and Monroy. et al (2014) argue that formal enterprises subcontract to only the modern efficient and technologically advanced informal enterprises. This is because subcontracting decisions are taken not just to reap the labour cost advantages of the informal sector, but also to ensure no compromise on the quality of the product to increase competitiveness and implement growth-oriented strategies (Shekar, K.C., 2021). Hence, it has been argued that when the formal sector subcontracts to the modern informal enterprises,

subcontracting has been found to be beneficial and it also leads to the modernization of the informal sector with improved technology and productivity levels.

However, Chen et al (2001) and Mehrotra & Biggeri (2007) affirms that subcontracting linkages contribute to an expansion of the traditional segment of the informal sector. These traditional enterprises are characterised by performing labour intensive activities, employing only family employees, having low capital ownership and located within the home premises of the owners. Bhattacharya et al (2013), and Basole.et al (2015) present evidence of higher labour productivity and higher capital-base for non-subcontracted enterprises as compared to subcontracted firms within the informal sector. In addition to this, subcontracted firms do not appear to perform any better in generating employment than their non-subcontracted counterparts. Considering the fact that informal sector remains largely concentrated in the relatively traditional activities, these evidences suggests that subcontracting has not helped informal firms to evolve towards modernisation and technological advancement.

The previous studies have highlighted the emergence of subcontracting in India's manufacturing sector. With majority of the manufacturing enterprises being informal in nature, several studies have focussed on analysing the effect of formal-informal linkages through subcontracting on productivity and efficiency of the informal enterprises. Although some conclusive evidences of a positive impact of subcontracting on the performance of the informal enterprises are found, there are several contestations regarding the selection criteria for subcontracting with the informal enterprises by the formal enterprises. Moreover, it has been observed that subcontracting did not manage to transform the traditional, low capital endowed, and dependent situation of the informal enterprises. With these results in hand, it becomes a pertinent question to ask, even if subcontracting is beneficial, does the advantages prevail over time for the informal enterprises. A related, and probably more important concern is sustainability of the gains from subcontracting. In other words, it is essential to understand whether the gains from subcontracting over non-subcontracting is sustainable, or the advantages of subcontracting recede over time. This is the primary contention of analysis in this article.

4. Empirical Studies

Although there is an extensive set of literature debating on the impact of labour in interfirm linkages (Oxfam, 2004; Nadvi, 2004; Barrientos et al., 2011; Barrientos et al.,2003; Ruthven, 2010; Brook, 2011; 2013), the critical strategic decisions of enterprises regarding subcontracting linkages have been insufficiently discussed, especially in the context of developing countries.

Literature on interfirm linkages emphasises on the importance of subcontracting where the formal sector is assumed to be promoting economic development in the informal sector through their forward linkage strategies (Ranis and Stewart, 1999; Arimah, 2001; Pieters et al., 2010; Meagher, 1995, 2010; Rogerson, 1997; Mlinga and Wells, 2002; Shekar, K.C., 2021). Although, lack of capital, technical weakness, and poor infrastructure made such linkages challenging to maintain, while intense competition and the role of intermediaries keeps the returns low. The National Productivity Council of India sponsored a Productivity Study Team on small industries, making a study tour to Sweden, West Germany, the U.S.A, and Japan and published a report in April 1960. According to the report, in the United States the volume of subcontracting increased with an increase in the size of the operation. The IBM Corporation was reported that 60 to 80 per cent of their components came from subcontractors and that

about one-third of these were from small industrial units. Nearly 72 per cent of the value of the automobiles produced by the Chrysler Corporation represented bought out items including raw materials and thousands of components and parts purchased from outside sources, 40 per cent of which were from small units. These components accounted for 20 to 25 per cent of the value of each automobile. "In many cases, due to the high level of technical know-how in the country, the small-scale units possessed, in their respective lines, specialised plant, techniques and skill which it was advantageous and worthwhile for the large units to utilise." (NPCI, 1960)

In contrast, several studies confirm the predominance of backward linkages over forward linkages between informal and formal economies in Africa (Arimah, 2001; Meagher, 2007, 2010; Meagher and Yunusa, 1996; Pedersen and McCormick, 1999; UNIDO GTZ, 2008). These studies have shown that the dominance of backward linkages by the formal economy generates exploitative and involuntary dynamics in which formal sector firms reap the bulk of profits through their linkages with the informal value chains, undermining growth in the informal economy (UNIDO/GTZ, 2008; Pedersen and McCormick, 1999). Using quantitative methods based on a survey of 2,506 enterprises across Nigeria, Arimah (2001) finds backward linkages to be two to three times more extensive than forward linkages. Further qualitative studies of formal-informal linkages in Nigerian informal manufacturing sector also find forward linkages to be relatively rare and highly unstable and exploitative (Meagher, 2010). Skinner's (2005) survey of 507 informal firms in Durban, South Africa, finds an even more extreme predominance of backward over forward linkages, and finds that it creates weak markets and limited growth potential. In dynamic informal economies such as India and Brazil, Phillips shows how "adverse incorporation" operates through subcontracting linkages that connect formal firms to a supply of vulnerable informal labour (Phillips, 2011), while du Toit and Neves (2007) reveal its operation in South Africa's undynamic informal economy through exploitative backward and consumption linkages with the formal economy. Carr and Chen (2002) mapped out a deliberate practice of "disguised employment", in which globalized production systems use subcontracting, casualization or temporary employment to evade labour regulations and cut the costs of social protection. Annavajhula's (1989) study in the context of Japanese economy observes that: "Subcontracting [...] is indeed both amazing and depressing for one thing the so-called Japanese' relational capitalism" is not without solid elements of asymmetry, instability and exploitation; however, the systems of subcontract in Japan are undoubtedly different from the version idealised and popularised in less developed countries".

5. Analytical Framework

Firms who engage in subcontracting relationships enter into a contractual obligation with their partners. These contractual obligations generally take the form of receiving raw materials, technological support, and managerial knowhow from the partner firms at the condition of sharing a certain percentage of product to their partners and thus sharing the value generated from production with them. Hence, the entire production and distribution mechanism for a subcontracted firm is remarkably different from that of a non-subcontracted firm. In other words, the endowments of the subcontracted firms will be different from that of the latter precisely because the former gets exogenous support from their partner firms. As the endowment of the firm is the pivotal factor which determines the firm's performance and outcome, comparing only the performance of subcontracted and subcontracted firms directly will give misleading claims about the effectiveness of subcontracting. It is essential to compare among only those firms whose endowments and other characteristics are similar and only the difference being that one is in subcontracting relationship and the other is not.

In this backdrop we have considered two endowments in our analysis. First is the age of the firm which reflects the experience of the firm. According to the 'learning effect' argument, matured firms can take more informed decision while engaging in subcontracting activities (Lazerson, 1990). Further, Das (1995) showed that age of the firm positively impacts the performance of the firms. Besides, a firm which is functioning for a longer period is expected to have a more stable organisational structure and corporate governance which is dynamic enough to address the changing conditions of production activities. Second is the size of the firm. Size can be conceived in terms of number of workers recruited and the total amount of capital assets the firms possess. Capital comprises of working capital such as liquid cash required for daily operations and fixed capital required for long term sustainability which includes tools, machineries, plants, and other equipment. Depending on the firm size and its composition, the firms take important strategies and decisions in their production process. For instance, firms endowed with higher capital asset can participate in capital intensive production activities. Similarly, firms endowed with higher number of workers can participate in labour intensive activities. Besides, larger firms are more prepared to cater a larger market and can accommodate higher units of production per production cycle.

Along with the two endowments we have considered additional three characteristics of the firms in our analysis. These are the location of the firm, the industry group of the firm and the ownership structure of the firm. Dicken (2015) highlights that regional characteristic of the place where the firm is embedded plays a crucial role in determining the firm's organisational strategies and production practices. The location of the firms is captured at three levels. First is the state at which the firm is located. Since India is a federal country, each state has their own formal institutions pertaining to laws, rules and regulations related to factors such as competition, trade, and labour usage. Hence, firms located in different regions can be expected to have different strategies business models. Second is within the state whether the firm is located in a rural or an urban setting. Rural regions are expected to have lower infrastructure and public support facilities than the urban regions. This can affect the production process and the organisational decisions. Third is within the rural or urban setting whether the firm is located within the home of the employer or in an outside premise. Home based firms have an organisational structure where the family members take the role of employees and only a few are hired workers. Hence, in a home based setting the family hierarchy can converge into the organisational structure of the firm (Mezzadri, 2016).

The second characteristic considered in our analysis is the industry group of the firm. The industry groups which are used to categorise the firms are retrieved from the National Industry Classification (2008) published by the Ministry of Statistics and Programme Implementation (MOSPI), Government of India. In appendix Table 9 the list of the industry group is given. Each industry group are focussed on a certain production activity and hence the firms engaged within the same industry group is expected to share certain business model and organisational structure. The third characteristics considered is the ownership structure of the firm. Depending on the ownership structure the firms' interpersonal relationships and the decision-making process are determined. Within the ownership structure we have identified the own account enterprises (OAE) and the establishments. According to the MOSPI, OAEs are those who do not hire workers for performing their production and are jointly owned by family members. Establishments are those firms who recruit hired workers and are owned by either partnership or proprietorship basis.

Finally, the performance indicators which are considered in our analysis are the net retained earnings of the firm (NRE) and labour productivity (LPR). A conventional measurement of efficiency of the firm is its labour

productivity (Bairagya, 2013; Basole.et al, 2015) which is calculated by the gross value added (GVA) per unit workers. Primary purpose of any firm is to accumulate surplus, the source for reinvestment required to grow. NRE is the accumulated net surplus calculated by subtracting the cost of emoluments given to workers, interest, and rent paid for operating capital from the total income generated by the enterprise.

We aim to analyse the difference in the performance between subcontracted and the non-subcontracted firms using NRE and LPR, for both at a given time period and over time. However, to ensure that the difference in the performance is solely due to subcontracting, we are going to compare between only those firms which possess similar endowments and characteristics as specified above.

Figure 1 bellow provides a schematic diagram of our analytical framework for two time periods. Here firm A engages in a subcontracting relationship with the partner firm X. Firm B is the non-subcontracted firm. A and B are in informal sector and X is in formal sector. The light shaded arrow shows that the performance indicators are determined by the endowments and the characteristics of the firms. This is true for both firms A and B. The dark double tipped arrow shows the inter-firm subcontracting linkage, which reflects the contractual obligations between A and X. The endowment and the characteristics indicators are depicted in yellow circle, the performance indicators are depicted in the red circles. The region covered by the blue rectangles shows the difference in performance between firm A and firm B for each time period. This is the subcontracting effect. The region covered by the blue ovals show the over-time change in performance for firm A and B separately. This is the time effect. The difference between time effect for firm A and firm B represents the overtime subcontracting effect.

<<Figure 1: Schematic Diagram of analytical framework>>

6. Data Source

Our analysis is based on latest two rounds of National Sample Survey Office's, Unincorporated Enterprise Survey data, 2010-11 (67th Round) and 2015-16 (73rd Round). Here an informal enterprise is considered to be having subcontracting linkages during the reference year if it has undertaken any marketing agreement or contract with other enterprises. This agreement pertains to sales of the product, supply of raw materials, technology, equipment by the other unit, mode and frequency of payment and price determination of the product. However, as the data was not designed to study contractual relationships, many additional information for a deeper examination of subcontracting linkage are not available. For instance, the size of the other firm with whom the contract is written, the motivation of the informal enterprise to come under the contract, the nature and duration of the contracts are not documented in the survey data. Having said so, these are the largest and representative datasets to identify the firms with contracts in the informal sector in India.

In order to segue the enterprises considered in the survey with the NCEUS (2007) definition of informal sector, only proprietary enterprises and enterprises with number of (paid and unpaid) workers less than twenty in the reference year are considered. The analysis is restricted to the manufacturing enterprises. Among the enterprises

reporting more than one industrial activity, only those enterprises whose major activity[1] is in the manufacturing industry, are considered. Further, to ensure that the performance of the subcontracted and non-subcontracted firms can be comparable, those firms who perform in contractual agreements only are considered to be engaged in subcontracting. In other words, those firms whose entire production goals are to meet the contractual obligations, are considered to be engaged in subcontracting. Finally, since the aim is to control for the state and industry fixed effects as well, those states/UT and industries with less than 1000 enterprises in the sample are omitted from the analysis[2].

7. Descriptive Analysis

Prevalence of subcontracting in the informal manufacturing sector has increased substantially from 19 percent in 2010 to 29 percent in 2015 (see Table 1). Firms with subcontracting linkages, typically receive raw materials and design specification from the other firms but use their own equipment for production purpose. However, the subcontracting firms who are receiving equipment from the other unit have risen dramatically from 3 percent in 2010 to 14 percent in 2015. Those firms receiving design specification have also risen from 84 percent to 90 percent during the same time period. On the other hand, those receiving raw materials from the other unit have fallen from 96 percent to 92 percent.

Informal sector is heterogeneous in nature. The enterprises may vary in terms of characteristics, endowments and performance. Indian informal manufacturing sector is predominantly populated with own account manufacturing enterprises (OAME), employing only family members[3]. Our results show that around 93 percent of the total subcontracted firms are OAMEs. From 2010 to 2015, number of OAMEs engaged in subcontracting have increased substantially from 21 percent to 31 percent. Another important characteristic of the Indian informal manufacturing sector is that more than 70 percent of them are home-based enterprises. Further, subcontracting among these home-based enterprises have risen from 25 percent to 35 percent from 2010 to 2015. Finally, although majority of the informal enterprises is owned by male, it is found that among the female owned enterprises 32 percent of them are more likely to engage in subcontracting whereas 11 percent of male owned enterprises are participating in subcontracting activities in 2010. In 2015 it has increased to 43 percent and 15 percent respectively. These results indicate that female owned, home-based, and own account enterprises are more likely to get engaged in subcontracting linkages (Table 1).

<<Table 1: Characteristics of Informal Manufacturing Enterprises>>

Table 2 summarises the key statistics on endowment and performances for subcontracted and non-subcontracted firms for the above mentioned time periods. Two essential endowment indicators are the value of capital and the number of workers engaged in the enterprises which determines the firms' size and their performance. Capital

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[1] According to the NSS-UES data (2010, 2015), major activity is that activity which yields maximum income (1st) / turnover(2nd) /employment(3rd) (in the order mentioned).

[2] The states/UT which are dropped from the analysis are Andaman and Nicobar, Pondicherry, Lakshadweep, Goa, Dadar and Nagar Haveli, Daman and Diu, Meghalaya, Mizoram, Arunachal Pradesh, Sikkim and Chandigarh. The manufacturing industries at 2-digit National Industry Classification (2008) which are considered in the analysis are food processing, beverage and tobacco products, textiles, garments, leather, wood products, paper products, printing and record product, chemicals, rubber and plastics, other non-metallic mineral products, and furniture.

[3] In 2010, 85 percent of the total manufacturing enterprises were OAMEs which have risen to 87 percent in 2015.

value is the sum of net value of the plants and machineries, land, buildings, tools, ITC and transport related equipment owned by the enterprise. The number of workers includes both part-time and full-time workers (hired and family) engaged in the enterprise in last 30 days from the date of the survey. Two performance indicators of the enterprises are considered in the analysis: labour productivity and net retained earnings (NRE). Both GVA, NRE and capital value of the enterprises are inflation adjusted by using the wholesale price index with 2004-05 as the base year.

<<Table 2: Endowments and Performance of Informal Manufacturing Enterprises>>

With most of the enterprises being OAMEs, the average number of workers engaged in each enterprise is low and at around 2. Our results do not show any significant difference in the number of workers employed between the subcontracted and the non-subcontracted enterprises from this overall average. Over time, a sign of labour substitution is observable as the average number of workers engaged per enterprise is falling. However, the non-subcontracted firms are found to be having significantly higher capital value in comparison to the subcontracted firms. Further, the capital value of the former is falling but for the latter is rising from 2010 to 2015. Also, the labour productivity and the NRE of the subcontracted firms is found to be significantly lower than that of the non-subcontracted enterprises.

The descriptive statistics indicates that subcontracted firms are lower in both endowments as well as performance. The firms with low performance and capital are more likely to engage in subcontracting. This might indicate that subcontracting is at-least not having any benefit to the enterprises if not having a detrimental effect. In Figure 2 the effect of subcontracting is further analysed by comparing across the different types of enterprises and for different levels of capital endowments in the informal sector. It depicts that in general, subcontracted firms have comparatively lower labour productivity and NREs than non-subcontracting firms. As the capital base increases (X axis), the gap between labour productivity and NREs of subcontracted and non-subcontracted firms has declined in both OAMEs and Establishments (Est). However, over time the gap between subcontracting and non-subcontracting has widened for OAMEs. This implies that the productivity and NREs among sub-contracted OAMEs have declined over time.

<<Figure 2: Changes in Labour productivity (Right side) and NREs (Left side) of subcontracting and non-subcontracting firms>>

On the contrary, for establishments the trend is reverse. In fact, there is no difference in performance between the subcontracted and the non-subcontracted establishments. This convergence of productivity as well as NREs between subcontracting and non-subcontracting establishments implies an increase in performance of subcontracted establishments over the given time period. How much of this difference in performance owes to subcontracting, and how much is it due to dearth of endowments or characteristics of the enterprises is analysed in details in the next section.

8. Empirical Model

8.1. Methodology

The aim of the article is to understand how the firms in the informal manufacturing sector has performed when they entered in subcontracting linkages with formal enterprises. Particularly, we attempt to see how the subcontracted firms have performed over time in comparison to the non-subcontracted firms. With this aim in hand, difference in difference (DID) model was seemed an appropriate econometric tool because it allows us to decompose total observed change in performance of firms after intervention into two components i.e., proportion of change that can be attributed to time or trend and the pure intervention (i.e., subcontracting) effect. However, unlike any exogenous policy intervention, subcontracting is not a treatment which is randomly implemented to a set of firms at a given time period. Thus, direct application of DID to decompose the observed change in pre- and post-treatment outcomes will not measure the effect of subcontracting in this enquiry. In addition, since the observed firms in two rounds of survey are not the same set of firms, it makes the identification of treatment and control group difficult. Thus, in order to make DID an appropriate tool for measuring the over-time impact of subcontracting we converted the two repeated independent cross-sectional data (mentioned in section 4.1) into a pseudo-panel data (Deaton, 1985) using the propensity score matching technique.

Deaton's (1985) showed that two independent cross-sectional surveys can be converted into a synthetic or pseudo-panel by creating a set of cohorts with each cohort consisting of a group of observations of similar characteristics. Here we are dealing with two independent cross-sectional surveys. Hence, the firms are not the same across both the rounds of surveys, and the total number of firms also varies across surveys. To identify the cohorts in the two rounds of cross-sectional data and converting them into a pseudo-panel, we took the propensity score matching (PSM) approach.

8.1.1. Propensity Score Matching

Deaton (1985) argues that using pseudo-panel data does not necessarily imply inferior results compared to using panel data as the former are subject to only limited measurement errors. It may be argued that in pseudo-panels cohorts are average values for some homogenous firms, hence, it approximates the population mean, with measurement errors. In order to overcome this concern, we have constructed the cohorts by selecting those firms which have similar likelihood to enter into subcontracting linkages, across the two time periods. Following three steps were undertaken to execute the PSM.

In the first step, the NSS Unincorporated Enterprise Survey, Unit level data 67th Round (2010) was used as the baseline year and the 73rd round (2015) was used as a follow up year for the analysis. These two rounds are the latest rounds and has a five-year gap in between. It can be assumed that the five-year gap is adequate for subcontracting to show an overtime effect on the firm performance. Hence it is appropriate to consider 2010 as the baseline year and 2015 as the follow up year.

In the second step we identify the treatment and the control group for the baseline year (2010). In order to ensure that the differences in the firm performance between the control and treatment group is due to the intervention (subcontracting) solely, it is necessary to confirm that the characteristics of the firms across the groups are similar. Firstly, the subcontracted firms and the non-subcontracted firms are sorted into treatment and control groups.

Then, the control and the treatment groups are matched by conducting a quasi-experimental method- Propensity Score Matching (PSM) technique (Gertler et al., 2011). The propensity scores are estimated for both the control and the treatment groups by performing a logit models for the baseline year. The Logit Model computes the odds of a firm to engage in subcontracting, based on their economic and regional characteristics. The model specification is depicted in equation 1.

$$Likelihood\ (subcontracting) = logit(D = 1|x) \tag{1}$$

Where D is the subcontracting dummy which takes the value 1 when a firm engages in subcontracting and 0 otherwise. x is the vector of covariates which determines the likelihood of a firm to engage in subcontracting. This vector comprises of a set of firm characteristics which includes capital value, number of workers, firm's age and type of the firm (whether a firm is an own account enterprise or establishment). It also comprises of a set of regional characteristics like location of the firm (home based or outside home); the state and the sector (rural or urban). Finally, the industry group[4] of the firm is also considered to capture the mean industrial characteristics of the firms. The result of the logit model for the baseline year is given in Table 3.

<<Table 3: Results of Logit Regression at the base year (2010)>>

The result of the logit model depicts that firms with larger number of workers are more likely to engage in subcontracting. This result is consistent with the argument that subcontracting is mostly driven by the cost cutting strategy of the formal sector by contracting out the labour-intensive activities to the labour abundant informal enterprises (Sahu, 2010; Mehrotra & Biggeri, 2007). Further, more experienced firms are found to be less likely to engage in subcontracting linkages. Capital value is having an insignificant effect whereas home-based and female owned enterprises having a significantly higher likelihood to engage in subcontracting. This supports the 'stagnation view' of subcontracting, where the traditional, small, home-based and capital deficient firms are predominantly participating in subcontracting. Following this argument, although it is expected that OAMEs and those in the rural sector are more likely to get engaged in subcontracting (Basole. et al, 2015), in our model they are not significant in determining the enterprises' likelihood to engage in subcontracting.

The predicted value of the logit model provides the propensity score of individual firms to engage in subcontracting. To ensure that the control and the treated groups are similar in their characteristics, the propensity scores are matched between the two groups using the single nearest neighbourhood, with replacement, matching technique (Abadie and Imbens, 2006). Further, only those firms which are falling in the common support region are considered for matching. The common support region is the region where there is an overlap in the propensity score between the treatment and the control group. In other words, it is the region within the maximin and the

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[4] National Industry Classification (2008) code at the two-digit level of disaggregation.

minimax of the propensity scores between the subcontracted and the non-subcontracted firms[5]. Additionally, the mean difference in the characteristics of the two groups are analysed by the balancing t-test. Table 4 shows the results of the t-test between the two groups before and after the matching. The null being that there is no difference in mean between the treated and the control groups. It is found that for all the covariates, the mean difference between the control and the treated groups has reduced in magnitude after matching, as shown by percentage reduction in bias. Also, for most of the variables, the mean difference has become insignificant in the in-matched sample. This indicates that the matching is successful.

<<Table 4: Balancing t-test in difference of covariate means at base year (2010)>>

The third step is to identify the treatment and the control group from the follow-up year (2015). Here the issue is twofold. The first requirement is to ensure that the characteristics of the subcontracted and the non-subcontracted firms in 2015 matches with their corresponding counterparts in 2010. By matching the set of control and treatment groups between the two time periods, one can reflect on the over-time effect of subcontracting on the firm performance. Second requirement is to match the firm characteristics of the control and the treatment group within 2015[6]. The propensity scores of the firms in the follow up year are retrieved from the logit model with exact specifications as that of equation 1 (See Appendix Table 7). Then those firms are considered from the follow up year whose propensity scores are within the common support region of the baseline year. This ensures that the control and the treated group of the follow up year matches with their counterparts in the base year.

The matching of the control and the treatment group within 2015 is performed in a similar way as that of 2010 using the same PSM technique, but for the observations matched with their counterparts in the base line year (See Appendix Table 8).

A total of 155567 firms with 86983 firms in 2010 and 68584 firms in 2015 met both the matching selection criteria. It should be highlighted that the difference between the mean and the standard deviations of the propensity scores for the baseline year and the follow up year is 0.5 and 0.16 respectively, after meeting both the above mentioned matching criteria. Similarly, the over time difference between the mean and standard deviation of propensity score for the control group is 0.4 and 0.2 and that of the treatment group is 0.2 and 0.1 respectively.

8.1.2. Difference in Difference

After finalising the control and the treatment group for both the years, the Card and Kruger's (2000) difference-in-difference (DID) model is executed. This exercise is executed for the entire informal manufacturing sector (OAME+Establishments) and also repeated for OAMEs and establishments separately. The firm performance is captured by NRE and the labour productivity of the firms. The model specification of the DID model is the following.

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[5] The common support region is (Maxmin, Minimax) of two regions. For example, if region 1 and region 2 have support regions ($a1$, $b1$) and ($a2$, $b2$), respectively, then the common support region is (Max ($a1$, $a2$), Min ($b1$, $b2$)) (Gertler et al., 2011).

[6] In order to achieve this over time matching of the propensity scores, it is necessary to ensure that the propensity scores are comparable between the two time periods. This is taken care of by normalising the variables-capital value, average number of workers and the age of the firm before being used in the logit regression for both the time periods.

$$Y_i = \alpha + \beta T_i + \gamma t_i + \delta(T_i \times t_i) + \epsilon_i \tag{2}$$

Here Y_i is the outcome variable which is NRE and labour productivity. T_i is the intervention dummy, which takes the value of 1 when the firm has engaged in subcontracting and 0, otherwise. t_i is the time dummy, which takes the value 1 when the year is 2015 and 0 when the year is 2010. β account for the average differences in the outcome variable between the subcontracted and the non-subcontracted firms. γ captures the permanent mean difference in the outcome variable between 2010 and 2015, depicting the trend of the outcome variable over the two time periods. δ depicts the difference in the over-time change of the outcome variable between the subcontracted and the non-subcontracted firms. In other words, δ is the DID indicator which represents how the subcontracted firms have performed from 2010 to 2015 in comparison to that of the non-subcontracted firms. ϵ_i is the error term.

The mean value of the outcome variables for the four groups of firms are stated in equation 3 to 6.

Group 1: Mean of outcome variables for the subcontracted firms in the base year;

$$E(Y_i \mid T_i = 1 \ and \ t_i = 0) = \alpha + \beta \tag{3}$$

Group 2: Mean of outcome variables for the subcontracted firms in the follow-up year;

$$E(Y_i \mid T_i = 1 \ and \ t_i = 1) = \alpha + \beta + \gamma + \delta \tag{4}$$

Group 3: Mean of outcome variables for the non-subcontracted firms in the base year;

$$E(Y_i \mid T_i = 0 \ and \ t_i = 0) = \alpha \tag{5}$$

Group 4: Mean of outcome variables for the non-subcontracted firms in the follow-up year;

$$E(Y_i \mid T_i = 0 \ and \ t_i = 1) = \alpha + \gamma \tag{6}$$

Equation (6) minus Equation (5) estimate the over-time change in the mean value of the outcome variable for the non-subcontracted firms. It takes the value, γ. Similarly, equation (4) minus equation (3) estimate the over-time change in the mean value of the outcome variable for the subcontracted firms. It takes the value $\gamma + \delta$. Now, the difference in the over-time changes of the mean value of the outcome variable between the non-subcontracted and the subcontracted firm is $(\gamma + \delta - \gamma) = \delta$. Hence δ is the DID indicator or the 'double difference' indicator.

8.2 Estimation Results

The effect of subcontracting on labour productivity is analysed in Table 5. The first column of the table 5 shows the result for all the informal manufacturing enterprises (OAMEs+ Establishments). Second and third column describes the estimation value for OAMEs and Establishments respectively. The labour productivity of both the non-subcontracting and the subcontracting firms have increased significantly from 2010 to 2015. This pattern is true irrespective of the type of the enterprise. It is the pure time effect which is not acknowledging the role of subcontracting intervention. We can also observe that the labour productivity of the non-subcontracted firms is significantly higher than that of the subcontracted firms for both the years 2010 and 2015 irrespective of the type of the enterprise. However, for the combined (OAMEs + establishments) manufacturing enterprises, the labour productivity of the non-subcontracted firms has increased slightly more than that of the subcontracted firms over

time. This indicates that subcontracted firms are not only having a lower productivity but also it is increasing at a lower rate than that of the non-subcontracted firms. Moreover, the difference in the growth of labour productivity between the subcontracted and non-subcontracted firms is insignificant. In case of the OAMEs the pattern is similar to that of the combined manufacturing enterprises except that the growth of labour productivity of the non-subcontracted firms is significantly higher than that of subcontracted firms. Similarly, in case of the establishments the non-subcontracted firms are having a significantly higher productivity than the subcontracted firms. However, the growth of labour productivity for the subcontracted firms is significantly higher than that of the non-subcontracted firms. This indicates that the productivity of the subcontracted firms among the establishments are showing potential to catch up and even possibly surpass their counterparts over time.

<<Table 5: Impact of Subcontracting on Labour Productivity>>

A similar exercise is repeated for NRE as another indicator of firm performance. This result can also be considered as a robustness check to our findings with that of labour productivity. This is because both labour productivity and NRE are highly correlated. In our analysis they are showing a correlation of 0.9. Besides, higher labour productivity is expected to ensure higher retained earnings as greater surplus can be generated with better labour productivity, resulting into higher accumulation of surplus for the firms (Bhattacharya & Kesar, 2018).

In Table 6 we can observe that over time the NRE have increased significantly for both the subcontracted and the non-subcontracted firms, irrespective of the type of enterprise. Here, the NRE of the non-subcontracted firms is significantly higher than that of the subcontracted firms for both the time periods separately. The growth of NRE among the non-subcontracted firms for the combined enterprise is higher than that of subcontracted firms and unlike that of labour productivity, the difference is also statistically significant. Further, the growth of NRE is significantly higher for the non-subcontracted firms than the subcontracted firms among the OAMEs, whereas the growth of NRE for the subcontracted firms is higher than that of the non-subcontracted firms for the establishments. Overall it can be inferred that the pattern is absolutely similar to that of labour productivity.

<<Table 6: Impact of Subcontracting on Net Retained Earnings>>

Therefore, it can be concluded that subcontracting is not beneficial to the entire informal manufacturing sector at a given time period as well as over time. This is reflected in the negative coefficients of the single and the double difference of the DID model for both the performance indicators. This indicates that not only subcontracted firms are performing lower than the non-subcontracted firms but also are not showing any possibility of catching up with them over time. However, this result is predominantly driven by the OAMEs, which covers the majority of the India's informal sector enterprises. On the other hand, establishments, which covers a much lower share of total informal manufacturing enterprises, are performing better through subcontracting. Although their performances are still lagging behind the non-subcontracted firms, they are growing faster in comparison to their counterparts. This indicates that subcontracting has a coping up mechanism for the informal manufacturing

enterprises is only limited for the establishments. Hence, for the establishments there exists a possibility of subcontracting to have a sustainable impact in the long run.

9. Discussion and Concluding Remarks

Subcontracting plays a pivotal role in characterising the Indian economy, especially in shaping its dual nature of simultaneous existence of informal and formal sector. The fascinating observation of parallel increase in the number of informal firms and subcontracting linkages since 1970s has encouraged several critical studies in this domain. Broadly two divergent views are found related to the determinants and impact of subcontracting in the informal sector. First is the modernist view which states that formal sector subcontracts with the relatively capital abundant and technologically efficient enterprises. This strategy of subcontracting eventually leads to a transformation of the informal sector by enabling them to be more productive and accumulate more capital (Monroy. et al, 2014; Marjit, 2003; Ranis and Stewart, 1999). In contrast to this benign view there is the 'exploitative' view which have highlighted the tendency of the formal sector to engage in unequal inter-firm subcontracting linkages with the small, home-based and capital scarce enterprises to extract surpluses from them. Due to these transactions between unequal economic agents the subcontracting firms are expected to have low bargaining power with the principle firms. This eventually results into the informal sector struggling to accumulate capital and increase their productivity thus reinforcing their stagnant situation (Basole.et al, 2015; Nagaraj, 1984; Portes and Walton, 2013; Moser, 1978).

This study adds to the existing literature by introducing a panel data framework to analyse the sustainable impact of subcontracting on the informal sector using a PSM-DID framework. This framework is gaining prominence in performing comparative-analysis using quasi experimental data in the field of social sciences. Using the well-established nationally representative data of National Sample Survey Office's (NSSO) two rounds of Household Consumption Expenditure, Das (2016) have analysed the impact of MNREGA on the livelihood of the households in India. Similar to our analysis, Gang. et al (2020) have also used the NSSO's two rounds of Unincorporated Enterprise Survey data to analyse the impact of financial inclusion on the informal economy. Moreover, this panel framework helps to provide new insights to this domain of studies on subcontracting by addressing the question of sustainability and long run benefits of subcontracting to the informal sector.

In the cross-sectional analysis this study broadly concords with the stagnant view of the previous studies. There is little evidence of any transformation in the informal sector from traditional, small and home-based enterprises to modern, capital abundant and large establishments. Considering productivity and NRE as critical indicator of the growth and development of the informal sector, this study further finds that the subcontracted enterprises have not only been performing at a much lower level than the non-subcontracted enterprises, the gap between the two is rising over time. This indicates a rather bleak picture to the prospect of development and coping up for the informal sector through subcontracting even in the long run.

Discussions on the Indian informal economy presented here and elsewhere depicts a picture of substantial degree of heterogeneity. Hence any examination of the linkages between formal and informal sector will be unrealistic if the informal sector is homogenized as one unit. In this light, this analysis has further explored the effect of subcontracting for the small, home-based own account enterprises (OAEs) and large, capital abundant establishments separately. It is found that subcontracting has not been able to ensure higher productivity and NRE

for the OAMEs in comparison to the non-subcontracted counterpart. Further, even the growth of labour productivity and NRE is also higher for the non-subcontracted firms. Hence there is no evidence of either immediate or long run benefits of subcontracting for the OAMEs. Perhaps this is the primary reason for the informal sector in India to remain stagnant at a low performance level. However, the adaptation of subcontracting practices for the establishments is showing the potential for sustainable gains. Although the results from cross sectional analyses show that subcontracted establishments are still lagging behind the non-subcontracted ones, they are growing at a faster rate than their counterpart in terms of both labour productivity as well as NRE.

Overall, our results show that subcontracting is not universally beneficial or detrimental. Basole. et al (2015) have highlighted that "effects of subcontracting are more complex than those predicted by the divergent perspectives. Policy-makers need to engage with this complexity." (Basole.et al, 2015; pp 2) More importantly, over the period of time this heterogeneity has only magnified rather than decreased. Apart from the increase in the coverage of economic activities being pursued in the informal manufacturing sector, stark differences have also emerged within the informal manufacturing sector itself in terms of functioning of the enterprises at various levels. These differences need to be explored further separately in the light of the emerging economic scenario at the Indian as well as the international context.

As far as this particular study is concerned, it has made some broad claims regarding the differences in immediate and long run performances between the subcontracted and non-subcontracted enterprises with respect to different types of informal manufacturing enterprises. It has been distinctly visible that sharper rates of inequality exist within the subcontracted enterprises as compared to the non-subcontracted counterpart. Subcontracting has not catered to the expectations of lifting the informal sector from the distress driven tendencies of operation. Rather the connotation of informal sector being a 'distress coping mechanism' has eventually led to the binary notion of 'High and Low Performance enterprises' within the informal manufacturing sector (Nagaraj, 1984). Thus, from the policy perspective, identifying the 'low Performing enterprises' and working towards the upliftment of these enterprises would probably help the informal manufacturing sector to be able to compete and sustain with that of the formal sector in the long run.

10. References

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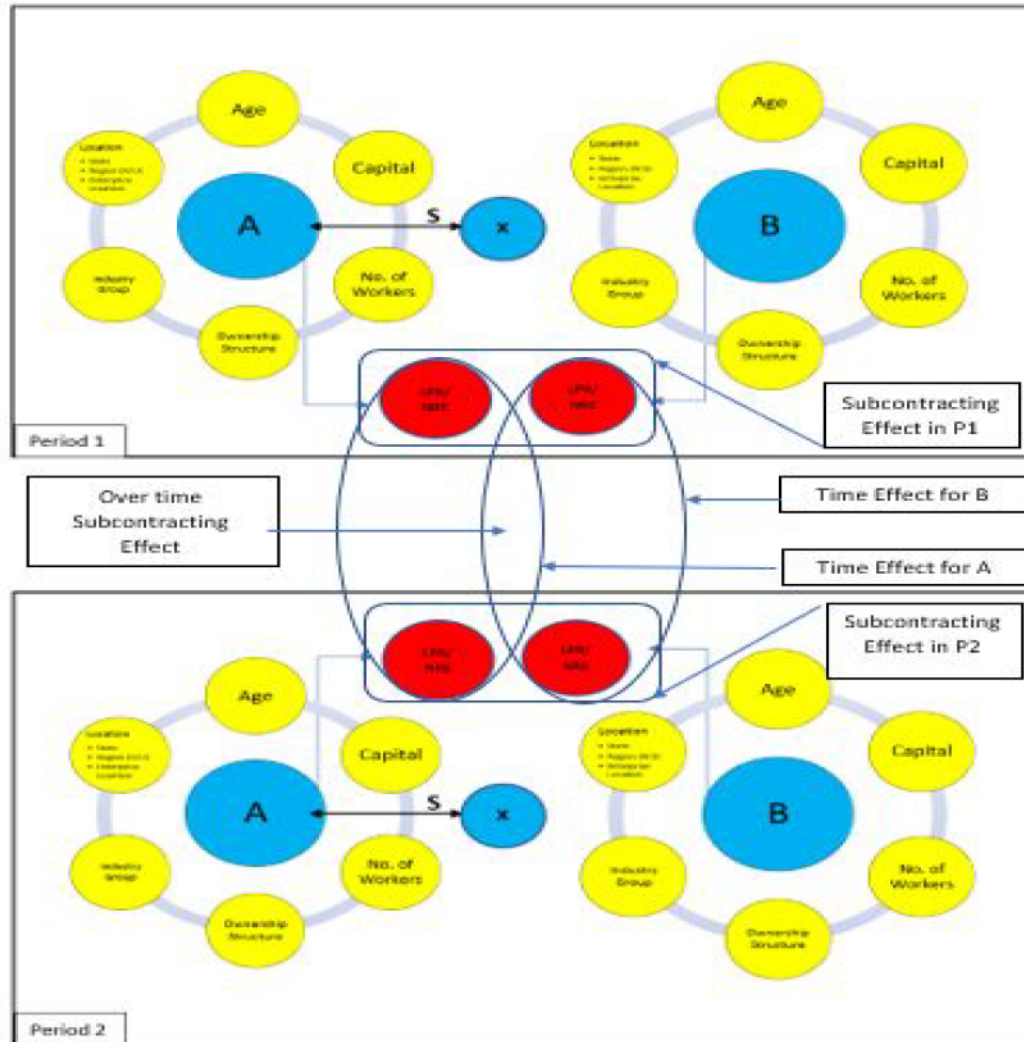
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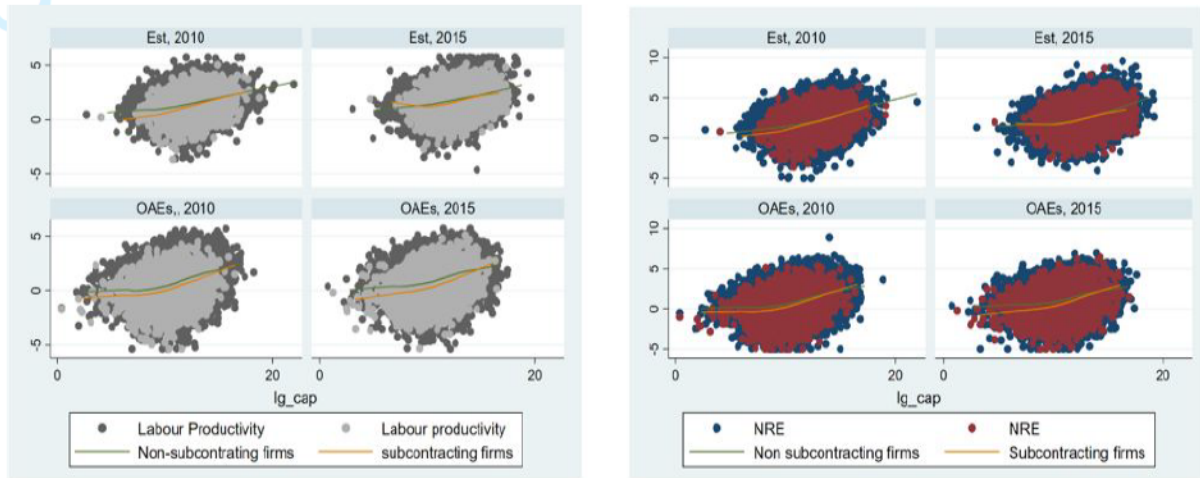
Tables and Figures:

Figure 1: Schematic Diagram of analytical framework

Note: 🔴 Depicts performance indicator; 🟡 Depicts endowments and characteristics of the firms; 🔵 Depicts the firms; X stands for Partner firm in the formal sector; A stands for subcontracted firm. B stands for non-subcontracted firm. S depicts inter-firm subcontracting linkages.

Figure 2: Changes in Labour productivity (Right side) and NREs (Left side) of subcontracting and non-subcontracting firms

Source: Authors' calculation using the NSS Unincorporated Enterprise survey 2010 and 2015, unit level data

Table 1: Characteristics of Informal Manufacturing Enterprises

	2010-11 (percent)			2015-16 (percent)		
	Subcontract	Non-subcontract	Total	Subcontract	Non-subcontract	Total
OAEs	18.2	66.9	85.1	26.5	60.6	87.1
DMEs	1.4	13.5	14.9	1.9	11.0	12.9
Rural	13.9	45.8	59.6	18.5	40.8	59.3
Urban	5.7	34.7	40.4	9.9	30.8	40.7
Male owner	6.4	52.7	59.1	8.3	44.4	52.7
Female owner	13.2	27.7	40.9	20.1	27.2	47.3
Home Ent.	17.9	54.6	72.4	25.6	48.7	74.3
Outside Ent.	1.7	25.9	27.6	2.8	22.9	25.7
Total	19.6	80.5	100	28.4	71.6	100

Source: Authors calculations from Unincorporated Enterprise survey unit level data 67th and 73rd round.

Table 2: Endowments and Performance of Informal Manufacturing Enterprises

	2010-11 Mean (S.D)			2015-16 Mean (S.D)		
	Sub contract	Non-subcontract	Total	Sub Contract	Non-subcontract	Total
Real NRE	2.14 (3.78)	4.70 (8.25)	4.20 (7.65)	3.06 (6.60)	6.01 (12.70)	5.17 (11.39)
LPR	1.43 (1.56)	3.04 (3.15)	2.73 (2.97)	2.03 (2.37)	4.09 (4.21)	3.50 (3.88)
Age	10.8 (8.88)	10.3 (9.72)	10.40 (9.56)	10.72 (9.02)	10.19 (8.85)	10.34 (8.90)
No. of Workers	1.73 (1.68)	1.90 (1.75)	1.87 (1.73)	1.57 (1.46)	1.73 (1.47)	1.68 (1.47)
Real Capital	83.7 (530.6)	206.4 (1143.6)	182.4 (1053.3)	106.6 (468)	156.8 (660.4)	142.5 (612.3)

Source: Authors calculations from Unincorporated Enterprise survey unit level data 67th and 73rd round. Note: LPR is Labour Productivity, NRE is Net Retained Earnings.

Table 3: Results of Logit Regression at the base year (2010)

Dependent Variable: Subcontracted=1	
Firm's Economic and Regional Characteristics	Coefficient
Capital Value'	-30.937 (63.468)
Average No of Workers'	2.509* (0.191)
Age of the Firm'	-1.063* (0.239)
Home Enterprises=1	0.763* (0.044)
Male Owner=1	-0.329*(0.44)
OAME=1	-0.037 (0.051)
Rural=1	-0.049 (0.035)
Constant	-4.849* (0.15)
State Dummy	Yes
Industry Dummy	Yes
Number of Observations	84224
pseudo. R^2	0.415
Wald Chi^2	11258.49*
Log Likelihood	-13287.53

Source: Authors calculations from Unincorporated Enterprise survey unit level data 67th round. Note: Robust Standard errors in parentheses; * Significant at 1 percent. 'Variables (x) are normalised by the following formula $\frac{x}{Max(x)}$.

Table 4: Balancing t-test in difference of covariate means at base year (2010)

Variables	Pre-Match Sample	In-Match Sample	Percent Reduction in Bias
OAME=1'	6.7***	2.6	60.8
Rural=1'	4.8***	4.5*	5.7
Male Owner=1'	-48.5***	-4.9***	89.8
Home Enterprise=1'	59.4***	0.01	99.9
Age of Firm'	-3.6***	0.9	73.6
Capital Value'	-1.5	-0.1	92.9
Average Number of Workers'	16.3***	-2.7	83.5

Source: Author's Calculations from Unincorporated Enterprise Survey Unit Level Data 67th round Note: Matching done by PSM of logit estimation. * P<0.1 ** P<0.05 *** P<0.001. ' Figures in percent. 'Normalised Values.

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Table 5: Impact of Subcontracting on Labour Productivity

Estimated Impact (coefficients)	Estimated Values (Average of Logs)		
	All Manufacturing	OAMEs	Establishments
Subcontract in 2010	10.978***	1.306***	1.254***
$(\alpha + \beta)$	(2.521)	(0.024)	(0.023)
Non-Subcontract in 2010	11.077***	1.360***	1.358***
(α)	(2.522)	(0.019)	(0.019)
Single Difference in 2010	-0.098***	-0.054***	-0.104***
(β)	(0.010)	(0.014)	(0.013)
Subcontract in 2015	11.266***	1.519***	1.611***
$(\alpha + \beta + \gamma + \delta)$	(2.515)	(0.024)	(0.023)
Non-Subcontract in 2015	11.376***	1.629***	1.668***
$(\alpha + \gamma)$	(2.516)	(0.020)	(0.019)
Single Difference in 2015' ($\beta + \delta$)	-0.110***	-0.109***	-0.057***
	(0.010)	(0.014)	(0.013)
Double Difference (DID)	-0.012	-0.056***	0.047***
(δ)	(0.013)	(0.017)	(0.017)
Total Observation in DID	155567	99015	56552
R-Square	0.43	0.39	0.28

Source: Author's Calculations from Unincorporated Enterprise Survey Unit Level Data 67th and 73rd round
Note: Robust Standard Error in Parenthesis *P<0.1 **P<0.05 ***P<0.001 'Subcontracting minus Non-subcontracting.
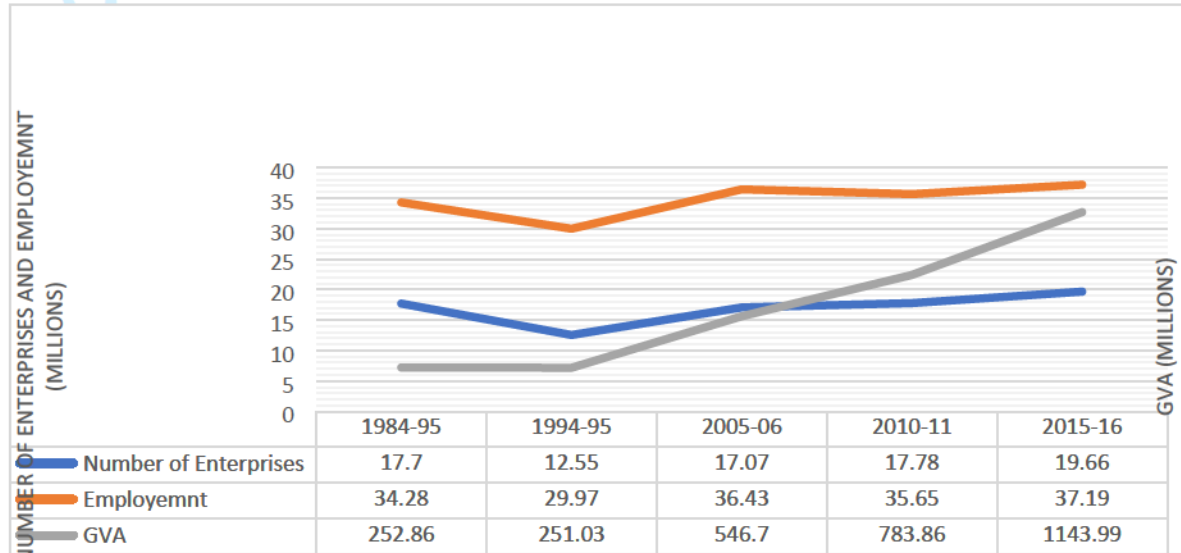
Table 6: Impact of Subcontracting on Net Retained Earnings

Estimated Impact (coefficients)	Estimated Values (Average of Logs)		
	All Manufacturing	OAMEs	Establishments
Subcontract in 2010	14.079***	0.749***	1.323***
$(\alpha + \beta)$	(2.803)	(0.023)	(0.029)
Non-Subcontract in 2010	14.185***	0.788***	1.494***
(α)	(2.805)	(0.019)	(0.023)
Single Difference in 2010	-0.106***	-0.040***	-0.172***
(β)	(0.011)	(0.014)	(0.016)
Subcontract in 2015	14.325***	0.977***	1.698***
$(\alpha + \beta + \gamma + \delta)$	(2.796)	(0.024)	(0.028)
Non-Subcontract in 2015	14.472***	1.092***	1.800***
$(\alpha + \gamma)$	(2.797)	(0.019)	(0.023)
Single Difference in 2015' ($\beta + \delta$)	-0.147***	-0.115***	-0.102***
	(0.011)	(0.015)	(0.016)
Double Difference (DID)	-0.041***	-0.075***	0.070***
(δ)	(0.013)	(0.017)	(0.021)
Total Observation in DID	155567	99015	56552
R-Square	0.55	0.41	0.35

Source: Author's Calculations from Unincorporated Enterprise Survey Unit Level Data 67th and 73rd round
Note: Robust Standard Error in Parenthesis * P<0.1 ** P<0.05 *** P<0.001. 'Subcontracting minus Non-subcontracting.

Appendices

Figure 3: Trends in Performance of Informal Manufacturing Sector in India (Enterprises, Employment and GVA)

	1984-95	1994-95	2005-06	2010-11	2015-16
Number of Enterprises	17.7	12.55	17.07	17.78	19.66
Employemnt	34.28	29.97	36.43	35.65	37.19
GVA	252.86	251.03	546.7	783.86	1143.99

Sources: (1) NSSO, Reports on ' Unorganized Manufacturing Sector' in India, 1984- 85. (2) CSO, Report on 'Directory Manufacturing Establishment Survey, 1984-85; Summary Results'. (3) NSSO, unit-level data on ' Unorganized Manufacturing Sector' in India, 1994- 95 and 2005-06, (4) NSSO, unit-level data on 'Unincorporated Non- Agricultural Enterprises (Excluding Construction) in India, 2010-11 and 2015- 16.

Table 7: Results of Logit Regression at the follow-up year (2015)

Dependent Variable: Subcontracted=1	
Firm's Economic and Regional Characteristics	Coefficient
Capital Value	1.651 (1.373)
Average No of Workers	2.713*(0.175)
Age of the Firm	-1.844*(0.266)
Home Enterprises=1	1.020*(0.045)
Male Owner=1	-0.290*(0.0496)
OAME=1	-0.220*(0.051)
Rural=1	-0.371*(0.0367)
Constant	-5.114*(0.158)
State Dummy	Yes
Industry Dummy	Yes
Number of Observations	68646
pseudo. R^2	0.414
Wald Chi^2	9694.15*
Log Likelihood	-12302.445

Source: Authors calculations from Unincorporated Enterprise survey unit level data 73rd round. Note: Robust Standard errors in parentheses; * Significant at 1 percent. 'Variables (x) are normalised by the following formula $\frac{x}{Max(x)}$.

Table 8: Balancing t-test in difference of covariate means at follow-up year (2015)

Variables	Pre-Match Sample	In-Match Sample	percent Reduction in Bias
OAME=1'	8.3***	7.2***	12.6
Rural=1'	-11.7***	3.1*	73.6
Male Owner=1'	-45.5***	-7.7***	83.1
Home Enterprise=1'	62.2***	5.8***	90.6
Age of Firm'	4.6***	0.9	80.3
Capital Value'	3.3**	-4.8**	-45.5
Average Number of Workers'	22.1***	-12.3***	44.4

Source: Author's Calculations from Unincorporated Enterprise Survey Unit Level Data 73rd round
Note: Matching done by PSM of logit estimation. * P<0.1 ** P<0.05 *** P<0.001. ' Figures in percent.
'Normalised Values.

Table 9: National industry classification at 2 digits (2008)

Description
The activity of food products
Beverages, tobacco and related products
Cotton textile, wool, silk, man-made fiber
textile, jute and other vegetable fiber
Textile
Textile products including wearing
Apparel
Wood and wood products; furniture and
Fixture
Paper and paper products and printing,
publishing and allied industries
Leather and products of leather, fur and
substitutes of leather
Basic chemicals and chemical products
Rubber, plastic, petroleum and coal
products; processing of nuclear fuels
Non-metallic mineral products
Basic metals and alloys industries
Metal products and parts except machinery equipment's
Machineries and equipment's other that transport equipment's
Transport equipment's and parts
Other manufacturing

Source: "Central Statistical Organization, Ministry of Statistics and Programmed Implementation,
Government of India"