

Informal Tradables and the Employment Growth of Indian Manufacturing

Ejaz Ghani
William R. Kerr
Alex Segura



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Abstract

India's manufacturing growth from 1989 to 2010 displays two intriguing properties: 1) a substantial fraction of absolute and net employment growth is concentrated in informal tradable industries, and 2) much of this growth is connected to the development of one-person establishments. This paper investigates the causes and determinants of these growth patterns. The rapid urbanization of the informal sector plays the strongest role, while there is

some evidence for subcontracting by the formal sector and a "push" entrepreneurship story. The paper also finds modest connections of this growth to rising female labor force participation. The connection between the presence of informal manufacturing and local productivity levels is strong, and varies across urban and rural areas in ways that bolster urbanization and subcontracting hypotheses.

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Ejaz Ghani, William R. Kerr, and Alex Segura

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Author institutions and contact details: Ghani: World Bank, Eghani@worldbank.org; Kerr: Harvard University, Bank of Finland, and NBER, wkerr@hbs.edu; Segura: Harvard University, asegura@hbs.edu.

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1. Introduction

The slow growth of Indian manufacturing is a concern for many observers of the Indian economy, and India's manufacturers have long performed below their potential. Although the country's manufacturing exports are growing, its manufacturing sector generates just 16 percent of India's GDP, much less than the 55 percent from services. India's manufacturing sector has been overshadowed by China's rapid development, and many economists and policy makers argue that a robust manufacturing sector is a key requirement for boosting India's growth rate from 5% up to 10%. For example, Amirapu and Subramanian (2014) worry about a "premature de-industrialization" that is occurring with respect to formal sector work, a worrisome sign if India's manufacturing sector is to be an engine for future development. Revitalizing manufacturing growth can help drive substantial poverty reduction and improved standards of living (e.g., Anand, Tulin and Kuman 2014).

Since its liberalization, India has undertaken many trade reforms to increase its global integration, and the country has invested in domestic infrastructure projects to improve its regional connectivity. These trade reforms have impacted many parts of the economy (e.g., Topalova 2010, Goldberg et al. 2010), and they seem to have held special importance for informal firms. Nataraj (2011) finds that tariff declines increase productivity for small informal firms. Thomas (2013) similarly notes that manufacturing employment growth for the informal sector appears to be in traded goods; he also describes the overall disconnect between output and employment growth for India.

This paper documents and analyzes two intriguing and under-appreciated facts about India's manufacturing growth. The first fact, which closely relates to the observations of Thomas (2013), is that much of the manufacturing sector's employment growth that has occurred since 1989 has come in the form of informal establishments in tradable sectors¹. As described in greater detail below, we define tradable industries at a three-digit industry level using high export and import ratios to gross output levels. While it may not be surprising that manufacturing

¹ As we discuss in greater detail in Section 2, the informal sector data comes from the National Sample Survey Unorganized manufacturing survey. Establishments in the unorganized sector in India are unregistered, do not pay taxes, and are generally outside the purview of the state, which closely parallels common definitions of the informal sector in other countries. Hence, we interchangeably refer to this sector as both unorganized and informal.

employment growth has followed from the improved connectivity and trade reforms, the degree of imbalance towards the informal and tradable sectors is. Figure 1 shows some basic trends to this effect. Panel A provides the total employment increase in the manufacturing sector from 1989 to 2010, showing important advances in the 1990s before a slowdown. Panel B highlights that a substantial portion of the 1990s growth occurs in the informal sector, which has subsequently been flat in terms of net job growth.

More striking, Panel C shows the exceptional increase of employment in informal tradables by over 10 million workers, equivalent to the entire net growth of the manufacturing sector. This group expanded from 19% of Indian manufacturing employment in 1989 to 39% by 2010. This break-out shows that the flat employment trend in Panel B for the informal sector as a whole masks two diverging trends—a strong rise in tradable employment and declines in non-tradables. Beyond the imbalance to non-tradables, the concentration of the tradables growth in the informal sector is also intriguing. It suggests that the growth in traded industries is not due to plants achieving larger economies of scale and shipping goods at a distance, as might have initially been imagined, especially in light of the 1990s reforms that made it easier to export, import, and increase plant size.²

The second trend that we identify is the particular development of 1-person enterprises within this informal tradables growth. These 1-person firms can also be defined as self-employed manufacturers. Tradables establishments with one employee grow from 6% of the informal sector workforce in 1989 to 21% by 2010. This trend is not present in non-tradable industries, and the growth dwarfs other size categories. For example, 2-5 person establishments in informal tradables increase just from 17% of informal employment in 1989 to 20% in 2010. This trend is particularly surprising given that we would expect the trade and investment reforms that India underwent in the 1990s to more strongly impact larger firms, as microenterprises in particular are known to face significant hurdles in competing in export and other non-local markets (Gonzalez 2014).

Our analytical work digs through the data to learn more about these two patterns and their origin. Among the hypotheses considered, the rapid urbanization of the informal sector appears

² *The Economist* (2014) describes a similar pattern for Mexico.

to be the most important factor. Despite the nation's substantial overall population density, urbanization for India has been slow and challenging (e.g., McKinsey 2010, World Bank 2013). Moreover, in manufacturing, Ghani, Goswami and Kerr (2012) identify divergent trends, with the formal sector moving towards rural areas of districts and the informal sector moving towards urban areas. This informal urbanization process appears to be particularly tied to tradable industries and the micro-establishments.

Our work also quantifies the role of the channels through which urbanization may operate in influencing the growth of informal microenterprises. We find some evidence for these trends to be linked to increasing female business ownership in India (e.g., Ghani, Kerr and O'Connell 2013c), greater subcontracting from formal sector firms (e.g., Mukim 2013), and a "push" entrepreneurship story (e.g., Schoar 2010). We are unable to establish a strong connection to many state- and district-level traits, which suggests that the documented features are much more general in scope than a single policy or explanatory factor (e.g., education, infrastructure). Similarly, we connect the 1-person establishments to lower wage opportunities in tradable industries, but the tradable nature of the work appears important and to not be a proxy for other industrial traits like financial dependency or materials intensity. Additionally, similar to Thomas (2013) and Hsieh and Olken (2014), we do not find any connection between labor market regulations and the growth of small informal firms, which has for many years been a common explanation for the large mass of informal microenterprises that dominate the Indian firm-size distribution (e.g., *The Economist* 2007; Krueger 2013).

Our study relates to several literatures. First, an extensive literature considers informal employment in developing economies. La Porta and Shleifer (2014) provide a recent perspective on this work and its connection to economic growth. Kotwal, Ramaswami, and Wadhwa (2011) consider Indian economic growth in particular and discuss divergence between formal and informal sectors. Bollard, Klenow, and Sharma (2013) consider productivity expansion in the formal sector, and our work provides new insights into the particular employment relationships evidence in the informal sector. Second, we build upon a trade literature noted above. Munro (2011) provides a broad review of trade reforms and informal labor markets and emphasizes how the context of each nation strongly shapes responses. This study articulates a particular connection between informal tradable growth and urbanization. Third, we contribute to studies of

location choices by Indian manufacturing establishments and their associated productivity consequences (e.g., Lall et al. 2004, Lall and Mengistae 2005, Deichmann et al. 2008, Fernandes and Sharma 2011).

Section 2 of this paper describes our establishment-level data. Section 3 provides greater detail on the growth of unorganized tradable industries and 1-person establishments. Section 4 analyzes explanatory factors for these trends. The fifth section quantifies local productivity consequences, and Section 6 considers contemporaneous growth across the establishment size distribution to the development of 1-person establishments. The last section concludes.

2. Indian Manufacturing Establishment Data

Our analysis builds upon repeated cross-sectional surveys of manufacturing establishments carried out by the government of India for the fiscal years of 1989, 1994, 2000, 2005, and 2010. In all cases, the survey was undertaken over two fiscal years (e.g., the 2000 survey was conducted during 2000-2001), but we will only refer to the initial year for simplicity. The organized and unorganized sectors of Indian manufacturing are surveyed separately, as described next. In every period except the last one, our surveys for the organized and unorganized sectors were undertaken contemporaneously. In the last period, we combine the 2009-2010 survey for the organized sector with the 2010-2011 survey for the unorganized sector. We will again refer to this period as 2010 for simplicity.

The organized sector comprises establishments with more than 10 workers if the establishment uses electricity. If the establishment does not use electricity, the threshold is 20 workers or more. These establishments are required to register under the India Factories Act of 1948. The unorganized manufacturing sector is, by default, comprised of establishments which fall outside the scope of the Factories Act. The organized sector accounts for over 80% of India's manufacturing output, while the unorganized sector accounts for over 80% and 99% of Indian manufacturing employment and establishments, respectively (Table 2b Panel A of this paper; Ghani, Kerr and O'Connell, 2013a).

The organized manufacturing sector is surveyed by the Central Statistical Organization through the Annual Survey of Industries (ASI). Our data for the unorganized sector come from the National Sample Statistics (NSS). These surveys are used for many published reports on the

state of Indian businesses and government agency monitoring of the Indian economy. The typical survey collects data from over 150,000 Indian establishments. In this respect, the surveys are comparable to the Annual Survey of Manufacturing conducted in the United States, with the Indian sampling frame being about three times larger.

Establishments are surveyed with state and four-digit National Industry Classification (NIC) stratification. The surveys provide sample weights that we use to construct population-level estimates of employment by district. Districts are administrative subdivisions of Indian states or territories that provide meaningful local economic conditions and policy choices. The average district size is roughly twice the size of a U.S. county (average size of ~5,500 square kilometers) and there is substantial variability in district size (standard deviation of ~5,500 square kilometers). Indian districts can be effectively considered as self-contained labor markets and, to some degree, economic units.

Our surveys record economic characteristics of plants like employment, output, and raw materials. Our analysis considers aggregated measures of manufacturing employment in locations and industries (e.g., state-industry). For this purpose, we sum the activity of plants up to the indicated level, combining the organized and unorganized sectors and using sample weights to prepare population estimates.

Much of our analysis considers tradable vs. non-tradable industries. We define tradable industries following Kothari (2014). Using data from the 2005/06 ASI and the Department of Commerce, Kothari calculates for each three-digit NIC industry the ratio of exports plus imports to gross production in that industry. Industries above the median index value are labeled tradable, and industries below the median index value are labeled non-tradable. We favor this definition of tradability over one that varies with each year of our cross-section due to the fact that tradability should relate more to the nature of the good than whether or not the good is traded in a specific time-period. For instance, in 1989, there were many policies and distortions in place that made it difficult to import/export goods that ideally would have been traded. Over time, these distortions have been lifted, so defining tradability using data from a recent year speaks more to the nature of the good itself than of the policy situation. Appendix Table 1 provides a list of three-digit NIC industries and their assignment. Appendix Table 2 describes the sizes of industries in formal and informal sectors in 2000.

3. Growth of unorganized tradable industries and 1-person establishments

This section depicts the growth patterns for Indian manufacturing. We start at the aggregate level, showing the important growth of informal tradables and 1-person establishments. We then consider industry- and state-level trends.

Aggregate data trends

Table 1a documents the core trends. Panel A presents employment levels, and Panel B displays establishment counts. Per Figure 1, we disaggregate the totals into four groups by sector (informal vs. formal) and the tradable nature of the industry. Below each data row we provide the growth rate relative to the prior period. The last four columns provide the share compositions in 1989 and 2010 and the medium-run growth rates to 2010 from 1989 and 2000.

The rise of employment in informal tradables is quite remarkable. In 1989, this group accounted for 6.2 million workers, 19% of Indian manufacturing employment, and 24% of manufacturing establishments. By 2010, this group has expanded to 16.4 million workers, 39% of manufacturing employment, and 55% of manufacturing establishments.³ The most pronounced period of growth was during the 1994 to 2000 period, but even after 2000, informal tradables added more jobs and establishments than any of the other groups. In total, informal tradables posted 166% and 193% growth in employment and establishments, respectively, across the two decades. Figure 1 provides a visual display of these growth patterns.

Among the other trends, formal tradables shows the most growth from 1989 to 2010, with employment in particular posting a 131% gain. Even with this growth, however, the share of jobs in the overall manufacturing sector accounted for by formal tradables stands at 10% in 2010. By

³ Thomas (2013), while noting similar trends to those identified in this paper, documents different levels of informal manufacturing employment than those presented in this paper. For instance, while we find roughly 47 million informal sector manufacturing employees in 2005/06, Thomas finds roughly 55 million in 2004/05. The source of this discrepancy is that Thomas pulls his employment figures from NSSO Employment and Unemployment Survey, which is conducted at the household level, while we pull our figures from the NSSO Unorganized Manufacturing Survey, which is conducted at the enterprise level (similar to the ASI). The enterprise-level survey gives a lower estimate when calculating employment levels across all years, but the trends are very similar.

contrast, informal non-tradables shows modest growth from 1989 to 2005 in employment, but then declines in 2010. As a result, the informal non-tradables sector declines from 62% of Indian manufacturing employment in 1989 to 38% in 2010. In 2010, informal tradables and non-tradables are of very comparable size in terms of employment, despite non-tradables starting three times larger. Formal non-tradables has been consistent at a 13% share of employment.

While not the focus of this paper, it is worth noting that, while levels are nearly reversed, we observe trends in output and wages that are similar to the employment patterns documented in Table 1a between the informal and formal sectors. Panel A of Table 1b shows that, while even in 2010 the informal sector share of total output was only 20%, informal sector output grew much faster in percentage terms from 1989 to 2010 than output in the formal sector. Informal tradables output grew by 9,556% over this time period, compared to the 5,009% that informal non-tradables output grew, and the roughly 640% that formal sector output grew. Furthermore, the majority of the informal sector output growth, especially in informal tradables, took place from 1989 to 2000, which mirrors the employment growth patterns seen in Table 1a. In Panel B of Table 1b we see similar trends in average wages – namely, much higher wage levels in the formal sector, much higher percentage growth in the informal sector, and the majority of that informal wage growth taking place from 1989 to 2000.

Figure 2 plots establishment size distributions for formal sector firms. Panels A and C provide the full distribution for tradables and non-tradables, respectively. The establishment size distributions for the formal sector in both groups of industries are unimodal and relatively smooth, reflective of the patterns noted by Hsieh and Olken (2014). Panels B and D provide more detail on the smaller size groups. Formal firms can have fewer than ten employees, despite the definitions above, due to establishments seeking to become organized (e.g., in advance of growth prospects) or employment losses to below ten employees without de-organizing. There is minimal evidence of bunching at the 10-person threshold. More important for this study, the distributions for tradables and non-tradables look fairly similar.

Figure 3 plots establishment size distributions for the informal sector. The differences between tradable and non-tradable industries are far more pronounced in the unorganized economy. Panel A shows a tremendous rise in the number of establishments with one employee in tradable industries. Some growth is present in larger size categories, but these expansions are

distinctly less. Panel B shows that at least half of the 1-person establishment growth is among apparel industries, a point that we return to later. By contrast, the count of 1-person establishments among non-tradable industries in Panel C roughly holds constant, and some declines are evident in the larger size bins.

Table 2a further documents these tabulations for informal establishments, providing a disaggregation by three size bins: 1-person establishments, 2-5 person establishments, and 6+ person establishments. Personnel counts include business owners, paid employees, and unpaid workers. The remarkable growth of 1-person establishments in tradable industries again jumps out. This group grows from 6% of informal manufacturing employment in 1989 to 21% in 2010. Behind this share rise is a baseline growth rate of 327% in raw employment. Large growth rates are also observed for the 6+ employee establishments, but these are off of a relatively small baseline. There is a very large drop in employment in non-tradables employment in 2-5 person establishments between 2005 and 2010.

Interestingly, there is some potential evidence in these trends for a macro “push” story into the opening of 1-person establishments in tradables. Growth of these 1-person tradable establishments is most pronounced between 1994 and 2000 and again between 2005 and 2010. In other years, the trend is either flat or slightly declining. The other series do not mirror these features. In particular, the 6+ person group shows its most remarkable growth during the 1989 to 1994 period and then between 2000 and 2005. This opposite pattern in timing may indicate that the 1-person firms are a response to a lack of opportunities, which we further investigate below.

Industry-level trends

Table 3 lists two-digit NIC industries and their growth properties. The first two data columns provide overall employment growth to 2010 from 1989 and 2000. Job growth is especially strong in the “Wearing apparel; dressing and dyeing of fur” industries (NIC 18) and “Rubber and plastic products” (NIC 25). Growth is also rapid among some high-tech industries, such as “Office, accounting and computing machinery” (NIC 30) and “Radio, television, and communication equipment and apparatus” industries (NIC 32). These latter industries, however, are generally growing from a very small base.

The growth of 1-person establishments is specifically concentrated in tradable industries, as the next columns show. Apparel definitely stands out in this area, but it is not alone. Panel A of Figure 4 shows that apparel accounts for about half of the net growth in tradables from 1989 to 2010. The final column of Table 3 provides 1-person average establishment shares across the two decades. Interestingly, there is only a minimal correlation of 0.02 between these shares and the growth rates from 1989 to 2010. This correlation increases to 0.36 if “Radio, television, and communication equipment and apparatus” industries (NIC 32) is removed. For growth from 2000 to 2010, the correlation to average levels is negative at -0.05.

Before proceeding, it is worth pausing to comment further on the potential hypothesis that these trends are due to coding changes in the NIC system. While it is true that the definitions of some industries adjust during the sample period, we have not found evidence that this could produce these trends. Perhaps most important in this regard is that the very concentrated rise among the smallest establishment sizes, which does not depend upon such definitions or industry reclassifications. To this end, Panels C and D of Figure 4 also show smooth trends with respect to new entry and the transitions between non-tradables and tradables.⁴ These trends do not display a dramatic flip that would be evidence for a reclassification issue.

State-level trends

Table 4 lists states and their growth properties for informal sector employment. We start with comparable statistics to Table 3 about aggregate growth rates and 1-person establishments, and then we document each state’s growth in informal tradable industries specifically. Reflective of its manufacturing prowess, Gujarat shows perhaps the most robust growth across the various dimensions. Some states are not surveyed in 1989, and they are excluded from the long-term growth calculations.

⁴ New firms in the data are defined as firms born in the last 3 years. We have NSS/ASI data for 1994/1995, and then again for 2000/01, a six-year jump in between cross-sections. Hence, any firm births from 1994-1997 would not be captured by the new firm variable. There was net growth of 1-person firms in the informal sector from 1994-2000 of roughly 3 million, and we see about 1.5 new informal sector firms in 2000. Our favored explanation for the disconnect observed between net 1-person firm employment growth and new firm growth from 1994-2000 is that a similarly large number of new firms were born from 1994-1997, which we are not able to pick up in our data.

At the bottom of Table 4, we document averages for leading and lagging states. We define leading states to be those with above average GDP per capita across 1989-2010. The unweighted series take state-level averages directly, and the two groups appear mostly similar. When using employment weights to take into account the size of the manufacturing sector in Indian states, we find that the 1-person firm growth is stronger in leading states, perhaps twice the rate of that observed in lagging states.

These state-level differences between leading and lagging regions are important to note, but we also need to place them into context. First, the initial data column shows that the weighted overall employment growth is three-times higher in the leading states, so the 1-person establishment growth is not out-pacing the aggregate trend for these groups. If anything, the development of 1-person firms is helping lagging states to not lose ground. Second, the variation across states in these growth rates is much less than the differences observed for tradables vs. non-tradable industries at the bottom of Table 3. Thus, the state-level variation is material, but second-order to that observed on other dimensions. This provides *prima facie* evidence that state-level factors like labor regulations or regional development levels will play a small role in the development of 1-person establishments.

4. Explanatory factors for the development of 1-person establishments

This section analyzes factors that might explain the development of 1-person establishments, including district traits, industry traits, and phenomena important to India's recent development (e.g., urbanization and rising female labor force participation). These explorations are not causal in nature, but they seek to isolate important influences for future work.

Correlations to district traits

Table 5 documents univariate correlations between district traits and the battery of outcomes considered. District traits are taken primarily from the 2001 Population Census, with measures of state labor regulations taken from Ahsan and Pages (2007). We winsorize variables at their 1%/99% values to guard against outliers and transform non-logarithm explanatory

variables to have unit standard deviation for interpretation. Correlations are unweighted and include an unbalanced number of districts over the outcome measures.

Column 5 shows the strongest correlations, where we relate the average 1-person establishment share for districts to their other traits. The share of 1-person establishments from 1989 to 2010 is higher in districts that are smaller, less dense, and less urban. Among demographic traits, higher female labor force participation is strongly correlated with 1-person establishment shares. By contrast, shares are lower in places with greater working-age population shares, larger population shares in scheduled castes or tribes, and greater literacy rates. Shares are higher in places far away from India's biggest cities or where roads are poorly developed. Column 8 shows that key parts of this depiction—smaller places, higher female labor force rates, greater distance—are also present when isolating tradable industries only.

In contrast to these cross-sectional depictions, univariate correlations of district traits to growth in these shares are mostly very low. Larger districts, those with greater population density, and those with higher shares of scheduled castes and tribes tend to display lower growth in the 1-person establishments. Growth appears higher in more educated places, and growth of 1-person tradables appears higher in urban areas, more educated places, and places with a higher literacy rate.

Table 6 presents this analysis in a multivariate format. Outcome and explanatory variables are expressed in unit standard deviations, and estimations report robust standard errors. This exercise restricts the sample to the 216 districts for which all of the outcome variables are observed. Table 6 itself only reports results for the urbanization variable, as in the growth specifications we rarely find that any other explanatory variables are significant, and urbanization is the only variable that is significant across the majority of our outcome measures. Appendix Tables A3a to A3c report complete results from the regressions for all variables.

In Panel A of Table 6, we document a highly significant positive relationship between a district's urban population share in 2000 and its employment growth from 1989 to 2010. This relationship holds for overall and 1-person firm employment growth. The relationship becomes stronger when restricting our sample to urban firms only, as can be seen in Panel B. The positive relationship between urbanization in 2000 and employment growth in 1-person firms in tradable sectors is stronger in urban areas from 2000 to 2010, but stronger in rural areas from 1989 to

2000. In Appendix Table A3b we document that education levels and female labor force participation rates at the district level are also positively associated with 1-person firm employment growth in urban areas.

As can be seen in Appendix Table A3a, the connections of local growth to other discernible district traits remain very low. On the other hand, the basic correlates of average shares of 1-person establishments persist. Similar results are obtained when weighting districts by their population sizes.

What do we take from this analysis? First, a district's urbanization in 2000 appears strongly related to that district's employment growth in general, and that district's growth of 1-person firms. The relationships between 1-person firm growth and urbanization in 2000 are stronger when considering employment growth in urban areas only, which suggests that there are features particular to urban areas that facilitate the growth of informal microenterprises in the face of high urbanization rates.

Second, while discussing Table 4, we noted the broad comparability in these patterns across leading and lagging states. Urbanization notwithstanding, this comparability, especially with respect to growth of 1-person firm employment, also appears to hold at the local level within districts. Urbanization in 2000 can partially explain where 1-person establishments have been more prevalent across the long-run, but the strong increase in these establishments since 1989 is evident across all of India. As a consequence, district-level policies or economic conditions do not appear to be the root cause for this increase, at least to the extent that we have been able to measure them.

Correlations to industry traits

Table 7 similarly considers raw correlations between industry traits and the development of 1-person establishments. Results from the multivariate analysis looked similar but did not return precise estimates due to the small sample sizes on the industry dimension, so we only report results from the univariate analysis. We measure labor intensity as total wages divided by the sum of wages, capital, and raw materials. Capital and materials intensity are similarly defined, with capital measures including fixed assets and working capital. Financial dependency (total loans outstanding) and import dependency are also defined relative to the baseline sum of

wages, capital, and raw materials. Industry traits are measured at the national level using the 2000 data.

Three consistent themes emerge. First, as we observed at the district level, urban themes are again strongly linked to employment growth. An industry's organized employment share in urban areas in 2001 is positively associated with overall employment growth in that industry, and the association is even stronger for the growth of 1-person firms. Second, apart from the urban trends we just discussed, lower unorganized sector shares of plants and employment, higher female ownership rates, higher rates of formal sector subcontracting, and more labor intensive production at the industry level have the most consistent connection to the growth of 1-person establishments, although the growth rates of 1-person establishments in these industries are not abnormally high. Third, apart from the correlations we just discussed, it is again quite difficult to predict the growth of 1-person firms, beyond our general depictions of tradable industries and the apparel industry in particular. It thus does not seem like our tradable definition is a proxy for something else like financial dependency or materials requirements.

Urbanization

Figure 1b documents the main employment trends in urban areas only. Panel A shows that essentially all of the net employment growth in Indian manufacturing over the past two decades occurred in urban areas. Across the two decades, the employment in informal tradables increased by a little over 10 million jobs. Panel C shows that almost 8 million of these jobs were developed in urban establishments. Furthermore, Figure 1d shows that the main employment trends do not vary substantially across districts with different population densities in 2000, which suggests that the size of the urban population in particular, and not merely district population density, is closely related to the aggregate changes we observe.

Thus, numerical accounting suggests a key role for urban areas, and the urban share of informal tradables employment rose from under one-third in 1989 to over 60% by 2010. This connects strongly with the broader trend for the informal sector to be moving into urban areas in India (Ghani, Goswami and Kerr 2012, 2014). A second factor pointing to the importance of urbanization is the very close timing of the urban increases (1995 to 2000, 2005 to 2010) with

the aggregate changes. As seen in Figure 1e, this close timing is also mirrored when only considering 1-person firm growth, both overall and in informal tradable sectors only.

Female business ownership

Panels C and D of Figure 5 demonstrate a more modest connection of these trends to the development of female-owned businesses. Ghani, Kerr, and O'Connell (2013c) calculate that much of the persistence in the relative size of India's informal sector during the post-1994 period can be linked to the rapid expansion of small female-owned businesses. (Gender of establishment owners is not recorded in 1989.) Female-owned businesses certainly play a role in the growth of informal tradables, accounting for almost four million of the jobs created in informal tradables since 1994. This level is significant since it represents half of the total employment increase in informal tradables, even though women-owned businesses account for under 20% of employment in Indian manufacturing throughout most of the period of study. Thus, female-owned businesses are playing a disproportionate role, albeit one that is second-order to urbanization in terms of jobs accounted for. Female-owned businesses also do not appear to be the causal agent compared to urbanization in terms of explaining the rise of informal tradables given that the timing of female increases is not very tightly connected to the overall employment gains of the sector, instead representing a steady gain.

Subcontracting and labor regulations

A third hypothesis about these trends relates to the sub-contracting of work from the formal sector, which Mukim (2013) shows to be important in the Indian context. Ghani, O'Connell, and Sharma (2013) broadly measure linkages between formal and informal sectors. This subcontracting is often anecdotally linked to the extensive literature regarding labor regulations in India (e.g., Besley and Burgess 2004) and the costs of large establishment sizes in India. The rise of informal tradables may represent the use of subcontracting to circumvent these regulations or maintain greater operating flexibility by large firms.

We collect information on subsidiary establishments across the full sample period, but it is important to note in advance the changes in the definitions used in the survey. In 1989 and 1994, subsidiary establishments are defined to be those connected to a larger enterprise. In 2000

and 2005, this definition shifts to establishments that work solely or mainly for an enterprise or contractor. In 2010, the term represents firms that have marketing agreements with another firm. The definitional shift in 2010 is the most dramatic of these.

Figure 6 shows that subsidiary employment grows from 1989 to 2010, with a huge spike during 1994 to 2000 that coincides well with the period of strongest growth for informal tradables. Additionally, as we describe in greater detail later in Table 9, we observe a negative correlation between employment in 1-person firms and employment in formal sector firms at the district-industry level, which hints at a linked industrial organization between informal microenterprises and larger formal firms. Despite these connections, there are factors that suggest that subcontracting may not be the key driver of the trends we observe. First, there is a decline in subcontracting employment during 2005 to 2010, when informal tradables employment further expands, but this mismatch may be due to definitional changes mentioned above. A second and more worrisome fact is that the growth in subsidiary employment in informal non-tradables exceeds that in informal tradables. Given that overall employment declined during the 1989 to 2010 period for informal non-tradables, it is difficult to rationalize why a smaller amount of subcontracting would have been the key for the informal tradables rapid employment growth.

Despite these skeptical observations, we should not entirely rule out a role for subcontracting as a key driver of the main employment patterns we observe. We do not have panel data on establishments, and thus the lack of continued growth in Figure 6 could represent a process where new establishments are born as subsidiary firms that serve larger enterprises, but that with time they transition into serving customers of their own. Such a process might look like Figure 6 and be having far larger effects on the Indian economy than one might initially suspect. It is also possible that this is linked to the urbanization outcomes, as it is easier to be a subsidiary firm in urban areas.

5. Productivity Consequences

We next analyze in Table 8 the relationship between 1-person establishments and local productivity. We estimate a simple production function with log output Y of each establishment i

in a district d , state s , industry j and year t as the dependent variable. The specification takes the form:

$$Y_i = \beta \cdot X_i + \phi \cdot Z_{d,t} + \gamma_{s,j,t} + \varepsilon_i.$$

We include a vector X_i of plant inputs into the production function: log employees, log book values of capital, and log costs of materials. We exclude plants with missing values for these metrics. Because we rely on revenue data to calculate productivity, we face a common limitation in the literature that we cannot separate the efficiency or productivity of plants in terms of real inputs and outputs from other factors like their mark-ups or quality (e.g., Foster, Haltiwanger, and Syverson 2008, De Loecker 2011). Regressions include state-industry-year fixed effects $\gamma_{s,j,t}$ to capture regular differences in production techniques and spatial locations across industries. Industries for this purpose are defined at the four-digit NIC level. We study two district traits in the $Z_{d,t}$ vector—the share of local manufacturing employment that is in the informal sector and the share of local informal employment that is contained in 1-person firms. We use establishment weights from the surveys to weight plants, and we report standard errors clustered by district-industry. Table 8a presents results for urban areas only, while Table 8b presents results for rural areas. It is important to note that our key explanatory district traits in the $Z_{d,t}$ vector are calculated over the whole district rather than separately for urban and rural areas.

In both tables, Column 1 provides a baseline estimation of the plant-level production function before district-level conditions are incorporated. These underlying parameters for the production function, emphasizing employees and materials, are very stable across estimations in both urban and rural areas. Column 2 of Table 8a shows that 1-person firm productivity tends to be higher in locations with significant shares of informal activity in urban areas, which suggests some form of agglomeration effects are at play. This relationship is reversed in rural areas, where 1-person firms have lower productivity when informality is a greater share of local activity, suggesting that complementarities with larger informal firms are not at play in rural areas the

way they are in urban areas. Ghani, Kerr, and O'Connell (2013a) describe this relationship in greater detail and show that it is not present in the United States with U.S. small firms.⁵

Column 3 introduces the 1-person establishment share and finds little aggregate relationship in both urban and rural areas. Beneath this null response is an interesting heterogeneity between tradables and non-tradables that is depicted in Columns 4-8. In Table 8a we see that in urban areas, for tradable industries, these 1-person establishments are weakly positively correlated with productivity gains, while the opposite is true for non-tradables where the correlation is larger in magnitude and highly significant. This difference emerges despite the other regressors in the production function being very comparable, including the positive effects of the district's informal manufacturing share. The relationship also holds when excluding the 1-person establishments from the sample. As seen in Table 8b, the relationships in Columns 4-8 between productivity and 1-person establishment share are completely reversed in rural areas, compared to urban areas. In rural areas, we see a strong positive correlation between 1-person establishments and productivity in tradable industries, while we observe a weaker negative correlation for non-tradable industries.

We do not have a complete story about why these differences between urban vs. rural and tradable vs. non-tradable industries exist. These patterns are, however, informative in their own right. Some of the theories—especially subcontracting— suggest that the endogenous growth of the informal sector would have been connected to more productive microenterprises. In urban areas, we do observe a positive correlation between productivity and informal employment, which suggests subcontracting may be occurring. Furthermore, in these areas we observe that productivity is positively associated with more 1-person firms in tradable industries, while the opposite is true for non-tradable industries, which suggests that the subcontracting story is more plausible in tradable than in non-tradable industries. And since we observe the majority of aggregate informal employment growth in informal tradable industries, subcontracting as a main driver of microenterprise employment growth in urban areas becomes a more plausible story in light of these relationships. As we noted, all of these correlations flip in rural areas, suggesting

⁵ Duranton and Puga (2004) and Rosenthal and Strange (2004) provide broad background to the agglomeration literature and productivity estimations. Duranton (2013) provides a recent review in the developing country context.

that vertical integration between microenterprises and larger firms is less likely to be occurring outside of urban areas.

6. Growth relationships and push/pull entry

Our final exercise considers whether the increase in 1-person establishments represents “push” entrepreneurship. Schoar (2010) describes how many entrepreneurs start businesses in developing economies out of necessity (e.g., lack of wage employment opportunities) rather than growth desires. That is, they are “pushed” into business ownership rather than “pulled” in by great opportunities. Two pieces of evidence thus far suggest that this may be true in the Indian context with respect to informal tradables. First, we noted in Table 2 the negative correlation at the macro-level between the expansion of 1-person establishments and that of larger size categories. Second, our analysis of industry traits in Table 7 shows the connection of average shares of these 1-person establishments to lower wage industries. These facts might suggest periods of growth in 1-person establishments are a cause for concern, but this conclusion is not certain as it could be that the induced entrants into 1-person establishments are coming from outside manufacturing and lower wage opportunities (e.g., agricultural transitions).

To test these features, in Table 9, we estimate growth regressions where the dependent variable is the log employment in 1-person establishments at the district-industry-year. In an alternative, we use log employment in newly formed 1-person enterprises. We include as our primary explanatory variables the contemporaneous employment in other size categories for the informal and formal sector. We include vectors of district-industry, industry-year and state-year fixed effects. The district-industry fixed effects control for the long-term levels of activity, shifting attention instead towards changes in activity in the size bins. The industry-year and state-year fixed effects control for common developments in the presence of 1-person establishments and explanatory variables. In addition to these, we include a control for the output level of the state-industry-year, to further capture growth trends. Estimations report standard errors clustered at the district-industry level and weight Indian observations by sample weights. Panel A displays results for urban areas while Panel B displays them for rural areas.

Looking across all industries, the first two columns of Table 9 show a strong positive correlation of employment in the 1-person size category to other parts of the informal sector’s

establishment size distribution, which holds across both urban and rural areas. This is not surprising and simply represents the greater overall activity in some locations. However, when considering the full sample of firms in Column 1, we observe an equally strong negative correlation in both urban and rural areas between employment in the 1-person size category and employment in the smallest size category of formal sector firms. This negative correlation persists for larger formal sector firms only in rural areas. In Columns 3 through 6, we observe that the negative correlation between 1-person firm employment and formal employment in both urban and rural areas is being driven by tradable industries.

To sum up, looking across these specifications, we find evidence that could be interpreted as the push hypothesis holding at the micro-level. At the same time, these negative correlations could also be evidence of subcontracting by larger formal firms to microenterprises, and it is currently difficult for us to disentangle the two hypotheses. To the extent that we believe subcontracting is more likely to occur in urban areas based on previous evidence presented in this paper, we can at least say with more confidence that in rural areas we observe something akin to a push into microentrepreneurship.

7. Conclusions

India's employment growth in manufacturing since 1989 displays some very intriguing features—most notably the extensive rise of informal tradables and the rapid development of 1-person establishments. Our examination suggests that these features are most closely linked to the urbanization of informal Indian manufacturing. Subcontracting and rising female participation also appear to play noteworthy roles, but the link to these is less strong than to urbanization. Many other traits and features of industries and local economies are less essential.

There are many useful ways that this analysis can be extended in future work. We generally need to learn more about agglomeration economies and how these micro enterprises connect with each other and with formal firms. The 1-person establishments are becoming increasingly prevalent—over one-third of informal sector employment in 2010—and their causes and consequences are not well understood. We particularly intend to explore going forward how informal firms connect into local supply chains and input-output networks, which can propagate shocks (e.g., Acemoglu et al. 2015). Additionally, we need to examine whether these trends

persist in the service sector too, or if they are specific to the production processes present in manufacturing. We are not able to provide very strong counsel at this stage about policy responses to them, which affects everything from poverty levels, the allocation of activity in the Indian economy (e.g., Hsieh and Klenow 2009, 2014), and much beyond. The established connection to the urbanization of the informal sector provides a start, but greater insights are needed for effective governance.

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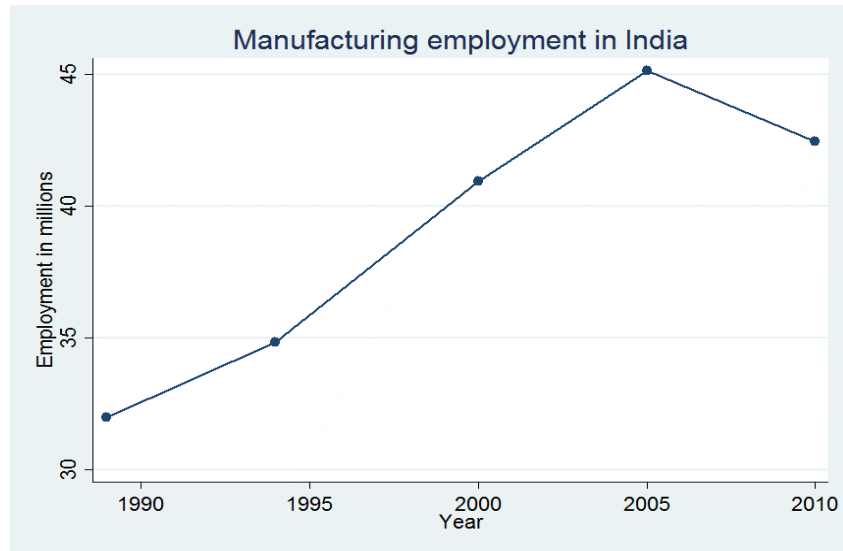
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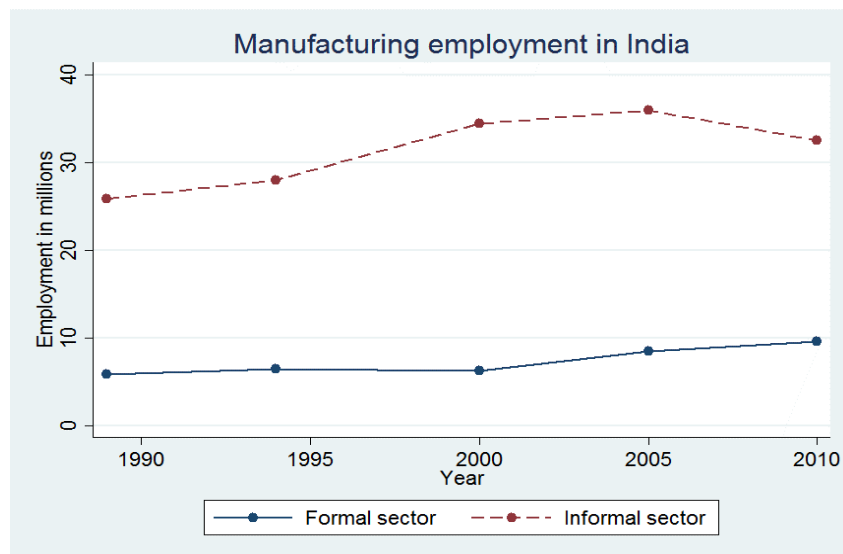
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Figure 1a: Indian manufacturing employment growth trends

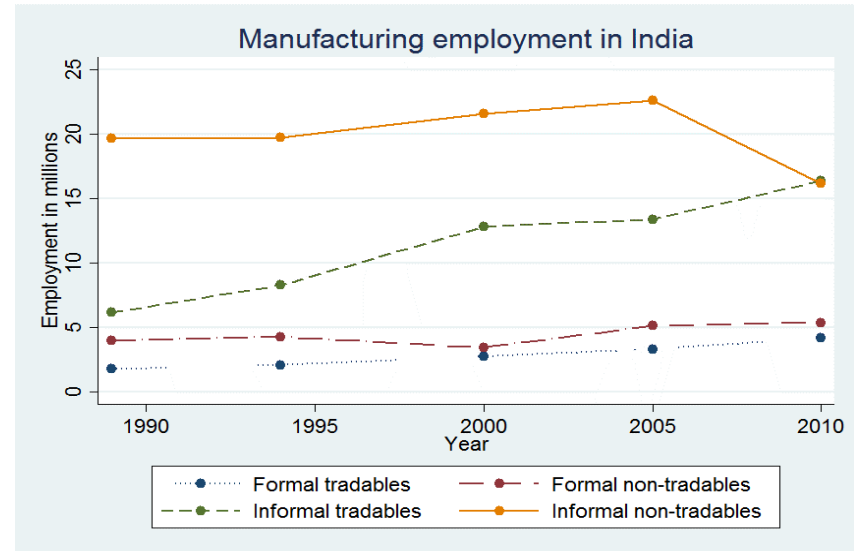
A. Manufacturing total



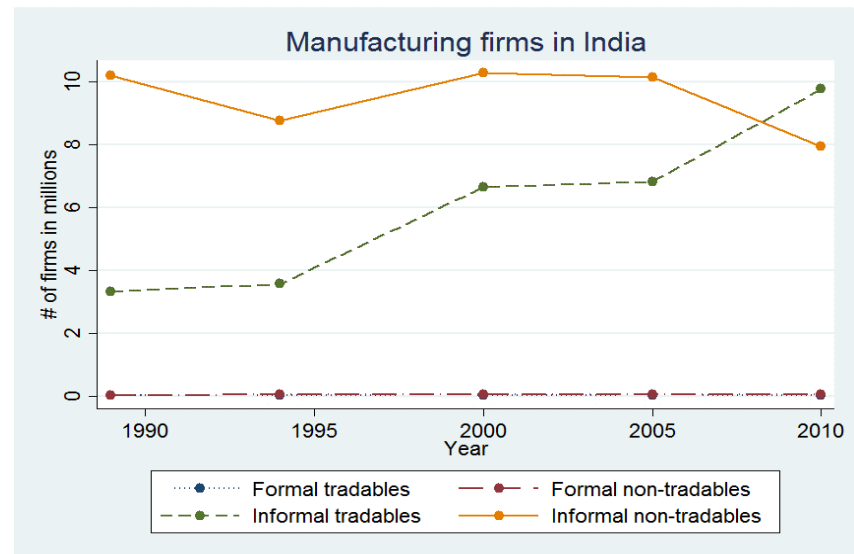
B. Formal and informal sectors



C. Tradables and non-tradables



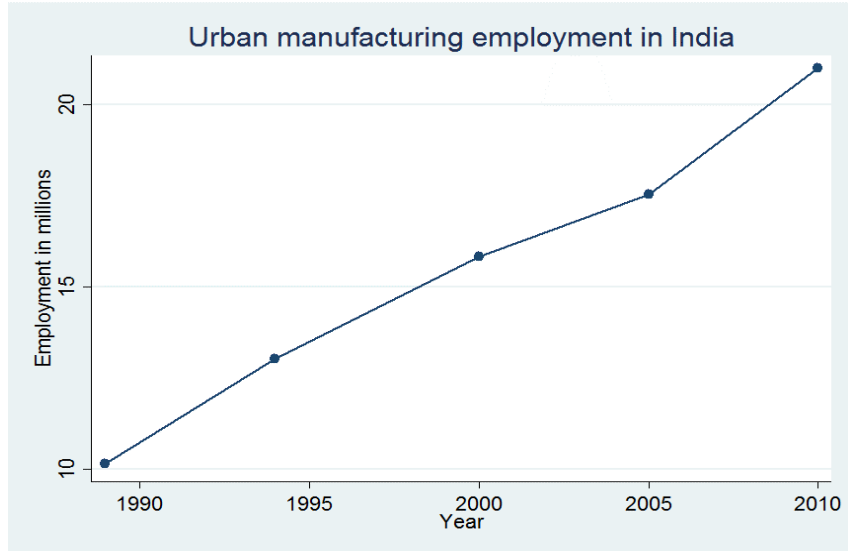
D. Panel C with establishments



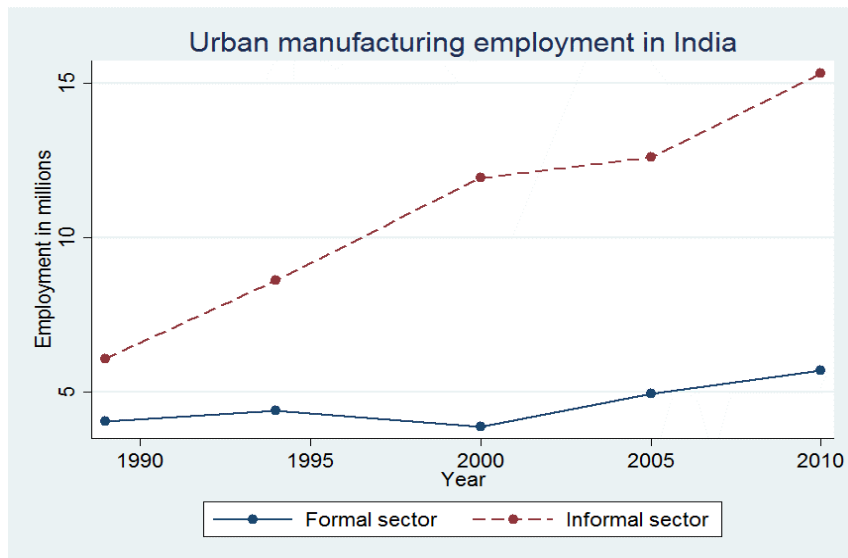
Notes: See Table 1.

Figure 1b: Indian manufacturing employment growth trends in urban areas

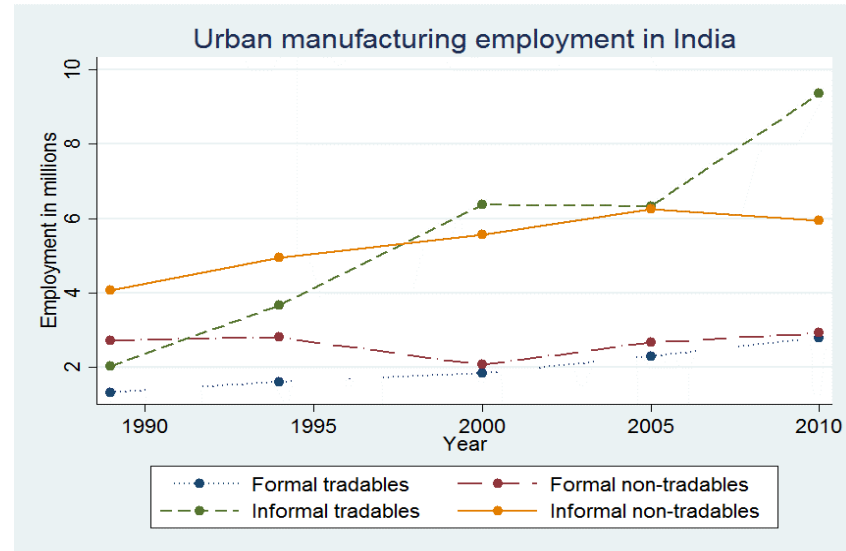
A. Manufacturing total



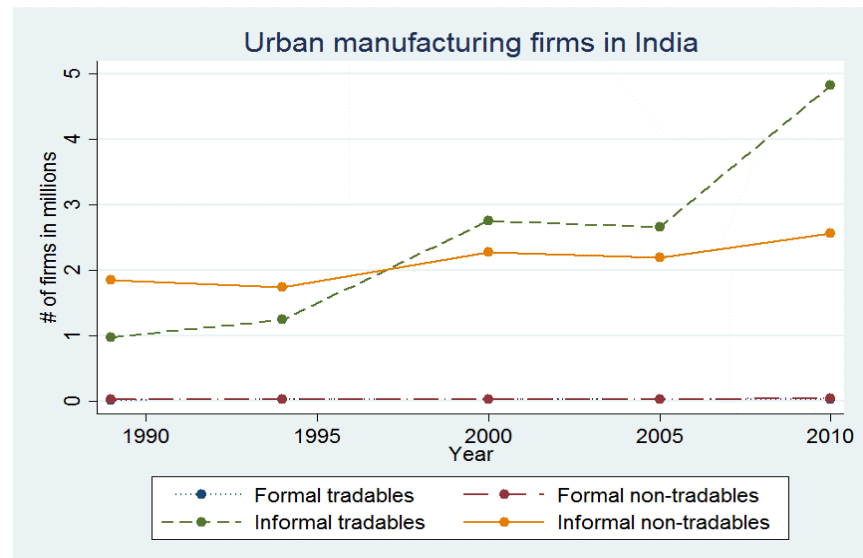
B. Formal and informal sectors



C. Tradables and non-tradables



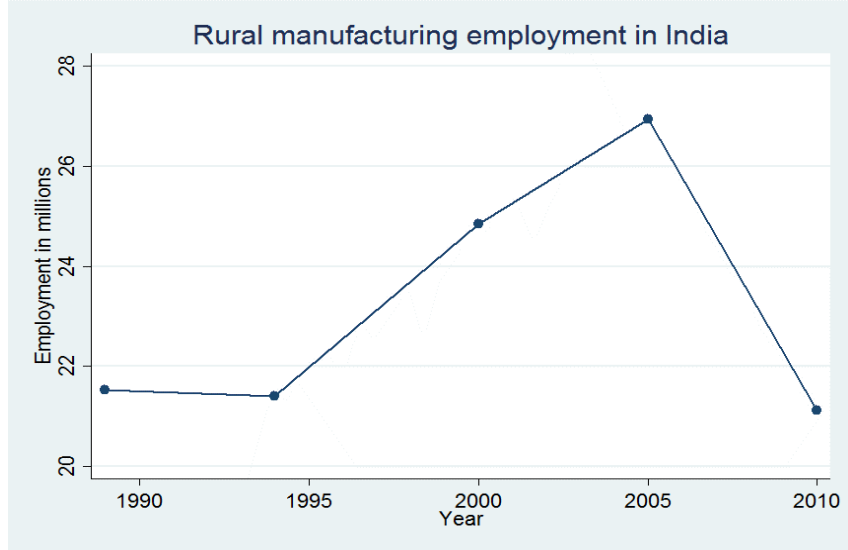
D. Panel C with establishments



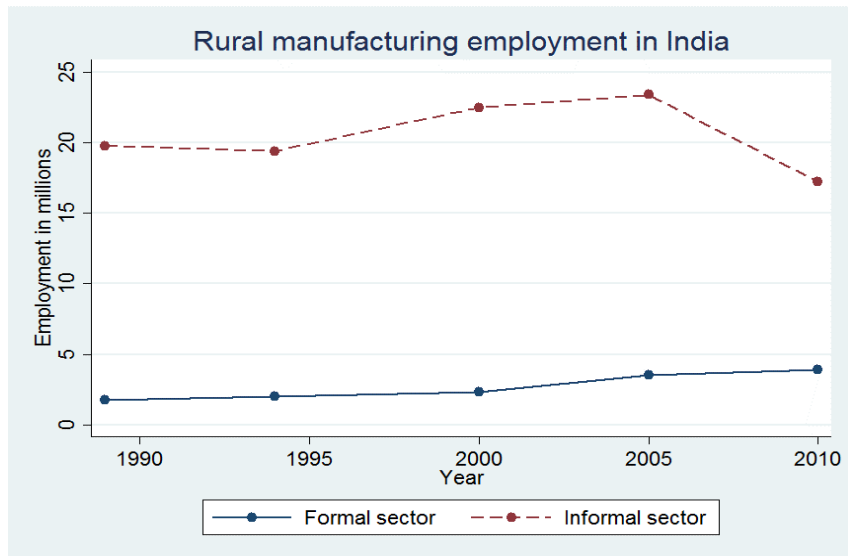
Notes: See Table 1.

Figure 1c: Indian manufacturing employment growth trends in rural areas

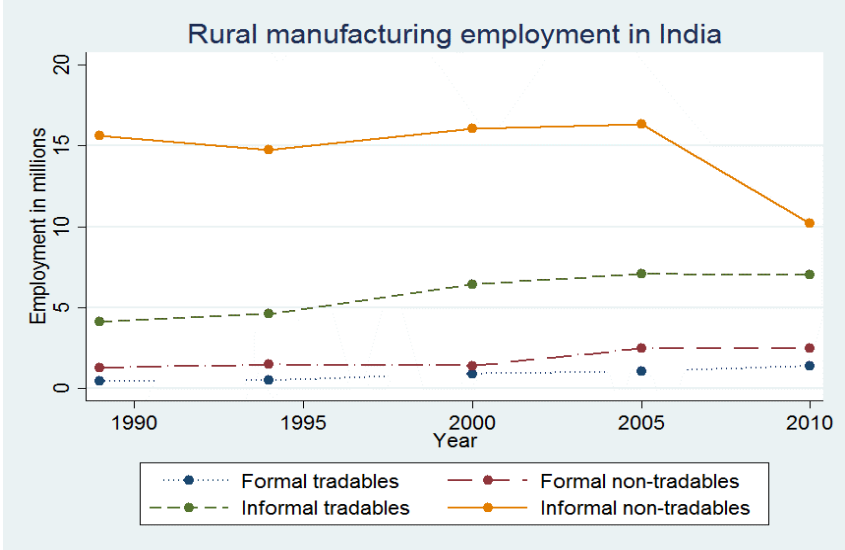
A. Manufacturing total



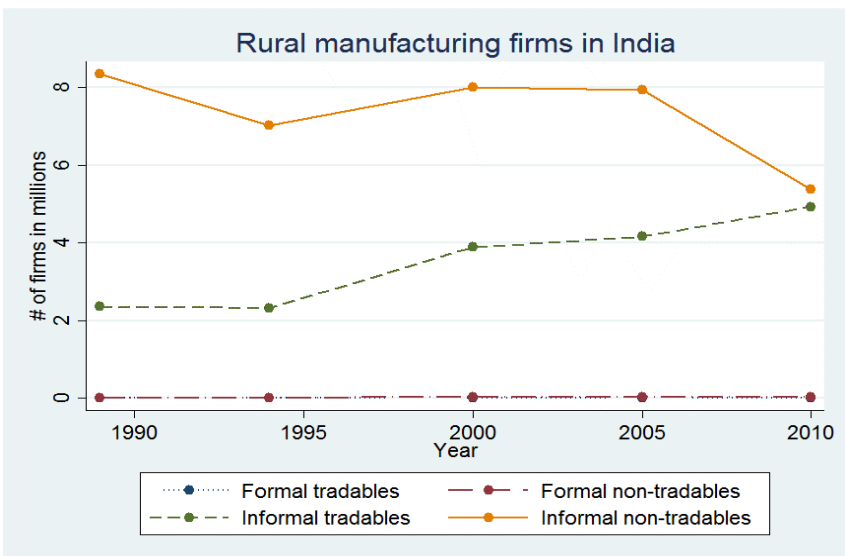
B. Formal and informal sectors



C. Tradables and non-tradables



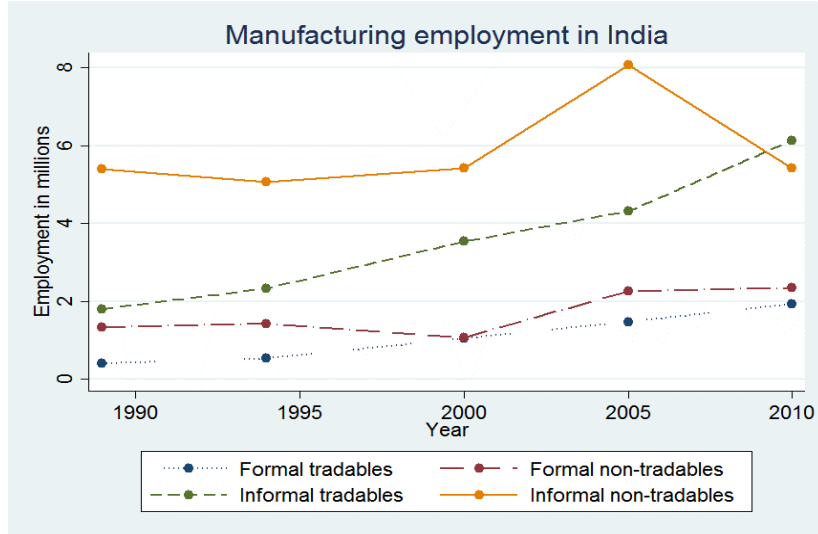
D. Panel C with establishments



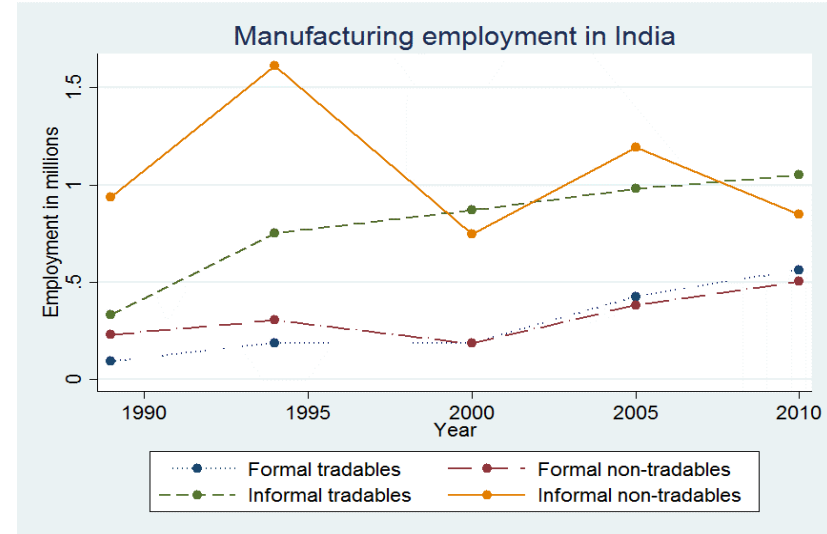
Notes: See Table 1.

Figure 1d: Indian manufacturing employment growth trends by population density of district

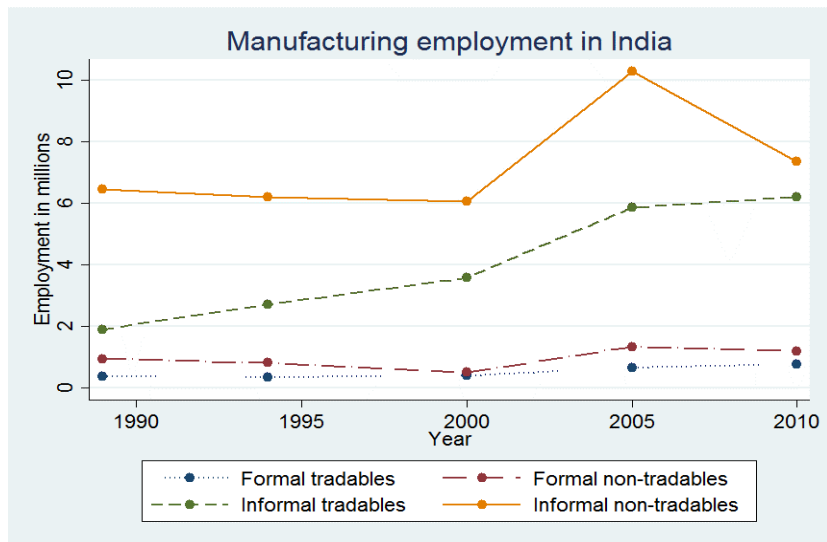
A. Low population density



C. High population density



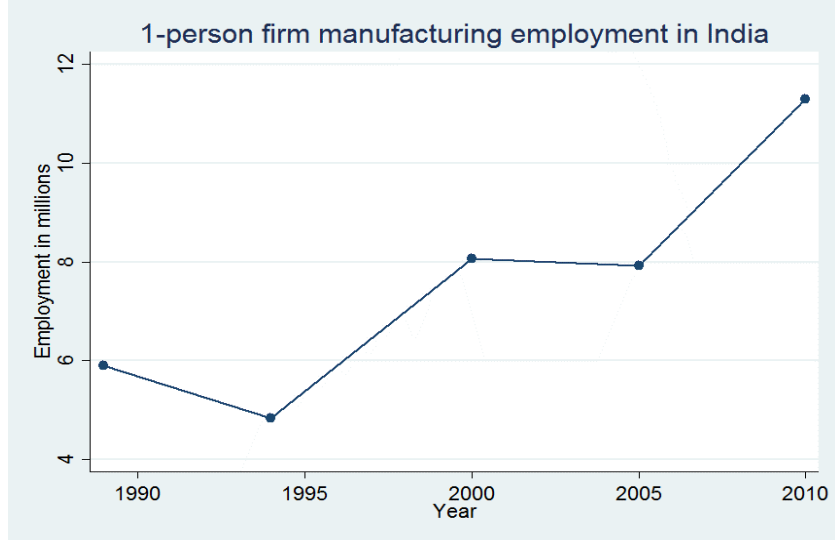
B. Medium population density



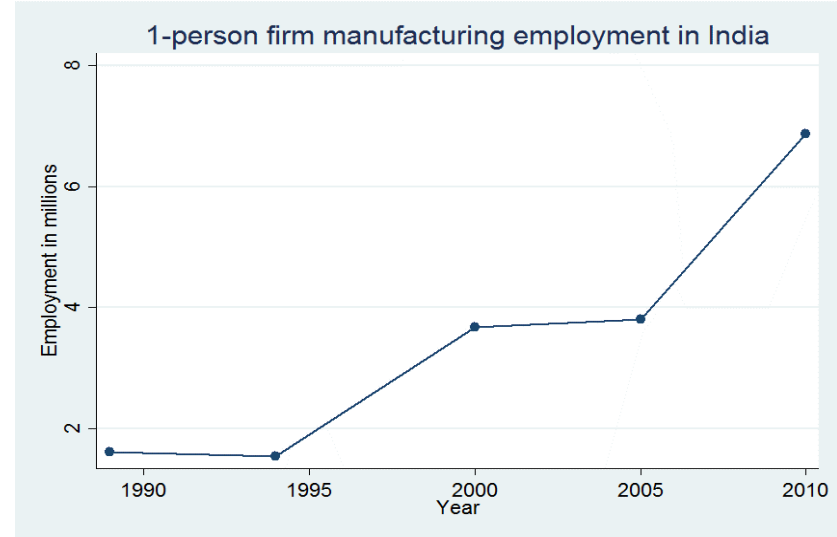
Notes: See Table 1. Appendix Figures 1a-1c provide a complete set of graphs by density bin.

Figure 1e: Indian manufacturing 1-person firm employment growth trends

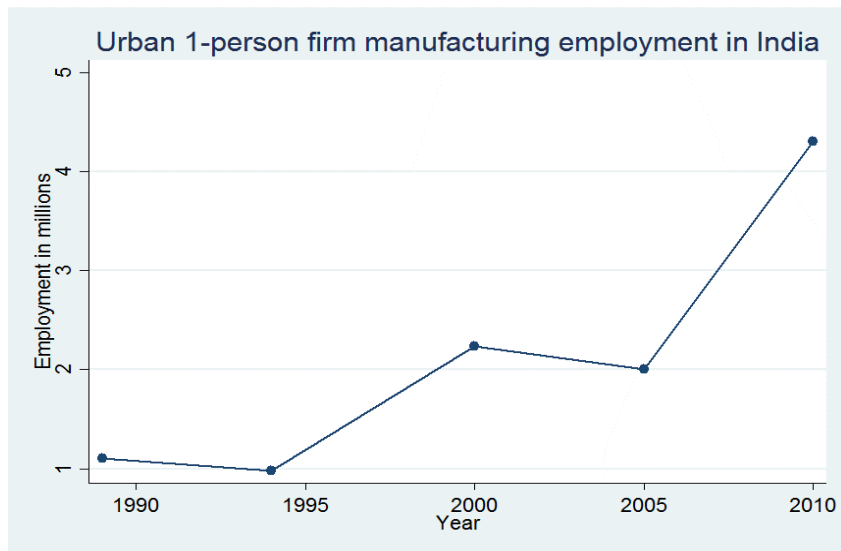
A. Manufacturing total



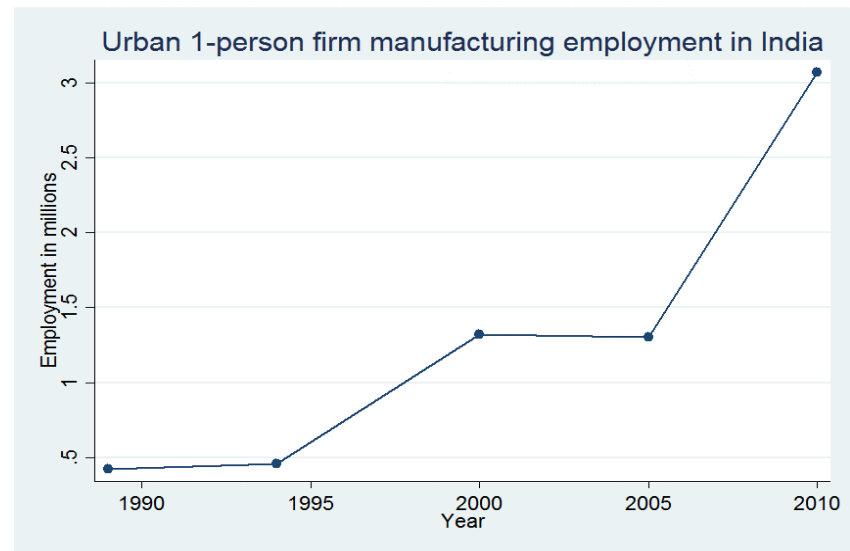
C. Informal tradables only



B. Urban areas only



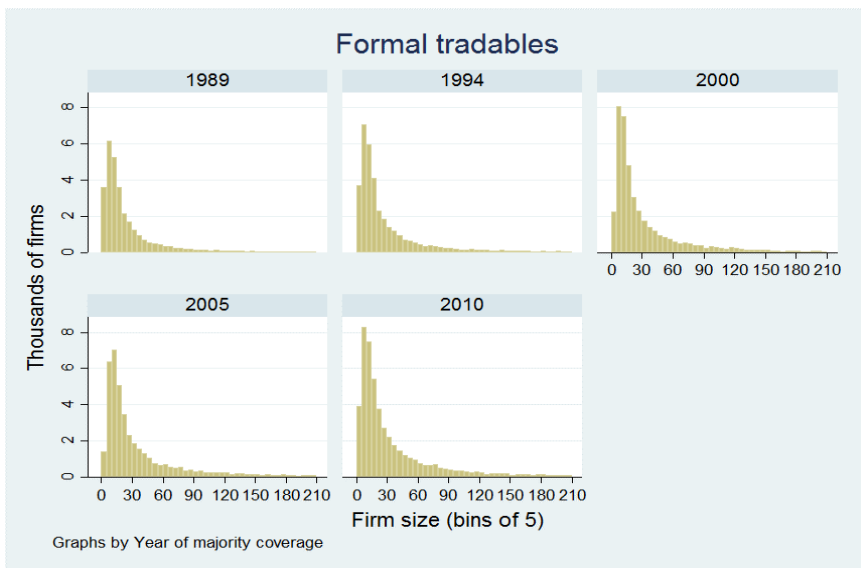
D. Informal tradables in urban areas only



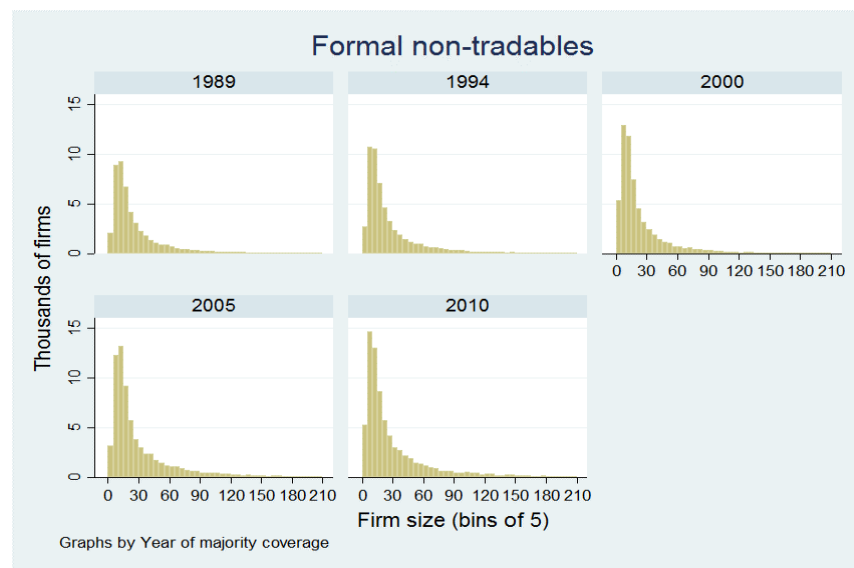
Notes: See Table 1.

Figure 2: Indian establishment size distribution for formal manufacturing sector

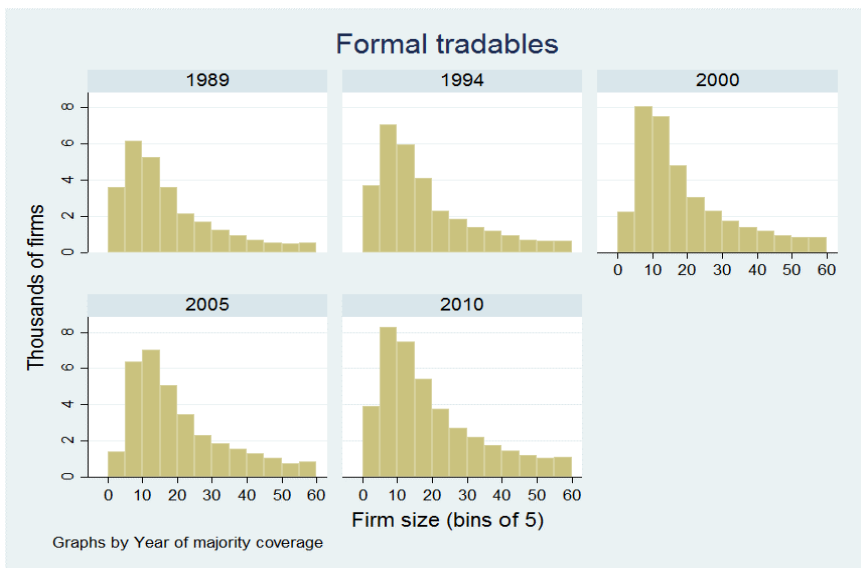
A. Tradables



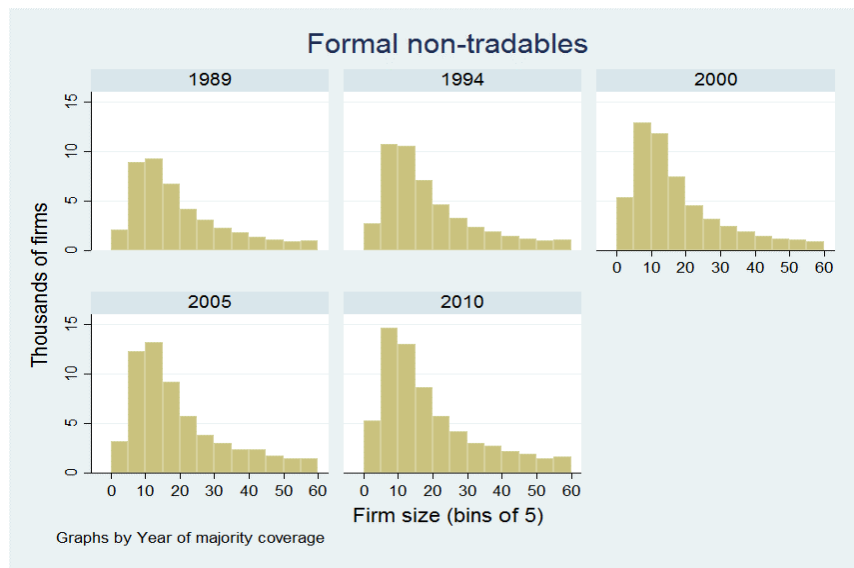
C. Non-tradables



B. Tradables, greater detail for small sizes



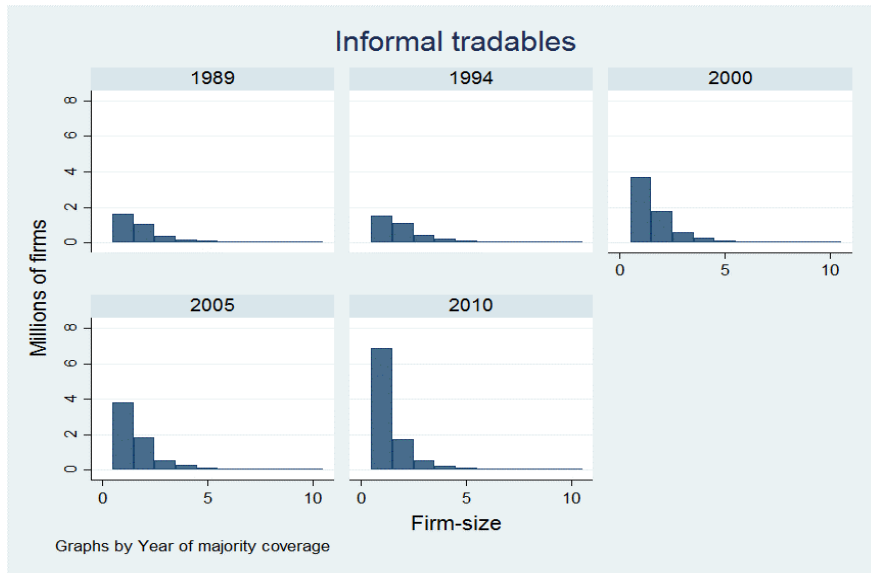
D. Non-tradables, greater detail for small sizes



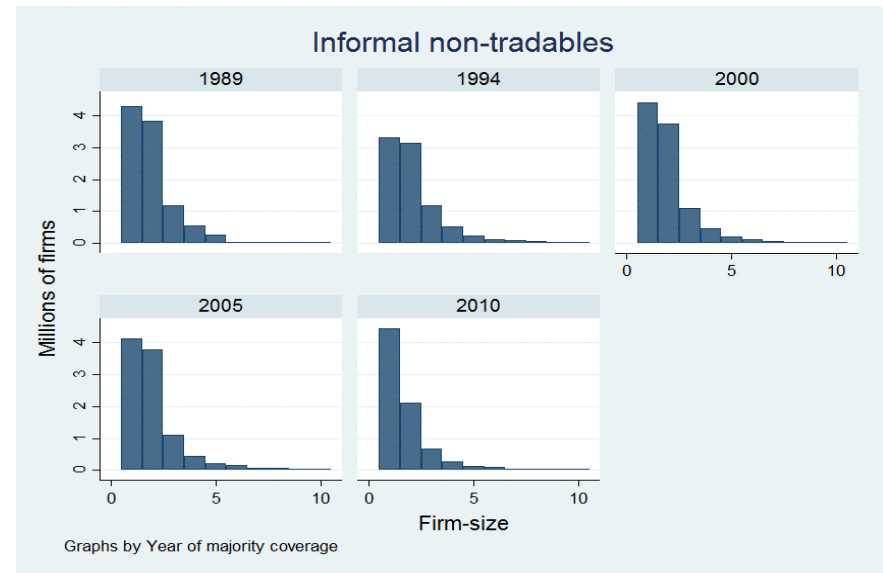
Notes: See Table 1.

Figure 3: Indian establishment size distribution for informal manufacturing sector

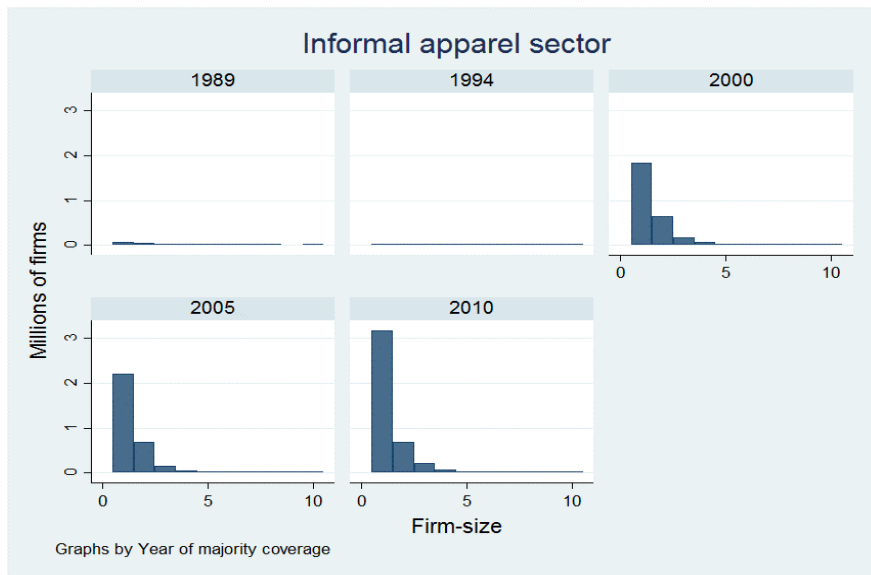
A. Tradables



C. Non-tradables



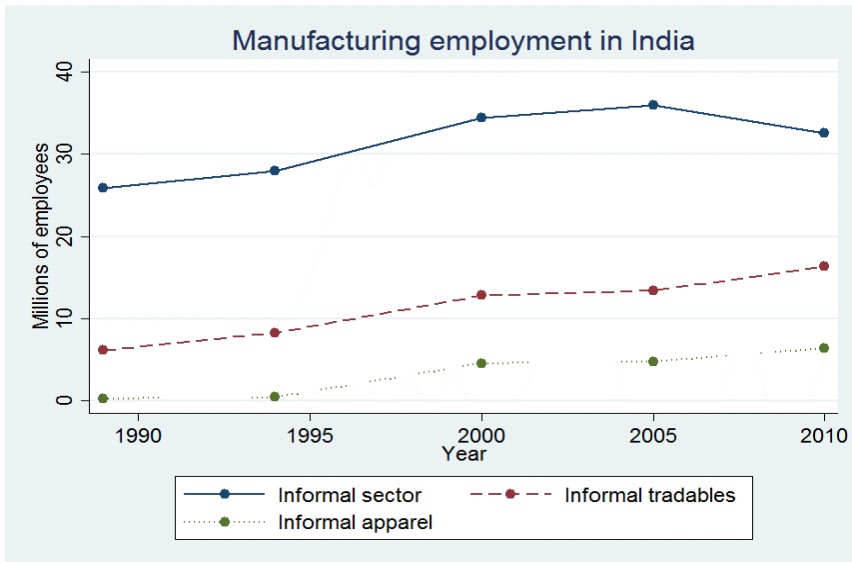
B. Apparel industry break-out for Panel A



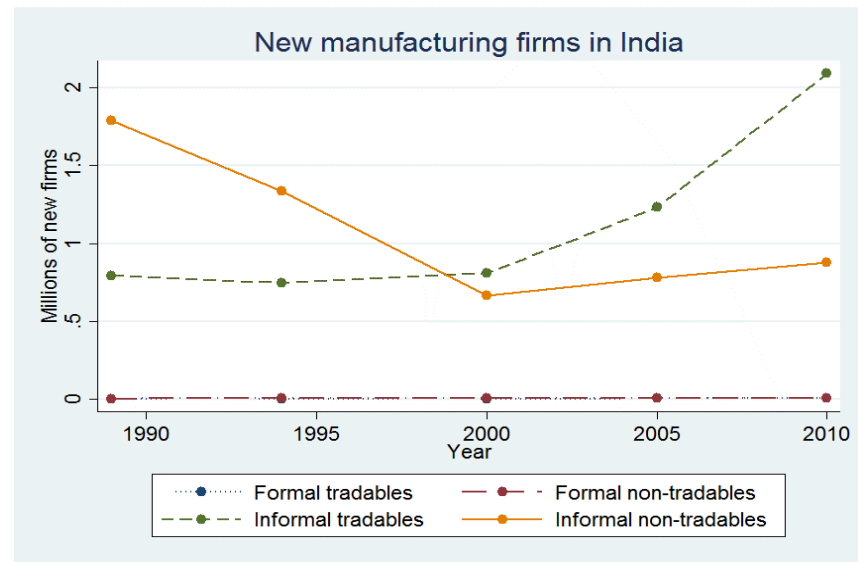
Notes: See Table 1.

Figure 4: Examination of apparel trends and new firms

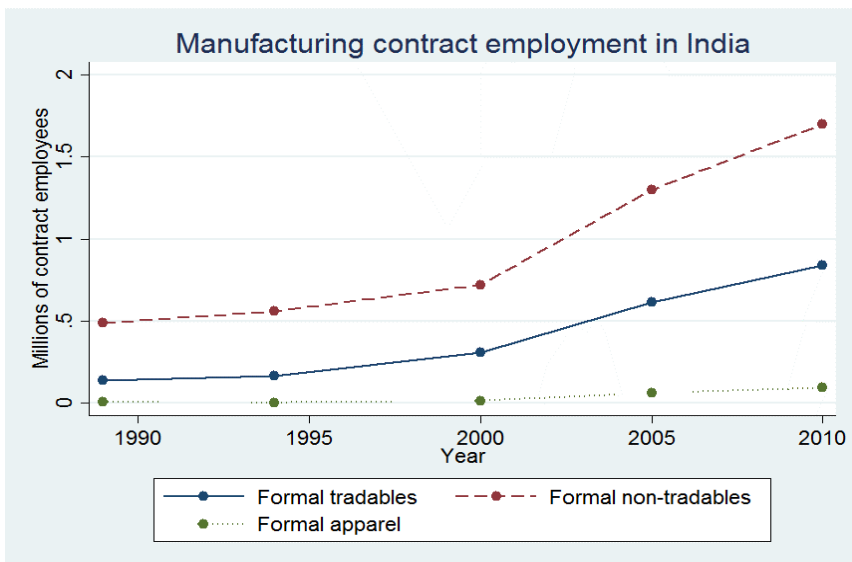
A. Informal employment in apparel



C. New establishments



B. Formal contract employment for apparel



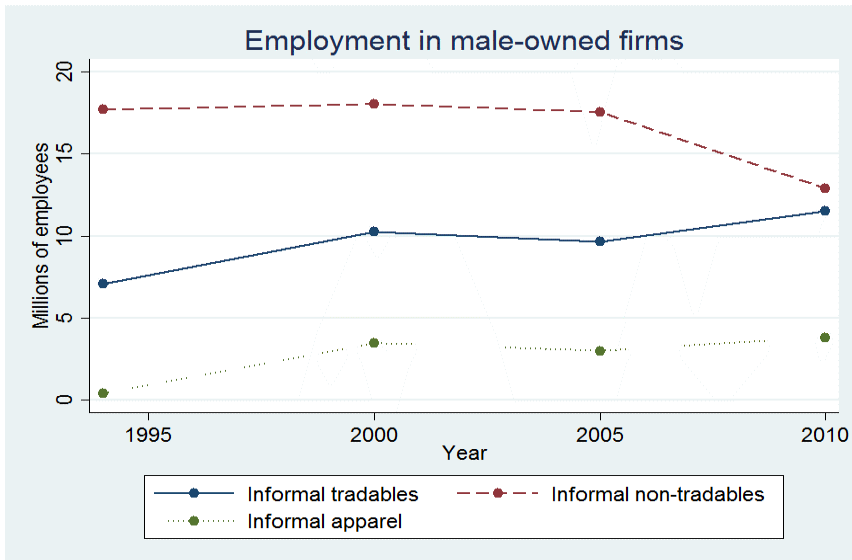
D. Apparel industry break-out for Panel C



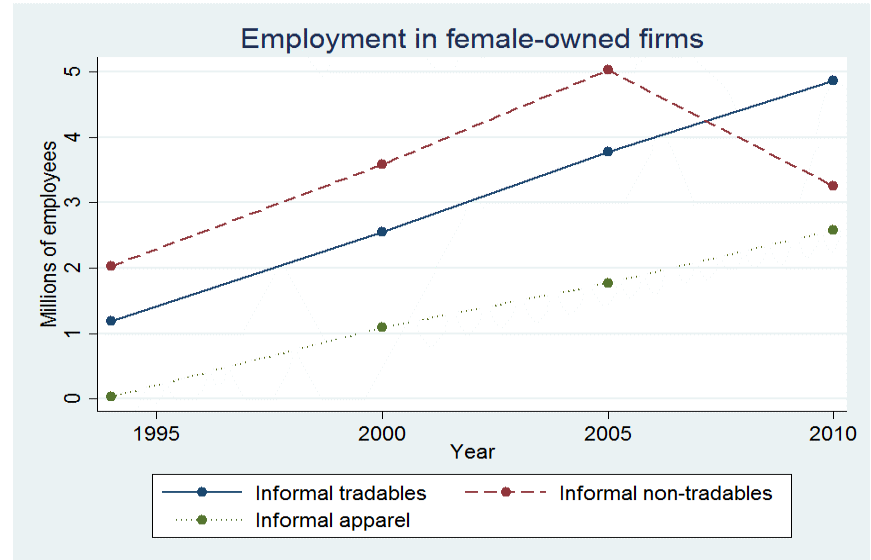
Notes: See Table 1.

Figure 5: Examination of male and female ownership

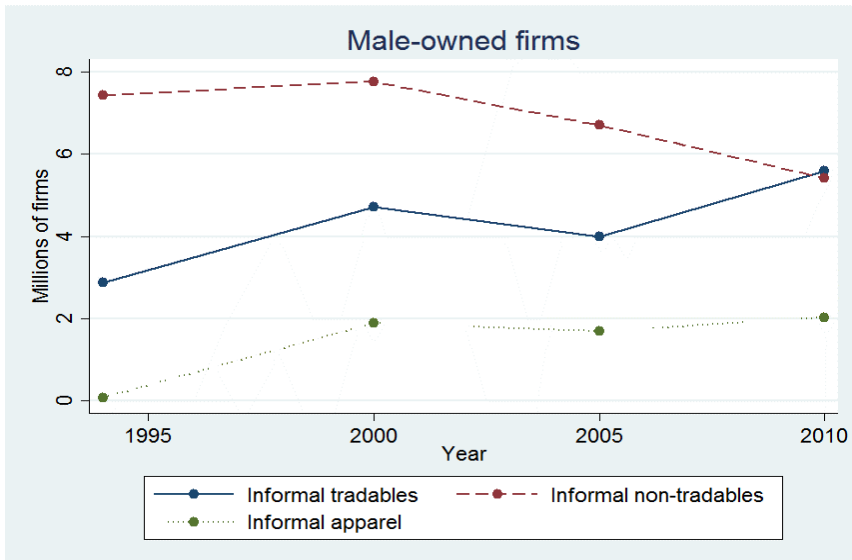
A. Employment and male ownership



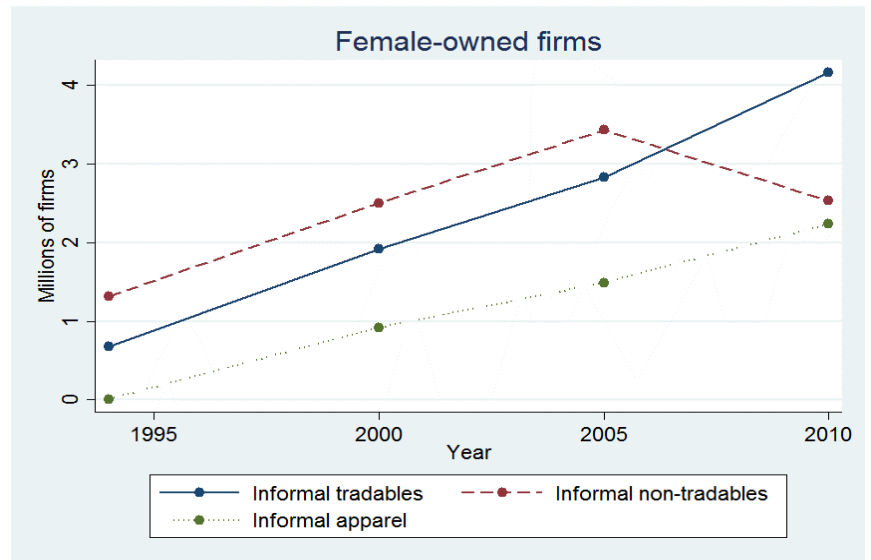
C. Employment and female ownership



B. Establishments and male ownership



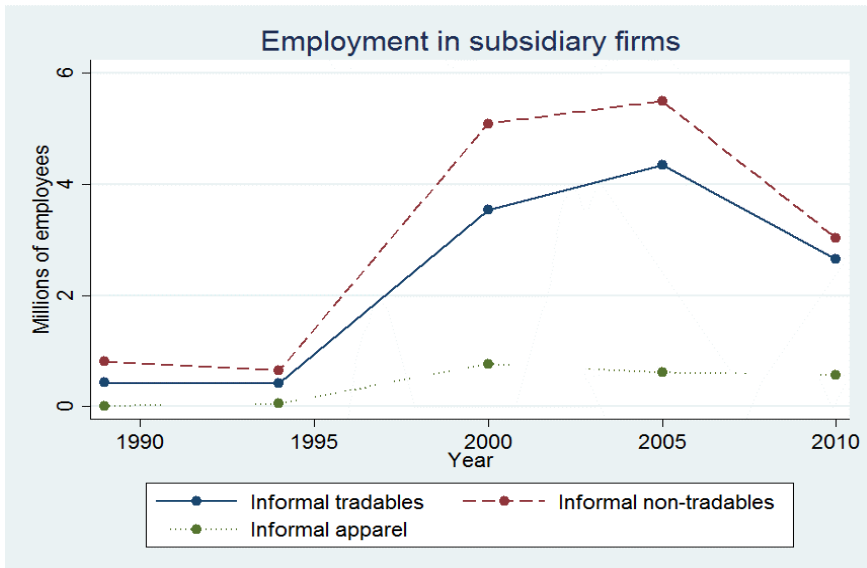
D. Establishments and female ownership



Notes: See Table 1.

Figure 6: Examination of subsidiary relationships

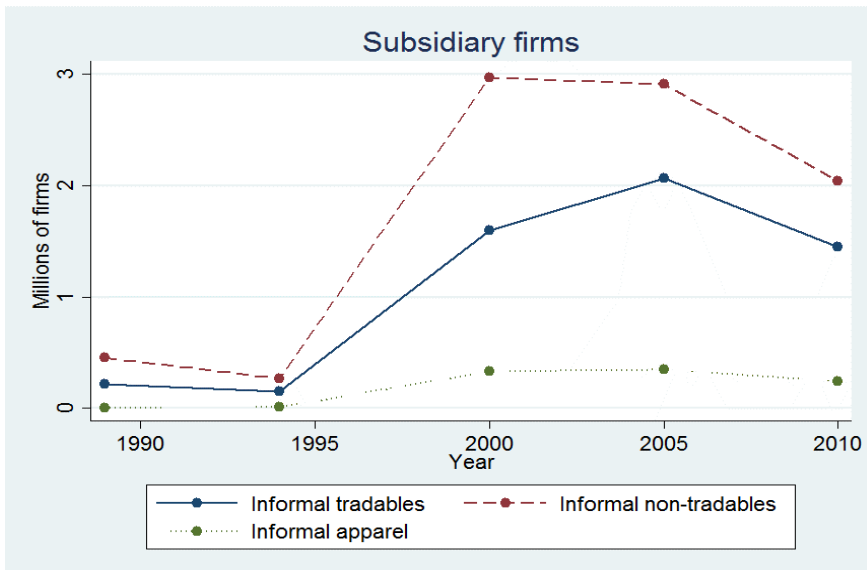
A. Employment



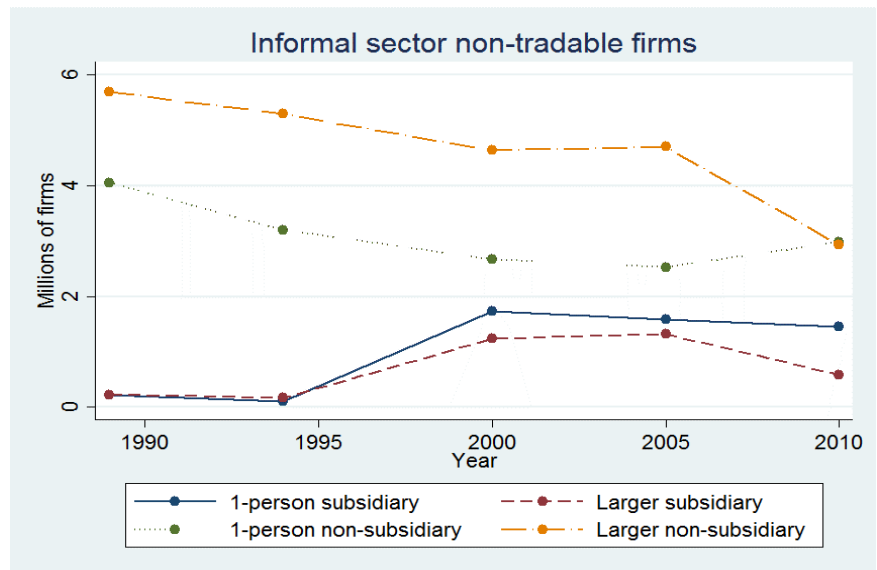
C. Tradables and size of subsidiaries



B. Establishments



D. Non-tradables and size of subsidiaries



Notes: See Table 1.

Table 1a: Growth in India's manufacturing sector

	1989	1994	2000	2005	2010	Share 1989	Share 2010	Growth 1989→2010	Growth 2000→2010
A. Employment levels									
Total	31,976,544	34,823,686	40,934,814	45,135,758	42,450,952			33%	4%
		9%	18%	10%	-6%				
Informal tradables	6,184,085	8,300,794	12,833,159	13,710,880	16,423,692	19%	39%	166%	28%
		34%	55%	7%	20%				
Informal non-tradables	19,699,080	19,758,028	21,642,168	22,685,924	16,222,000	62%	38%	-18%	-25%
		0%	10%	5%	-28%				
Formal tradables	1,844,234	2,201,461	2,842,195	3,413,113	4,256,341	6%	10%	131%	50%
		19%	29%	20%	25%				
Formal non-tradables	4,249,145	4,563,403	3,617,292	5,325,841	5,548,919	13%	13%	31%	53%
		7%	-21%	47%	4%				
B. Establishment counts									
Total	13,630,773	12,445,471	17,044,168	17,172,154	17,890,526			31%	5%
		-9%	37%	1%	4%				
Informal tradables	3,335,930	3,573,835	6,642,636	6,879,311	9,780,790	24%	55%	193%	47%
		7%	86%	4%	42%				
Informal non-tradables	10,208,306	8,772,108	10,291,135	10,171,737	7,973,908	75%	45%	-22%	-23%
		-14%	17%	-1%	-22%				
Formal tradables	32,958	38,512	45,624	44,773	53,891	0.2%	0.3%	64%	18%
		17%	18%	-2%	20%				
Formal non-tradables	53,579	61,016	64,773	76,333	81,937	0.4%	0.5%	53%	26%
		14%	6%	18%	7%				

Notes: Indian descriptive statistics taken from Annual Survey of Industries and National Sample Statistics. Tradables definition comes from Kothari (2014) based upon above-median values of exports plus imports to gross production at the three-digit industry level.

Table 1b: Output and wage growth in India's manufacturing sector

	1989	1994	2000	2005	2010	Share 1989	Share 2010	Growth 1989→2010	Growth 2000→2010
A. Total sales (Billions of 2005 Rupees)									
Total	2,674	2,769	5,206	10,896	24,198			805%	365%
		4%	88%	109%	122%				
Informal tradables	23	127	472	722	2,245	1%	9%	9556%	376%
		448%	270%	53%	211%				
Informal non-tradables	52	220	697	1,094	2,645	2%	11%	5009%	279%
		325%	217%	57%	142%				
Formal tradables	1,043	1,055	1,949	3,871	7,771	39%	32%	645%	299%
		1%	85%	99%	101%				
Formal non-tradables	1,556	1,366	2,088	5,210	11,537	58%	48%	641%	453%
		-12%	53%	150%	121%				
B. Average wage (2005 Rupees)									
Total	140	632	1,340	348	1,739			1139%	30%
		350%	112%	-74%	400%				
Informal tradables	121	589	1,412	2,125	5,429			4382%	285%
		386%	140%	51%	156%				
Informal non-tradables	81	405	1,011	1,703	6,829			8357%	575%
		402%	150%	68%	301%				
Formal tradables	8,854	25,757	31,343	55,199	138,310			1462%	341%
		191%	22%	76%	151%				
Formal non-tradables	6,734	19,833	23,970	37,896	112,859			1576%	371%
		195%	21%	58%	198%				

Notes: Indian descriptive statistics taken from Annual Survey of Industries and National Sample Statistics. Tradables definition comes from Kothari (2014) based upon above-median values of exports plus imports to gross production at the three-digit industry level. Output is measured as annual gross sales. Average wage is measured as total annual wages divided by the number of employees in the firm. Output and average wages across all years are converted into 2005 rupees.

Table 2a: Establishment size distribution for informal manufacturing employment growth

	1989	1994	2000	2005	2010	Share 1989	Share 2010	Growth 1989→2010	Growth 2000→2010
A. Employment levels									
Informal 1-person establishments	5,896,198	4,844,355	8,088,172	7,944,154	11,318,993			92%	40%
Tradables	1,611,330	1,537,987	3,672,305	3,815,137	6,876,512	6%	21%	327%	87%
Non-tradables	4,284,868	3,306,368	4,415,867	4,129,017	4,442,481	17%	14%	4%	1%
Informal 2-5 person establishments	19,230,144	17,881,270	20,645,146	20,727,806	14,627,439			-24%	-29%
Tradables	4,424,572	4,758,442	6,913,728	6,981,567	6,578,348	17%	20%	49%	-5%
Non-tradables	14,805,572	13,122,828	13,731,418	13,746,239	8,049,091	57%	25%	-46%	-41%
Informal 6+ person establishments	756,824	5,333,196	5,742,009	7,724,845	6,699,260			785%	17%
Tradables	148,183	2,004,365	2,247,126	2,914,176	2,968,832	1%	9%	1903%	32%
Non-tradables	608,641	3,328,831	3,494,883	4,810,669	3,730,428	2%	11%	513%	7%
B. Establishment counts									
Informal 1-person establishments	5,896,198	4,844,355	8,088,172	7,944,154	11,318,993			92%	40%
Tradables	1,611,330	1,537,987	3,672,305	3,815,137	6,876,512	12%	39%	327%	87%
Non-tradables	4,284,868	3,306,368	4,415,867	4,129,017	4,442,481	32%	25%	4%	1%
Informal 2-5 person establishments	7,548,731	6,915,265	8,260,254	8,329,014	5,820,195			-23%	-30%
Tradables	1,705,840	1,827,768	2,731,982	2,780,015	2,610,403	13%	15%	53%	-4%
Non-tradables	5,842,891	5,087,497	5,528,272	5,548,999	3,209,792	43%	18%	-45%	-42%
Informal 6+ person establishments	99,307	586,323	585,345	777,880	615,510			520%	5%
Tradables	18,760	208,080	238,349	284,159	293,875	0%	2%	1466%	23%
Non-tradables	80,547	378,243	346,996	493,721	321,635	1%	2%	299%	-7%

Notes: See Table 1.

Table 2b: Establishment size distribution for informal manufacturing output and wage growth

	1989	1994	2000	2005	2010	Share 1989	Share 2010	Growth 1989→2010	Growth 2000→2010
A. Total sales (Billions of 2005 Rupees)									
Informal 1-person establishments	14.2	37.7	133.0	174.8	895.1			6193%	573%
Tradables	5.2	12.4	68.0	91.2	575.0	7%	12%	10925%	745%
Non-tradables	9.0	25.3	65.0	83.6	320.1	12%	7%	3454%	393%
Informal 2-5 person establishments	59.2	155.7	562.8	764.6	2,351.9			3870%	318%
Tradables	17.6	49.4	213.4	296.7	1,067.7	23%	22%	5965%	400%
Non-tradables	41.6	106.2	349.3	467.9	1,284.2	56%	26%	2984%	268%
Informal 6+ person establishments	1.6	154.2	473.3	876.1	1,643.2			105753%	247%
Tradables	0.4	65.5	190.2	334.0	602.5	1%	12%	139581%	217%
Non-tradables	1.1	88.7	283.2	542.1	1,040.6	1%	21%	92735%	267%
B. Average Wage (2005 Rupees)									
Informal 1-person establishments	15.8	165.0	28.2	101.7	203.5			1187%	622%
Tradables	29.8	100.1	21.0	104.3	185.2			522%	783%
Non-tradables	10.5	195.2	34.2	99.3	231.8			2099%	577%
Informal 2-5 person establishments	149.1	421.6	1,594.5	2,222.0	12,802.8			8486%	703%
Tradables	206.9	573.5	2,253.0	3,045.4	13,651.4			6497%	506%
Non-tradables	132.2	367.0	1,269.2	1,812.0	12,113.1			9059%	854%
Informal 6+ person establishments	94.0	3,315.1	10,890.8	16,758.4	50,067.1			53172%	360%
Tradables	171.5	4,335.7	13,214.1	22,042.2	55,285.7			32142%	318%
Non-tradables	75.9	2,753.0	9,296.1	13,964.7	45,288.5			59560%	387%

Notes: See Table 1a.

Table 3: Employment share in informal sector by manufacturing industry

NIC	Industry Description	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1-person firm employment share 1989-2010
15	Food products and beverages	-12%	-35%	-17%	-12%	17%
16	Tobacco products	5%	-10%	40%	28%	40%
17	Textiles	-25%	-1%	139%	41%	26%
18	Wearing apparel; dressing and dyeing of fur	2058%	41%	5109%	73%	32%
19	Tanning and dressing of leather; luggage, handbags, saddlery, harness and footwear	-56%	-45%	-83%	-63%	20%
20	Wood and wood products, except furniture; articles of straw and plating material	-62%	-63%	-55%	-57%	23%
21	Paper and paper products	52%	-12%	62%	-9%	13%
22	Publishing, printing and reproduction of recorded media	148%	11%	102%	66%	8%
23	Coke, refined petroleum and nuclear fuel	-37%	-54%	-63%	-23%	6%
24	Chemicals and chemical products	155%	34%	342%	103%	25%
25	Rubber and plastic products	546%	114%	449%	337%	13%
26	Other non-metallic mineral products	28%	-16%	4%	241%	8%
27	Basic metals	145%	-12%	1106%	123%	16%
28	Fabricated metal products, except machinery and equipments	130%	21%	79%	9%	13%
29	Machinery and equipment, n.e.c.	58%	51%	-46%	111%	20%
30	Office, accounting and computing machinery	338%	588%	838%	.	
31	Electrical machinery and apparatus, n.e.c.	40%	-76%	-15%	-42%	16%
32	Radio, television, and communication equipment and apparatus	2985%	1467%	29992%	56001%	16%
33	Medical, precision and optical instruments, watches and clocks	275%	132%	247%	1524%	17%
34	Motor vehicles, trailers and semi-trailers	2331%	-11%	-24%	-21%	19%
35	Other transport equipment	-19%	-37%	-84%	-53%	6%
36	Furniture, manufacturing n.e.c.	70%	44%	126%	143%	25%
	Weighted industry average	26%	-5%	92%	40%	24%
	Tradables	166%	28%	327%	87%	29%
	Non-tradables	-18%	-25%	4%	1%	21%

Notes: See Table 1. Weighted averages weight by employment in industry to add up to India as a whole.

Table 4: Employment share in informal sector by state

State	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1-person firm employment share 1989-2010
A & N Islands	208%	-11%	229%	109%	15%	2908%	408%	6%
Andhra Pradesh	12%	-2%	55%	32%	29%	164%	112%	14%
Arunachal Pradesh	95%	225%	-65%	232%	33%	-35%	496%	8%
Assam	65%	-20%	98%	-1%	29%	405%	50%	6%
Bihar	-54%	-50%	-33%	-29%	27%	62%	-14%	8%
Chandigarh	120%	-56%	738%	129%	24%	1685%	120%	17%
Chhattisgarh	.	-31%	.	6%	.	.	9%	.
Dadra & Nagar Haveli	445%	74%	21%	-10%	35%	2485%	156%	7%
Daman & Diu	220%	5%	286%	199%	24%	916%	414%	13%
Delhi	357%	-17%	329%	33%	6%	401%	34%	4%
Goa	15%	-68%	29%	-41%	20%	1548%	-43%	9%
Gujarat	234%	107%	625%	311%	19%	1727%	390%	12%
Haryana	104%	21%	144%	34%	22%	353%	61%	13%
Himachal Pradesh	-33%	1%	20%	-8%	40%	330%	39%	15%
Jammu & Kashmir	-12%	-7%	93%	35%	38%	92%	0%	20%
Jharkhand	.	-36%	.	37%	.	.	8%	.
Karnataka	16%	-24%	58%	-2%	32%	313%	46%	12%
Kerala	6%	-4%	10%	11%	31%	547%	48%	13%
Lakshadweep	227%	293%	145%	75%	19%	125%	108%	.
Madhya Pradesh	42%	5%	93%	71%	25%	371%	107%	9%
Maharashtra	92%	12%	157%	46%	20%	532%	76%	11%
Manipur	-7%	-27%	71%	-16%	56%	588%	-30%	11%
Meghalaya	56%	-28%	25%	-45%	22%	1291%	-32%	3%
Mizoram	77%	-32%	24%	-40%	32%	115%	-40%	8%
Nagaland	233%	6%	496%	75%	38%	214%	302%	10%

Table 4: Employment share in informal sector by state (continued)

State	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1-person firm employment share 1989-2010
Orissa	-42%	-48%	-12%	85%	17%	56%	247%	7%
Pondicherry	136%	-15%	233%	96%	18%	925%	149%	11%
Punjab	115%	11%	168%	29%	27%	255%	41%	19%
Rajasthan	12%	9%	51%	20%	29%	189%	35%	14%
Sikkim	155%	35%	-40%	-29%	33%	-10%	-1%	13%
Tamil Nadu	33%	5%	127%	37%	25%	256%	42%	12%
Tripura	58%	52%	341%	356%	22%	1403%	691%	7%
Uttar Pradesh	37%	-3%	82%	26%	20%	205%	65%	10%
Uttaranchal	.	-13%	.	-9%	.	.	54%	.
West Bengal	-13%	-15%	103%	61%	24%	754%	196%	9%
Unweighted state average	94%	10%	147%	55%	27%	662%	124%	11%
Leading states	95%	14%	176%	60%	25%	629%	113%	12%
Lagging states	93%	7%	122%	50%	28%	691%	133%	9%
Weighted state average	26%	-5%	92%	40%	24%	327%	87%	11%
Leading states	36%	5%	119%	55%	24%	424%	112%	11%
Lagging states	13%	-18%	59%	21%	24%	210%	52%	10%

Notes: See Table 1. Weighted averages weight by employment in industry to add up to India as a whole. Leading and lagging states are separated using the average GDP per capita across 1989-2010.

Table 5: Correlation of district traits and 1-person establishment development

	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1-person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1-person firm employment share 1989-2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log population	-0.24*	-0.19*	-0.07	-0.09	-0.38*	-0.02	-0.10*	-0.16*
Log population density	0.07	-0.06	0.02	-0.11*	-0.10*	-0.02	-0.12*	-0.02
Share of population that is urban	0.01	-0.05	0.00	-0.02	-0.32*	0.10*	0.08	-0.06
Share of population that is middle aged (15-49)	0.04	0.08	0.00	0.08	-0.16*	0.06	0.08	-0.07
Share of population in scheduled caste/tribe	-0.08	-0.08	-0.05	-0.13*	-0.15*	-0.09	-0.07	0.01
Female labor force participation rate	0.04	0.04	0.01	0.02	0.35*	-0.03	-0.06	0.19*
Educated worker share (middle and up)	0.08	0.03	0.07	0.11*	0.05	0.14*	0.06	0.07
Literacy rate	-0.02	-0.03	0.00	0.02	-0.10*	0.10*	0.01	0.06
Infrastructure: share of villages with electricity	-0.08	-0.09	0.01	-0.10*	-0.04	0.05	0.04	0.19*
Infrastructure: share of villages with paved roads	-0.04	-0.06	0.01	-0.06	-0.28*	0.09	-0.05	0.04
Labor laws strength	-0.06	0.01	-0.03	0.00	-0.05	0.00	0.02	-0.06
Travel time to nearest of India's ten largest cities	0.02	0.05	-0.03	0.02	0.30*	-0.05	0.01	0.29*
Share of households with a bank account	0.01	-0.08	-0.01	-0.09	-0.17*	-0.01	-0.08	0.09*

Notes: Table documents correlations between district traits and the development of 1-person establishments. District traits are from the 2001 Population Census. District traits are expressed in log values or percentage point values as indicated. We winsorize variables at their 1%/99% values. An asterisk denotes a correlation is statistically significant at the 10% level.

Table 6: Multivariate estimations of urbanization and 1-person establishment development

	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1- person firm employment share 1989-2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. All firms in district								
Share of population that is urban	0.112 [0.029]***	0.129 [0.044]***	0.116 [0.040]***	0.078 [0.034]**	-0.295 [0.058]***	0.171 [0.081]**	0.176 [0.117]	-0.150 [0.076]**
Observations	216	216	216	216	216	216	216	216
Adjusted R-squared	0.166	0.081	0.126	0.083	0.390	0.060	0.103	0.270
Panel B. Urban firms in district								
Share of population that is urban	0.130 [0.044]***	0.070 [0.046]	0.178 [0.076]**	0.172 [0.085]**	-0.094 [0.048]*	0.088 [0.057]	0.151 [0.079]*	-0.092 [0.060]
Observations	198	198	198	198	198	198	198	198
Adjusted R-squared	0.160	0.078	0.157	0.083	0.292	0.107	0.050	0.286
Panel C. Rural firms in district								
Share of population that is urban	0.070 [0.028]**	0.084 [0.047]*	0.078 [0.044]*	0.120 [0.153]	-0.153 [0.074]**	0.399 [0.164]**	0.075 [0.136]	-0.012 [0.090]
Observations	203	203	203	203	203	203	203	203
Adjusted R-squared	0.042	0.088	0.054	0.047	0.300	0.085	0.073	0.234

Notes: See Table 5. Estimations include districts for which all eight outcome variables are observed. Outcome and explanatory variables are expressed in unit standard deviations. Unreported district covariates include the traits shown in Table 5. Appendix Tables 3a-3c report the complete regression results. Estimations report robust standard errors. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 7: Correlation of industry traits and 1-person establishment development

	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Average tradables 1-person firm employment share 1989-2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Labor intensity	0.01	0.10	0.07	0.35*	0.01	-0.04	-0.09	0.04
Capital intensity	0.06	-0.09	0.03	-0.19*	0.01	0.08	0.11	-0.05
Materials intensity	-0.10	0.03	-0.14	0.08	-0.02	-0.1	-0.08	0.03
Log average wage	0.11	0.03	0.01	0.09	-0.36*	-0.04	0.18	-0.36*
Financial dependency	0.00	0.12	-0.04	-0.14	-0.03	-0.02	0.01	0.03
Import dependency	-0.02	-0.03	-0.05	-0.03	-0.08	0.07	0.1	-0.09
Unorganized sector share of plants	0.01	-0.17	-0.02	-0.45*	-0.07	0.07	-0.06	-0.11
Unorganized sector share of employment	-0.10	-0.03	-0.09	-0.26*	0.21*	0.02	-0.19	0.20*
Unorganized sector share of output	-0.14*	0.07	0.10	0.09	0.11	0.02	-0.15	0.20*
Rate of female ownership	-0.10	-0.02	0.22*	0.20*	-0.01	0.10	-0.13	0.05
Rate of formal sector subcontracting	-0.09	-0.05	0.29*	0.29*	-0.10	-0.01	-0.12	-0.09
Urban unorganized employment share	-0.05	0.21*	-0.11	-0.12	0.15	-0.02	-0.08	0.03
Urban organized employment share	0.21*	0.24*	0.23*	0.43*	-0.05	-0.02	0.22	-0.11

Notes: Table documents correlations between industry traits and 1-person establishment development. Industry traits are measured in 2000-2001, and industries are defined at the 4-digit NIC level. We winsorize variables at their 1%/99% values. An asterisk denotes a correlation is statistically significant at the 10% level.

Table 8a: Estimations of urban manufacturing production functions and local 1-person establishment shares

	Full sample	Full sample	Full sample	Tradables industries	Col. 4 excluding 1- person firms	Non-tradables industries	Col. 6 excluding 1- person firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DV: Log output in manufacturing establishment							
Log employment in establishment	0.594 [0.010]***	0.592 [0.009]***	0.591 [0.009]***	0.578 [0.013]***	0.743 [0.013]***	0.601 [0.011]***	0.734 [0.012]***
Log capital in establishment	0.065 [0.003]***	0.065 [0.003]***	0.065 [0.003]***	0.052 [0.004]***	0.068 [0.004]***	0.086 [0.004]***	0.091 [0.005]***
Log materials in establishment	0.559 [0.006]***	0.559 [0.006]***	0.558 [0.006]***	0.581 [0.007]***	0.516 [0.007]***	0.528 [0.008]***	0.508 [0.009]***
Informal manufacturing employment share in district		0.145 [0.028]***	0.151 [0.035]***	0.124 [0.049]**	0.154 [0.038]***	0.202 [0.040]***	0.149 [0.041]***
Informal manufacturing 1-person firm employment share in district			-0.043 [0.142]	0.190 [0.175]	0.054 [0.162]	-0.449 [0.162]***	-0.259 [0.155]*
Observations	284,615	284,615	284,615	139,664	102,754	144,951	124,999
Adjusted R-squared	0.928	0.928	0.928	0.918	0.924	0.938	0.936
State-industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Estimations consider simple production functions for manufacturing establishments in urban areas. Estimations report standard errors clustered by district-industry, include state-industry-year fixed effects, and weight observations by sample weights. + significant at 10% level; ++ significant at 5% level; +++ significant at 1% level.

Table 8b: Estimations of rural manufacturing production functions and local 1-person establishment shares

	Full sample	Full sample	Full sample	Tradables industries	Col. 4 excluding 1- person firms	Non-tradables industries	Col. 6 excluding 1- person firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DV: Log output in manufacturing establishment							
Log employment in establishment	0.372 [0.013]***	0.373 [0.013]***	0.375 [0.013]***	0.382 [0.020]***	0.611 [0.034]***	0.373 [0.016]***	0.463 [0.025]***
Log capital in establishment	0.128 [0.006]***	0.126 [0.006]***	0.126 [0.006]***	0.095 [0.010]***	0.117 [0.013]***	0.143 [0.008]***	0.149 [0.009]***
Log materials in establishment	0.555 [0.009]***	0.554 [0.009]***	0.554 [0.009]***	0.594 [0.013]***	0.528 [0.020]***	0.533 [0.012]***	0.517 [0.013]***
Informal manufacturing employment share in district		-0.199 [0.033]***	-0.217 [0.040]***	-0.148 [0.072]**	-0.229 [0.094]**	-0.242 [0.047]***	-0.243 [0.053]***
Informal manufacturing 1-person firm employment share in district			0.067 [0.089]	-0.196 [0.175]	-0.327 [0.234]	0.203 [0.088]**	0.206 [0.100]**
Observations	266,718	266,718	266,718	86,983	51,865	179,735	139,321
Adjusted R-squared	0.925	0.925	0.925	0.929	0.942	0.924	0.929
State-industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: See Table 8a.

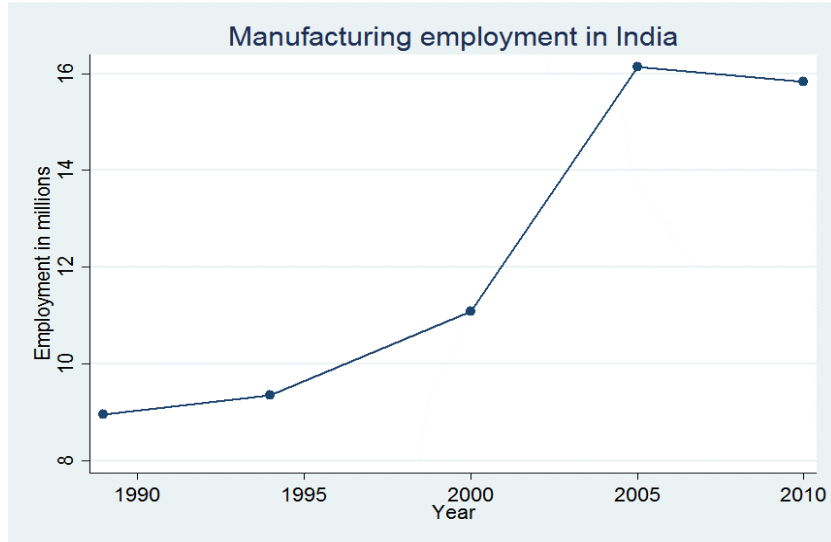
Table 9: Multivariate estimations of push vs. pull entry at the district-industry level

	All industries		Tradable industries		Non-Tradable industries	
	Full sample	New firms	Full sample	New firms	Full sample	New firms
	(1)	(2)	(3)	(4)	(5)	(6)
DV: Log employment in informal sector 1-person firms						
Panel A: Urban areas						
Log employment in informal sector firms with 2-5 employees	0.116*** (0.008)	0.068*** (0.006)	0.137*** (0.013)	0.095*** (0.010)	0.103*** (0.011)	0.049*** (0.007)
Log employment in informal sector firms with >5 employees	0.033*** (0.008)	0.021*** (0.007)	0.048*** (0.012)	0.039*** (0.012)	0.023** (0.011)	0.009 (0.008)
Log employment in organized sector firms with 1-50 employees	-0.026*** (0.010)	0.008 (0.008)	-0.033** (0.016)	0.013 (0.013)	-0.023* (0.013)	0.003 (0.009)
Log employment in organized sector firms with >50 employees	-0.008 (0.008)	0.006 (0.006)	-0.008 (0.012)	0.009 (0.011)	-0.008 (0.011)	0.002 (0.008)
Observations	30,882	30,882	12,449	12,449	18,433	18,433
Panel B: Rural areas						
Log employment in informal sector firms with 2-5 employees	0.114*** (0.010)	0.079*** (0.007)	0.084*** (0.016)	0.091*** (0.012)	0.139*** (0.012)	0.072*** (0.009)
Log employment in informal sector firms with >5 employees	0.011 (0.011)	0.026*** (0.008)	0.009 (0.020)	0.013 (0.017)	0.011 (0.012)	0.028*** (0.010)
Log employment in organized sector firms with 1-50 employees	-0.039*** (0.012)	0.003 (0.009)	-0.068*** (0.021)	0.017 (0.014)	-0.019 (0.015)	0.001 (0.011)
Log employment in organized sector firms with >50 employees	-0.025*** (0.010)	-0.002 (0.007)	-0.038** (0.017)	-0.001 (0.012)	-0.013 (0.012)	-0.002 (0.009)
Observations	27,867	27,867	9,081	9,081	16,961	16,961

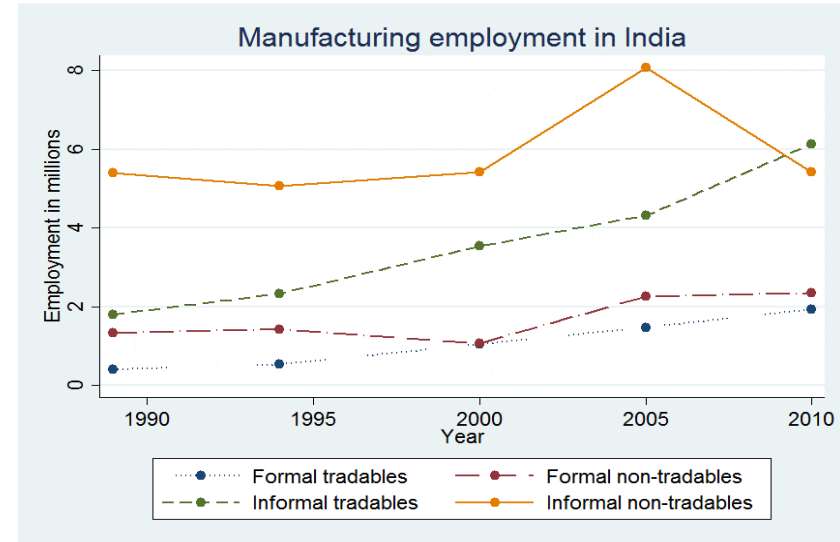
Notes: Estimations include district-industry, industry-year, and state-year fixed effects and control for state-industry-year output trends. Estimations report standard errors clustered at the district-industry level and weight observations by sample weights. District-industry cells with less than 4 observations were dropped from the sample in order to incorporate fixed effects. * significant at 10% level; ** significant at 5% level; *** significant at 1% level.

App. Figure 1a: Indian manufacturing employment growth trends in low-density districts

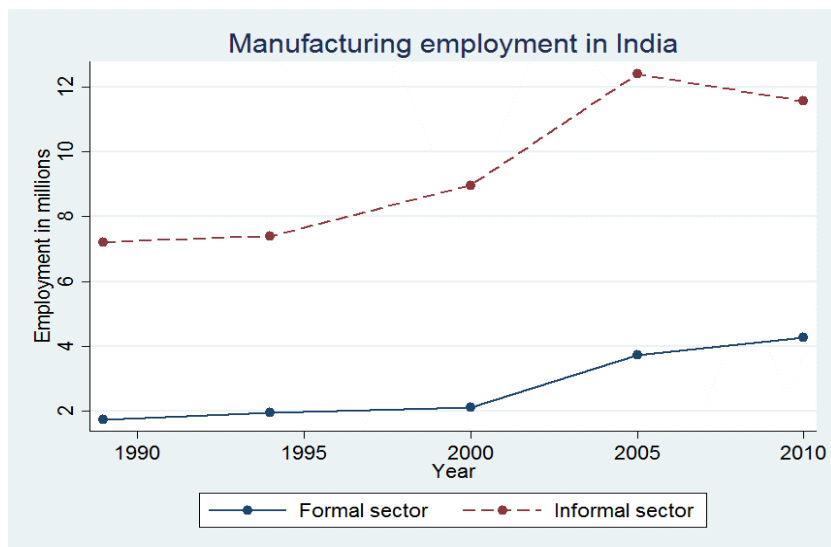
A. Manufacturing total



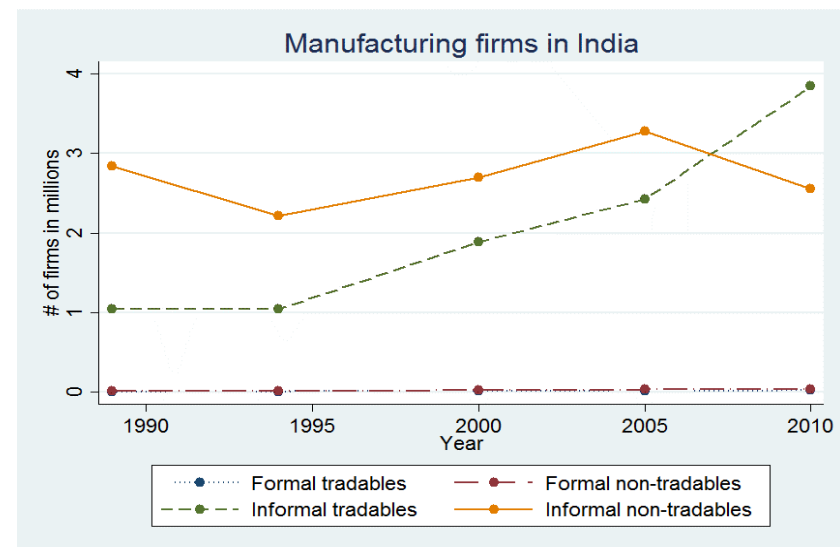
C. Tradables and non-tradables



B. Formal and informal sectors



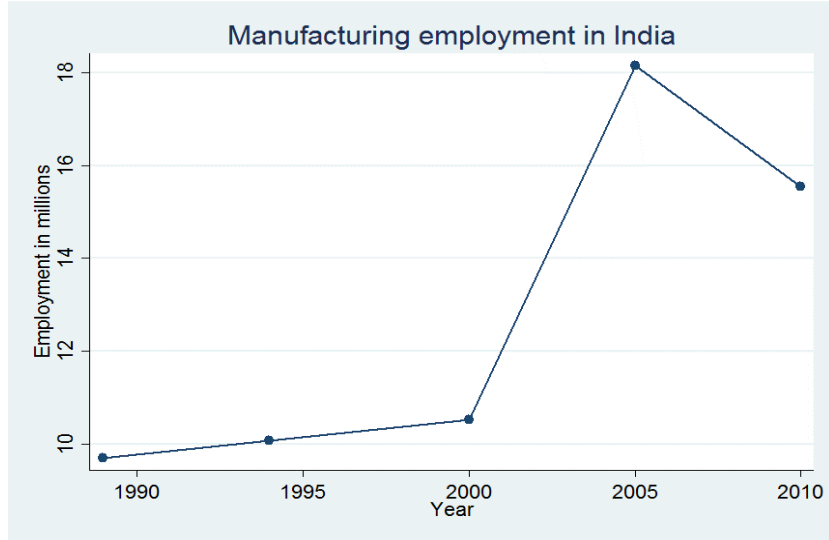
D. Panel C with establishments



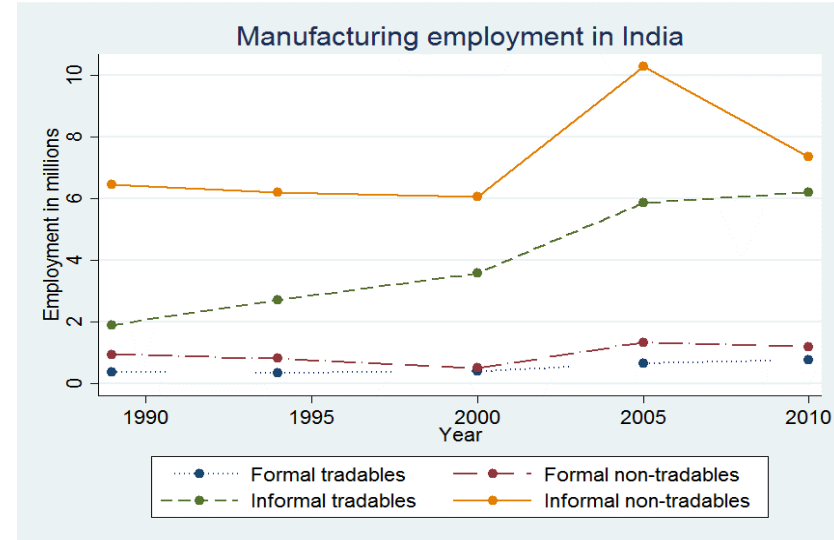
Notes: See Figure 1d.

App. Figure 1b: Indian manufacturing employment growth trends in medium-density districts

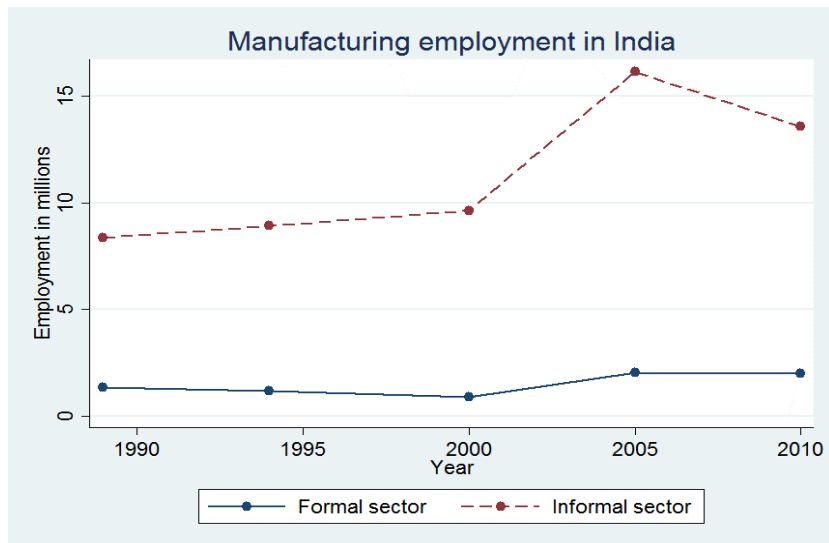
A. Manufacturing total



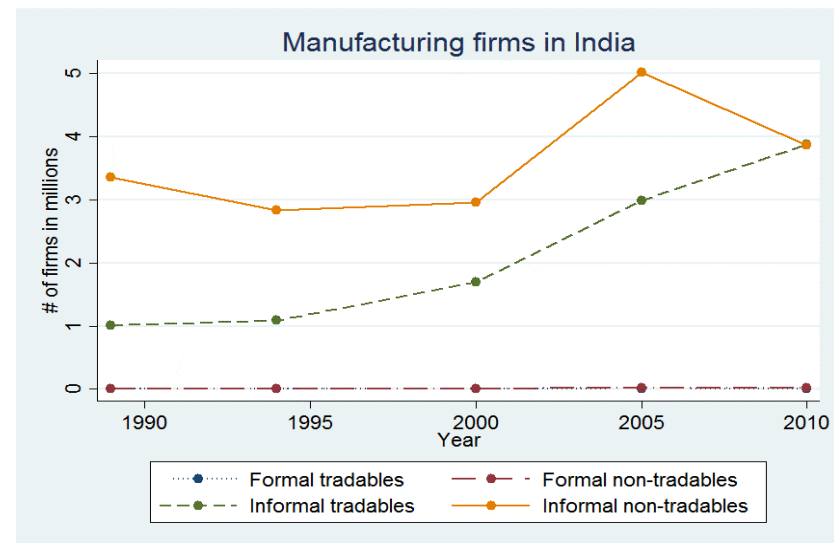
C. Tradables and non-tradables



B. Formal and informal sectors



D. Panel C with establishments



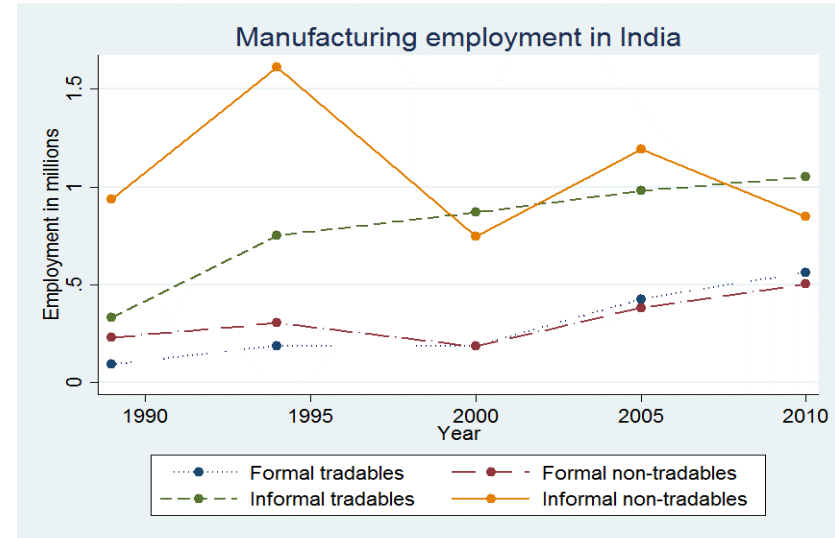
Notes: See Figure 1d.

App. Figure 1c: Indian manufacturing employment growth trends in high-density districts

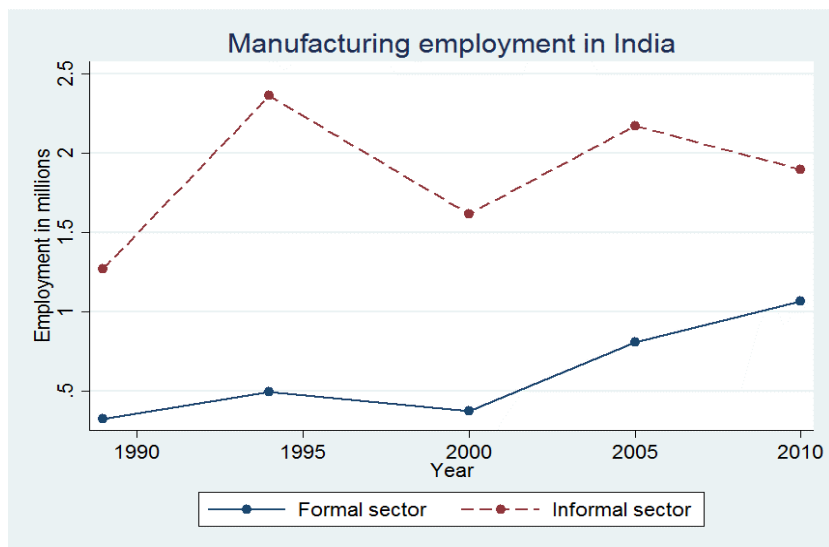
A. Manufacturing total



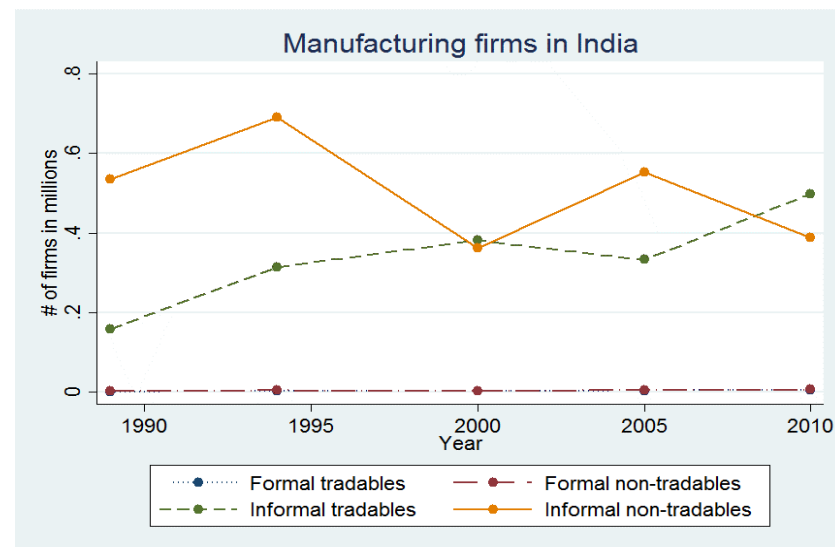
C. Tradables and non-tradables



B. Formal and informal sectors



D. Panel C with establishments



Notes: See Figure 1d.

App. Table 1a: Industries classified as tradable

NIC	Description
151	Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats
172	Finishing of textiles
173	Manufacture of knitted and crocheted fabrics and articles
181	Manufacture of wearing apparel, except fur apparel
191	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness
192	Manufacture of footwear
221	Publishing
232	Manufacture of refined petroleum products
241	Manufacture of basic chemicals
242	Manufacture of other chemical products
243	Manufacture of man-made fibres
261	Manufacture of glass and glass products
272	Manufacture of basic precious and non-ferrous metals
289	Manufacture of other fabricated metal products; metalworking service activities
291	Manufacture of general -purpose machinery
292	Manufacture of special-purpose machinery
300	Manufacture of office, accounting and computing machinery
312	Manufacture of electricity distribution and control apparatus
319	Manufacture of other electrical equipment n.e.c.
321	Manufacture of electronic valves and tubes and other electronic components
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
331	Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments
332	Manufacture of optical instruments and photographic equipment
333	Manufacture of watches and clocks
351	Building and repairing of ships and boats
353	Manufacture of aircraft and spacecraft
369	Manufacturing n.e.c.

App. Table 1b: Industries classified as non-tradable

NIC	Description
152	Manufacture of dairy products
153	Manufacture of grain mill products, starches and starch products, and prepared animal feeds
154	Manufacture of other food products
155	Manufacture of beverages
160	Manufacture of tobacco products
171	Spinning, weaving and finishing of textiles
182	Dressing and dyeing of fur; manufacture of articles of fur
201	Sawmilling and planing of wood
202	Manufacture of products of wood, cork, straw and plaiting materials
210	Manufacture of paper and paper products
222	Printing and service activities related to printing
223	Reproduction of recorded media
231	Manufacture of coke oven products
233	Processing of nuclear fuel
251	Manufacture of rubber products
252	Manufacture of plastics products
269	Manufacture of non-metallic mineral products n.e.c.
271	Manufacture of basic iron and steel
273	Casting of metals
281	Manufacture of structural metal products, tanks, reservoirs and steam generators
293	Manufacture of domestic appliances n.e.c.
311	Manufacture of electric motors, generators and transformers
313	Manufacture of insulated wire and cable
314	Manufacture of accumulators, primary cells and primary batteries
315	Manufacture of electric lamps and lighting equipment
341	Manufacture of motor vehicles
342	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
343	Manufacture of parts and accessories for motor vehicles and their engines
352	Manufacture of railway and tramway locomotives and rolling stock
359	Manufacture of transport equipment n.e.c.
361	Manufacture of furniture

App. Table 2: Sizes of industries, 2000

NIC	Industry Description	Organized sector			Unorganized sector		
		Plants	Empl	Output	Plants	Empl	Output
15	Food products and beverages	21.4	1,261.4	1,234,459	1,743.6	4,622.3	392,886
16	Tobacco products	2.2	475.2	103,597	169.7	485.8	16,820
17	Textiles	12.3	1,245.9	773,018	724.5	2,034.3	149,788
18	Wearing apparel; dressing and dyeing of fur	2.8	329.2	141,507	2,018.0	3,257.1	93,687
19	Leather; luggage, handbags, saddlery, harness and footwear	2.2	135.7	88,793	130.5	287.3	22,159
20	Wood and wood products, except furniture; straw and plating	2.7	45.6	18,731	1,226.7	2,646.0	76,124
21	Paper and paper products	3.2	176.1	178,617	59.6	189.9	17,998
22	Publishing, printing and reproduction of recorded media	3.0	116.7	53,516	109.4	382.3	36,042
23	Coke, refined petroleum and nuclear fuel	0.8	66.7	771,868	5.6	19.0	2,807
24	Chemicals and chemical products	9.9	779.8	1,439,134	38.8	198.9	40,877
25	Rubber and plastic products	6.4	251.1	258,618	50.5	216.3	42,320
26	Other non-metallic mineral products	10.5	428.3	288,191	623.9	2,562.2	116,946
27	Basic metals	6.5	551.0	820,940	15.5	73.1	28,293
28	Fabricated metal products, except machinery and equipments	7.9	292.6	181,534	282.1	797.0	80,883
29	Machinery and equipment, n.e.c.	8.9	422.9	373,526	52.5	224.1	43,967
30	Office, accounting and computing machinery	0.2	17.1	36,757	0.2	0.9	309
31	Electrical machinery and apparatus, n.e.c.	3.7	229.0	237,760	35.8	183.6	283,943
32	Radio, television, and communication equipment and apparatus	1.0	109.1	166,577	4.0	25.7	2,995
33	Medical, precision and optical instruments, watches and clocks	0.9	58.8	42,137	4.7	19.3	3,511
34	Motor vehicles, trailers and semi-trailers	2.5	257.3	389,512	9.3	45.9	9,931
35	Other transport equipment	1.8	182.7	200,111	8.3	38.2	7,273
36	Furniture, manufacturing n.e.c.	2.1	119.3	105,705	435.0	1,078.1	90,704
	Traditional	70.3	4,626.0	3,167,666	7,523.1	18,342.3	1,094,037
	Modern	42.8	2,925.5	4,736,939	225.1	1,045.0	466,225

Notes: Plants and employments are expressed in thousands. Output is expressed in millions of rupees. "n.e.c." stands for Not Elsewhere Classified. Taken from Ghani et al. (2013b).

App. Table 3a: Complete regression results for Panel A of Table 6

	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1- person firm employment share 1989-2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log population	-0.014 [0.030]	-0.043 [0.072]	-0.027 [0.040]	-0.008 [0.045]	-0.142 [0.078]*	0.006 [0.086]	-0.065 [0.110]	-0.161 [0.098]
Log population density	0.027 [0.030]	-0.000 [0.035]	-0.056 [0.033]*	-0.008 [0.021]	-0.014 [0.041]	-0.074 [0.085]	-0.107 [0.070]	-0.008 [0.057]
Share of population that is urban	0.112 [0.029]***	0.129 [0.044]***	0.116 [0.040]***	0.078 [0.034]**	-0.295 [0.058]***	0.171 [0.081]**	0.176 [0.117]	-0.150 [0.076]**
Share of population that is middle aged (15-49)	-0.085 [0.049]*	-0.038 [0.062]	0.011 [0.031]	0.026 [0.034]	-0.039 [0.079]	0.014 [0.076]	0.098 [0.095]	-0.168 [0.090]*
Share of population in scheduled caste/tribe	-0.039 [0.018]**	0.043 [0.040]	-0.039 [0.034]	0.005 [0.024]	0.099 [0.042]**	-0.100 [0.086]	0.008 [0.069]	0.065 [0.052]
Female labor force participation rate	0.034 [0.024]	0.143 [0.050]***	0.025 [0.027]	0.009 [0.042]	0.015 [0.071]	0.026 [0.057]	-0.136 [0.133]	0.053 [0.078]
Educated worker share (middle and up)	0.056 [0.042]	0.123 [0.097]	0.043 [0.036]	0.069 [0.065]	-0.249 [0.094]***	0.084 [0.110]	0.088 [0.130]	-0.283 [0.122]**
Literacy rate	-0.012 [0.050]	-0.035 [0.083]	-0.060 [0.043]	-0.030 [0.055]	0.314 [0.110]***	-0.051 [0.130]	-0.040 [0.143]	0.387 [0.142]***
Infrastructure: share of villages with electricity	0.024 [0.032]	-0.055 [0.053]	-0.010 [0.028]	0.031 [0.034]	-0.021 [0.079]	-0.036 [0.091]	0.112 [0.094]	0.071 [0.089]
Infrastructure: share of villages with paved roads	0.000 [0.028]	0.057 [0.056]	0.025 [0.032]	-0.061 [0.047]	-0.181 [0.088]**	0.009 [0.092]	-0.209 [0.112]*	0.133 [0.097]
Labor laws strength	-0.008 [0.010]	-0.012 [0.027]	0.034 [0.022]	0.004 [0.019]	-0.068 [0.057]	0.082 [0.069]	0.026 [0.049]	-0.122 [0.048]**
Travel time to nearest of India's ten largest cities	-0.011 [0.026]	0.001 [0.047]	0.007 [0.020]	-0.049 [0.043]	0.145 [0.063]**	-0.048 [0.064]	-0.135 [0.091]	0.310 [0.070]***
Share of households with a bank account	0.223 [0.165]	-0.253 [0.388]	0.044 [0.160]	-0.337 [0.224]	-0.580 [0.537]	-0.061 [0.464]	-0.683 [0.813]	-0.166 [0.561]
Observations	216	216	216	216	216	216	216	216
Adjusted R-squared	0.166	0.081	0.126	0.083	0.390	0.060	0.103	0.270

Notes: See Table 6.

App. Table 3b: Complete regression results for Panel B of Table 6

	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1- person firm employment share 1989-2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log population	0.087 [0.051]*	0.090 [0.084]	0.095 [0.088]	0.194 [0.108]*	0.068 [0.068]	0.071 [0.065]	0.016 [0.101]	0.010 [0.081]
Log population density	0.022 [0.050]	-0.009 [0.040]	-0.102 [0.063]	-0.040 [0.058]	0.008 [0.039]	-0.046 [0.047]	-0.009 [0.054]	-0.002 [0.051]
Share of population that is urban	0.130 [0.044]***	0.070 [0.046]	0.178 [0.076]**	0.172 [0.085]**	-0.094 [0.048]*	0.088 [0.057]	0.151 [0.079]*	-0.092 [0.060]
Share of population that is middle aged (15-49)	-0.118 [0.070]*	-0.061 [0.106]	0.031 [0.052]	-0.014 [0.079]	-0.120 [0.069]*	0.051 [0.042]	-0.112 [0.114]	-0.219 [0.081]***
Share of population in scheduled caste/tribe	-0.077 [0.040]*	0.022 [0.036]	-0.129 [0.073]*	-0.010 [0.072]	0.011 [0.042]	-0.068 [0.054]	-0.099 [0.089]	-0.049 [0.055]
Female labor force participation rate	0.112 [0.082]	0.155 [0.069]**	0.105 [0.083]	0.151 [0.077]*	0.078 [0.057]	0.032 [0.044]	0.108 [0.099]	0.086 [0.067]
Educated worker share (middle and up)	0.273 [0.094]***	0.238 [0.151]	0.111 [0.058]*	0.212 [0.123]*	-0.228 [0.082]***	0.043 [0.050]	0.174 [0.108]	-0.432 [0.118]***
Literacy rate	-0.090 [0.076]	-0.214 [0.134]	-0.033 [0.064]	-0.215 [0.147]	0.249 [0.104]**	-0.005 [0.062]	-0.194 [0.140]	0.470 [0.157]***
Infrastructure: share of villages with electricity	0.028 [0.104]	0.124 [0.082]	-0.093 [0.106]	0.186 [0.083]**	-0.025 [0.078]	-0.045 [0.057]	0.151 [0.077]*	-0.099 [0.098]
Infrastructure: share of villages with paved roads	-0.016 [0.061]	0.007 [0.051]	0.061 [0.071]	-0.085 [0.076]	-0.076 [0.067]	0.053 [0.045]	-0.060 [0.064]	0.084 [0.086]
Labor laws strength	-0.037 [0.026]	-0.082 [0.036]**	0.049 [0.046]	-0.105 [0.069]	0.000 [0.057]	0.022 [0.041]	-0.049 [0.061]	-0.040 [0.055]
Travel time to nearest of India's ten largest cities	-0.026 [0.048]	-0.056 [0.076]	0.079 [0.042]*	-0.095 [0.092]	0.195 [0.050]***	0.069 [0.038]*	-0.078 [0.083]	0.340 [0.066]***
Observations	198	198	198	198	198	198	198	198
Adjusted R-squared	0.160	0.078	0.157	0.083	0.292	0.107	0.050	0.286

Notes: See Table 6.

App. Table 3c: Complete regression results for Panel C of Table 6

	Overall growth 1989→2010	Overall growth 2000→2010	1-Person firm growth 1989→2010	1-Person firm growth 2000→2010	Average 1- person firm employment share 1989-2010	Tradables 1- person firm growth 1989→2010	Tradables 1- person firm growth 2000→2010	Tradables 1- person firm employment share 1989-2010
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log population	-0.076 [0.031]**	-0.110 [0.080]	-0.124 [0.060]**	-0.079 [0.112]	-0.248 [0.084]***	-0.131 [0.101]	-0.062 [0.088]	-0.301 [0.096]***
Log population density	0.008 [0.021]	0.009 [0.039]	-0.018 [0.025]	0.001 [0.047]	-0.074 [0.052]	-0.013 [0.067]	-0.098 [0.077]	-0.037 [0.065]
Share of population that is urban	0.070 [0.028]**	0.084 [0.047]*	0.078 [0.044]*	0.120 [0.153]	-0.153 [0.074]**	0.399 [0.164]**	0.075 [0.136]	-0.012 [0.090]
Share of population that is middle aged (15-49)	-0.073 [0.057]	0.008 [0.053]	-0.078 [0.070]	0.127 [0.100]	-0.061 [0.098]	0.035 [0.114]	0.138 [0.096]	-0.101 [0.110]
Share of population in scheduled caste/tribe	-0.026 [0.034]	0.053 [0.048]	-0.029 [0.050]	0.048 [0.051]	0.161 [0.053]***	-0.149 [0.105]	0.028 [0.054]	0.149 [0.062]**
Female labor force participation rate	0.045 [0.062]	0.081 [0.050]	0.067 [0.089]	-0.045 [0.141]	0.015 [0.078]	-0.067 [0.084]	-0.168 [0.162]	-0.020 [0.088]
Educated worker share (middle and up)	0.002 [0.045]	-0.042 [0.077]	0.030 [0.062]	0.087 [0.160]	-0.374 [0.132]***	-0.081 [0.198]	0.060 [0.120]	-0.269 [0.151]*
Literacy rate	-0.024 [0.068]	0.078 [0.079]	-0.090 [0.093]	-0.064 [0.148]	0.329 [0.152]**	-0.052 [0.266]	-0.042 [0.132]	0.183 [0.178]
Infrastructure: share of villages with electricity	-0.005 [0.052]	-0.120 [0.049]**	-0.044 [0.078]	0.066 [0.100]	-0.037 [0.102]	0.037 [0.121]	0.068 [0.129]	0.166 [0.102]
Infrastructure: share of villages with paved roads	0.058 [0.072]	0.089 [0.073]	0.121 [0.086]	-0.229 [0.154]	-0.109 [0.108]	-0.075 [0.158]	-0.267 [0.154]*	0.207 [0.113]*
Labor laws strength	0.015 [0.019]	0.033 [0.029]	0.038 [0.024]	0.009 [0.043]	-0.067 [0.060]	0.109 [0.086]	0.029 [0.052]	-0.108 [0.052]**
Travel time to nearest of India's ten largest cities	0.030 [0.036]	0.049 [0.044]	0.035 [0.047]	-0.104 [0.121]	0.152 [0.074]**	-0.004 [0.089]	-0.069 [0.098]	0.241 [0.076]***
Observations	203	203	203	203	203	203	203	203
Adjusted R-squared	0.042	0.088	0.054	0.047	0.300	0.085	0.073	0.234

Notes: See Table 6.