Working Paper

URBANIZATION AND AGGLOMERATION BENEFITS: Gender Differentiated Impacts on Enterprise Creation in India's Informal Sector

Ejaz Ghani, Ravi Kanbur, and Stephen D. O'Connell

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By

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Ravi Kanbur
Stephen D. O'Connell

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Abstract

This paper presents an exploration at the intersection of four important themes in the current development discourse: urbanization, agglomeration benefits, gender and informality. Focusing on the important policy objective of new enterprise creation in the informal sector, it asks and answers four specific questions on the impact of urbanization and gender. It finds that (i) the effect of market access to inputs, on creation of new enterprises in the informal sector, is greater in more urbanized areas; (ii) This "urbanization gradient" also exists separately for the creation of female owned enterprises and male owned enterprises; (iii) there is a differential impact of female specific market access compared to male specific market access, on female owned enterprise creation in the informal sector ; and (iv) gender specific market access to inputs matters equally in more or less urbanized areas. Among the policy implications of these findings are that (i) new enterprise creation by females can be encouraged by urbanization, but (ii) the effect can be stronger by improving female specific market access, especially to inputs. The analysis in this paper opens up a rich research agenda, including further investigation of the nature of input based versus output based perspectives on agglomeration benefits, and exploration of policy instruments that can improve female specific market access, which is shown to increase female owned enterprise creation.

1.   Introduction

The ongoing process and pace of urbanization in developing countries is the subject of much discussion and analysis. The famous "tipping point", where more than half the world's population is now urban, driven largely by urbanization in developing countries, has further spurred the debate on the benefits and costs of urbanization.[1] Among the key benefits of urbanization are the advantages of agglomeration. The simplest way of conceptualizing these benefits has been through the impact of location externalities. It is hypothesized that being located in a dense network of production and market access linkages increases the productivity and lowers the unit costs of each individual enterprise in the network.[2] These agglomeration and market access externalities lead to a positive feedback loop until they are countered eventually by the congestion costs that agglomeration can also bring.[3]

Unpacking the specific nature of agglomeration externalities, and going beyond a simple specification of impact on unit costs, is not straightforward. One route to a deeper exploration is to consider in detail the industrial structure of a location, and to gauge market access effects of the connectedness of an enterprise to the suppliers of its inputs and the purchasers of its outputs.[4] The hypothesis is that urbanization, which is associated with greater spatial density of economic activity, also brings with it greater proximity of suppliers and customers, improves market access and hence the benefits of agglomeration on costs and productivity of each individual enterprise. Such "Marshallian" conceptualization underlies much recent work on agglomeration benefits in industrialized economies.[5] For developing countries, the approach has been followed by Mukim (2011) and Ghani, Kerr and O'Connell (2011).

Two further questions often arise in the discourse on urbanization and its costs and benefits. First, although urbanization has continued at a rapid pace in developing countries, formalization appears to have stalled, or at least does not seem to be proceeding as rapidly as might be expected given country growth rates (Ghani, Kerr and O'Connell, 2013b; Ghani and Kanbur, 2013). Further, in India, the mass of informal enterprises seems to be moving in to urban areas and the mass of formal enterprises seems to be moving out of urban areas. Thus, increasingly, the effects of urbanization are as likely to be found in the outcomes for informal enterprises as for formal enterprises.

Secondly, the overrepresentation of women in informal sector employment has been an important departure point in the literature. However, there is a corresponding underrepresentation of women in the ownership of enterprises in the informal sector. What exactly are the roles of market access and urbanization in this underrepresentation, and how these factors impact the creation of new women owned enterprises in the informal sector, are therefore important analytical and policy questions to be addressed.

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[1] Glaeser and Joshi-Ghani (2013), Beall, Guha-Khasnobis and Kanbur (2010)
[2] Fujita, Krugman and Venables (1999).
[3] Overman and Venables (2010).
[4] Ellison and Glaeser (1997), Glaeser and Kerr (2009).
[5] Glaeser and Kerr (2009), Jofre-Monseny et. al. (2011), Dauth (2011).

With this background, this paper analyzes the effects of urbanization, gender and market access on a critical outcome variable—the creation of new enterprises in the informal sector. We take a gender differentiated perspective both in terms of the outcome variable (we consider enterprise creation in general and the creation of female owned enterprises separately), and in terms of the Marshallian channels of agglomeration effects (we construct and consider the impact of general and gender specific market access variables). We focus on the case of India using a 2005-06 survey dataset of unorganized manufacturing enterprises carried out by India's National Sample Survey Organization (NSSO). Following earlier work (Ghani, Kerr and O'Connell, 2011) the outcome variable of interest is creation of new enterprises, measured specifically as employment in young enterprises (less than three years old).

Focusing on the determinants of enterprise creation, the paper poses a series of specific questions:

- Is the effect of general market access on creation of new enterprises in the informal sector greater in more urbanized areas?
- Does the above "urbanization gradient" exist also for the creation of female owned enterprises, and does it differ from male owned enterprises?
- Is there a differential impact of female specific market access compared to male specific market access, on female owned enterprise creation in the informal sector?
- Does the effect of gender specific market access vary with the degree of urbanization?

The plan of the paper is as follows. Section 2 sets out the background and basic framework with an introduction to the data and the estimating equation. Section 3 assesses the impact on the creation of enterprises owned by females and males, of the interaction of the Marshallian channels with urbanization. In Section 3, although the outcome variables are gender differentiated, the Marshallian channels are not. Section 4 goes a step further and constructs gender specific Marshallian measures and assesses their impact on gender specific enterprise creation. Section 5 concludes with possible policy implications, and a set of puzzles and areas for further research.

2.   The Basic Framework

Following earlier work, and in recognition of data limitations, our analysis focuses on (i) India's informal sector in manufacturing as the universe of enterprises, and (ii) on employment in young enterprises, those less than three years old, as the outcome variable of interest. As is well known, India's manufacturing enterprises are divided into an "organized" sector and an" unorganized" sector. The organized sector comprises all enterprises required to register under the Factories Act of 1948. These are enterprises that have 10 workers or more if they use electricity, and 20 workers or more if they do not. The Annual Survey of Industries (ASI) conducts a survey of enterprises registered under the Factories Act every year. Enterprises that are not registered under the Factories Act are surveyed separately, under the NSSO Survey of Unorganised Manufactures conducted approximately every five years.

In principle, we can construct a universe of all manufacturing enterprises in India by combining these two data sources. This is done, and among others, in Ghani, Kerr and O'Connell (2011). However, the two data sources are independent of each other and collect different information. Crucially from our perspective, the ASI does not have gender differentiated information on enterprise ownership. Thus in this paper we will focus only on the NSSO data source. This is a restriction because we leave out the unorganized sector as officially defined. However, as Chatterjee and Kanbur (2013) show in their analysis of non-compliance with India's Factories Act, there are as many enterprises in the NSSO who should be registered under the Factories Act but are not, as there are registered enterprises reported in the ASI. Thus our data source captures at least some large enterprises as well. The focus on NSSO survey also ensures a sole focus on the unorganized sector.

Before developing the framework for analyzing the interactions between urbanization, gender and market access on enterprise creation, we begin with the basic trends on enterprises in the informal sector. Tables 1, 2 and 3 provide information on trends in employment in enterprises disaggregated by the gender of owner and workers. The striking finding is that there is a large increase in the share of employment in women-owned establishments in the manufacturing sector over a relatively short period of time: from 9% of total (organized + unorganized) manufacturing employment in 1994 to 19% in 2005. (Table 1, top right panel). We note that if we look only at women's employment as a share of total manufacturing employment (rather than employment in women-owned establishments) we find a relatively stable trend: women comprise 27-29% of manufacturing employees in any of the years we study (Table 3, top right). So this highlights that while there may not be huge employment shifts, there is an important ownership dynamic to pay attention to.

Female ownership is largely concentrated in household establishments, and this remains relatively stable (Table 1, bottom right panel). These establishments continue to comprise only a fraction of total output, and this share of output has remained small over the time period even given the changes in employment (Table 2, top right). Among female proprietorships, there has been some shift in the distribution of output away from

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household-base establishments toward non-household establishments (Table 2, bottom right). These features may become relevant as we interpret the impact of market access for on female enterprise creation.

Table 4 looks at growth of employment within various size classes for male and female-owned enterprises separately. The largest employment growth among female owned enterprises was in the 1-employee size category (both in terms of growth rate, and number employed); second largest growth in terms of sheer numbers was the 2-4 category. For men, largest growth in both share and numbers was in the 11+ category. Thus female owned enterprises have distinctly different growth patterns than men owned enterprises in this respect. This differentiation in gender trend by size of enterprise can also be a channel of differential impact of Marshallian agglomeration economies on the growth of female owned enterprises.

Table 5 looks at the employment-by-plant ownership breakdown across rural and urban areas. Among urban areas, employment in female-owned establishments went from 6% in 1994 to 14% in 2005; in rural areas, 11 to 22%. Thus there is a slightly stronger pattern of growth in female owned business employment in urban versus rural areas—the total employment in women-owned businesses nearly tripled in urban (and doubled in rural). Thus urbanization seems to be favoring the growth of female owned enterprises, a trend which will need to be investigated in greater detail.

With this background on gender differentiated trends in enterprise growth, we turn now to the specific framework for our investigation of the interaction between urbanization, gender and market access in the creation of new informal enterprises. We make a basic distinction between young enterprises, those less than three years old, and incumbent enterprises, of age three years or more. Employment in young enterprises is our independent variable to be explained, and the industrial structure of incumbent enterprises is the key explanatory variable, capturing the Marshallian channel of agglomeration benefits. The specific dependent variable is employment in new enterprises divided by employment in incumbent enterprises, for all enterprises, female enterprises and for male enterprises. We call this variable "Entry" for obvious reasons:

Entry=[employment in all | male | female NEW establishments]/ [employment in all | male | female INCUMBENT establishments]

The microdata are aggregated up from plant-level observations to district and 3 digit industry "cells" using the sampling weights to get population counts of plants and employment. Following Glaeser and Kerr (2009), the central idea is to compare a location's industrial composition to that industry's input and output flows nationally. The latter is the benchmark giving an estimate of the industry's requirement. Comparing this to the district's actual industrial composition then gives a measure of how conducive the location is to that industry's development and in particular to the emergence of new enterprises in that industry in that location.

The above pattern can be estimated for India as set out in Ghani, Kerr and O'Connell (2011). Using India's input output matrix, we first calculate the share of an industry i's input that comes from industry k. A location's industrial composition is proxied by the share of industry k in the location's total employment. The absolute difference between these two is then taken as the deviation of a location's industrial structure from the benchmark national input requirements for that industry. Summation of these deviations across all industries is then a measure of the unsuitability of the location for that industry. The negative of the summation is thus a measure of the Marshallian match between industry and location. The input based metric can be calculated on inter industry material flows, or on inter industry labor flows. For the latter, the benchmark used is for the industry in the United States, since the relevant data is not available for India.

The input based measure can be complemented with a corresponding output based measure which starts from the share of an industry i's output that is sold to industry k. For the input based Marshallian metric, the reasoning in Glaeser and Kerr (2009) is that the commodity input requirements for production of an output can be relatively fixed. Thus having suppliers around you who match your input needs is important. However, on the output side what is needed are those who purchase your output—the more of these, the better. The output metric is thus calculated simply as a weighted sum of the share of industry i's output sold to industry k, the weights being the employment share of industry in that location.[6]

The core regressions estimated in this paper follow from the logged version of the new enterprises measure via OLS in an "unrestricted" framework:

$$ln[employment\ in\ all\ |male\ |\ female\ NEW\ establishments + 1]_{i,j}$$
$$= \beta_0 + \beta_1[employment\ in\ all\ |male\ |\ female\ INCUMBENT\ establishments]_{i,j}$$
$$+ \beta[X]_{i,j} + u_{i,j}$$

Districts are indexed by i and industries by j. The X vector contains district and industry fixed effects, as well as the set of Marshallian metrics. We add one to the underlying counts to include district-industries reporting zero entry (ensuring the logarithm is defined). Standard errors are clustered by district. The Marshallian metrics are all transformed to have zero mean and unit standard deviation.

Further, the Marshallian metrics are interacted with urbanization variables to test for their channel of operation along the central hypothesis of this paper, and the metrics are also recalculated in gender disaggregated fashion to test for this dimension of the hypothesis. These estimations and tests are performed in Sections 3 and 4 respectively, and we now turn to these.

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[6] The output metric is more subject to outliers than the input metric. Because of this, we adjust this metric by winsorizing the 5 percentile tails of the variable before including in estimations.

3. Urbanization, Market Access and Enterprise Creation

If the benefits of urbanization work through the Marshallian market access mechanisms, we should be able to see an interaction of this impact with measures of urbanization. In what follows we create an "urbanization gradient" as follows. Urbanization of a district is measured either as population density or the standard urbanization rate (urban population divided by total population). We explore the interaction by first assigning districts into three groups for each measure based on the 33rd / 66th percentile value cutoffs (lowest third, middle, highest third). So the "density" variable for a district is 1,2,3 corresponding to higher values of overall density, and similarly for urbanization rate. We then interact this measure with the market access metrics to assess an imposed linear gradient across the 3 buckets. District fixed effects already in the estimation take care of the main effects of density or urbanization rate.

We first run a base regression with only the Marshallian metrics and fixed effects. The results are presented in Table 6 for total employment in new enterprises, and also for employment in new female owned and male owned enterprises. This estimation is similar to, but different from, specifications in Ghani, Kerr and O'Connell (2011). Consistent with their results, the Marshallian metrics are significant as determinants of employment in new enterprises controlling for total employment in incumbent enterprises.

The interaction results are presented in Table 7, and need to be compared to the base runs in Table 6. The overall conclusion from the comparison is that the main effect of the Marshallian metric is dominated by the interaction term. So, for example, in column 1 there are no statistically significant effects of the Marshallian metrics on their own: the effect is entirely dependent on the interaction term with the population density gradient. The interaction term is positive, suggesting the Marshallian effects are strongest in the densest of districts.

Column 2 performs the same analysis interacting with urbanization rate. Since these two measures are somewhat correlated across districts (correlation = 0.48 in the underlying measures used to bucket districts) it is not surprising that the pattern of importance of the interaction holds for the most part for the Input based metric. However, for the urbanization rate measure, the main effect of the output index remains a statistical significant determinant and is not affected by urbanization.

For female versus male enterprises, is there an urbanization gradient in the effect of local market access? Columns 3-4 and 5-6 of Table 7 estimate employment in new female- and male-owned plants, respectively. The trend with respect to the importance of the interaction term holds for both, and there does not appear to be a substantial difference in the urbanization gradient across female versus male entry employment.

Looking at the interaction terms across columns 1-6, one sees a robust pattern of significance of the interaction term between urbanization and the Marshallian input metric for material input flow, but a far less robust pattern for the labor inputs based

metric or for the output based metric. Thus the impact of a match between input requirements and input availability on enterprise creation is greater in more urbanized areas. However, there does not appear to be a gender differentiated impact of this Marshallian metric on enterprise creation—the effects are similar across male and female owned young enterprises. But this is with a non-gender differentiated Marshallian metric. The next section deepens the analysis by using gender-differentiated market access measures.

4.   Gender Differentiated Market Access

In Section 2 we highlighted some differences in patterns of growth of female owned enterprises (FOEs) and male owned enterprises (MOEs). For FOEs the growth has been more urban, and it has been in smaller enterprises. We might expect smaller enterprises to be more dependent on local market access, and for this market access to be stronger in urban areas. Yet in Section 3 we found no major gender differentiation in the interaction of urbanization and Marshallian market access metrics as a determinant in the creation of enterprises. But the Marshallian metrics calculated in Section 3 were themselves not gender specific. This section begins the task of constructing and using gender differentiated market access metrics.

The actual calculation of the gender differentiated metrics is straightforward. Recall that for the Marshallian material flows input metric, we start with the share of an industry i's input that comes from industry k, as calculated from the national level Input-Output matrix for India. This part of the calculation is unchanged as the benchmark for the input needs of an enterprise in industry i, whether female or male owned. However, this benchmark is now compared to the local own-gender industrial distribution. In other words, it is compared to the share of employment in female owned enterprises to in industry k to total female employment in the district.

The actual specification of the metric is then as in Section 2—the absolute differences are summed across all industries and the metric is the negative of these sums. The input basic metric using labor flows is calculated in analogous manner. For the output based metric we start again with the share of an industry i's output going to industry k. The metric is a weighted sum of this, but the weights are now the share of employment in FOEs in industry k as a share of total female employment. We are now in a position to pose our question: For enterprise creation by women, is there a difference in the effect of local market access measures based on female enterprises? These estimations are presented in Table 8.

Column 1 of Table 8 presents the estimation of total entry employment with market access measures constructed based on separate local industrial distributions of male and female-owned enterprises. We find the following when predicting total entry: (i) the distribution of both male and female businesses strongly predict entry via output market conductivity, with a positive but smaller in magnitude and statistically insignificant effect of male- and female-owned input markets; and (ii) labor market

conductivity based on male-owned businesses is a stronger determinant of total entry than that based on female-owned industry.

Our main interest of course is in how well gender differentiated market access predicts gender differentiated enterprise creation. In predicting female entry (column 2 of Table 8): (i) local female-owned input markets strongly predicts female entrepreneurship, while male-owned input markets have no effect; (ii) the labor input market based on female-owned industry predicts female entrepreneurship, with again no significant effect of labor market compatibility based on local male-owned industry; and (iii) we find a very different results for the output market metric—both local male- and female-owned output markets have a weakly significant effect on female entry—suggesting a potential "upstream" relationship of female producers supplying intermediate goods to both local female and male-owned businesses. Across metrics predicting female entry, the largest effect comes from female-based local input market strength, as opposed to labor or output markets.

In predicting male entry, local male-owned industrial distributions matter far more than local female-owned industrial distributions in predicting male entry (column 3 of Table 8). This is certainly the case for input and labor markets; again for output markets, both local female and male–owned industrial distributions matter, and these relationships are far larger in magnitude and statistical significance for male as opposed to female entry. Across metrics predicting male entry, the effect is stronger for the output markets comprised of male-owned businesses rather than material or labor input markets.

We appear then to have the strongest gender differentiated pattern for the Marshallian material flow based input metric of market access, seen most clearly in comparing rows 4 and 5 of columns 2 and 3 in Table 8. The gender specific market access metric is significant for gender specific enterprise creation. The result is also present for the labor flows input metric (rows 8 and 9 of columns 2 and 3). However, for the output based metric we have a different pattern: plant entry among both genders is equally predicted by own- and other-gender output market strength.

Finally, we investigate whether the effect of the own-gender market access measure differs by urbanization level. Table 9 estimates equations that answer this question. This is effectively a replication of columns 3-6 of Table 7, but replacing the general Marshallian metrics by gender-specific metrics. The findings fall in line with those of Table 7: the effect of input and labor market compatibility appears to differ by urbanization and density levels for both male and female enterprises. The effect of output market conductivity does not depend on urbanization or density, as the main effect is positive and strong for both male and female enterprise creation.

5.   Conclusion: Policy Implications and Further Research

This paper has been an exploration at the intersection of four important themes in the current development discourse: urbanization, agglomeration benefits, gender and informality. Let us return to the four questions posed in the Introduction. The analysis in this paper provides at least tentative answers to these questions.

- *Is the effect of general market access on creation of new enterprises in the informal sector greater in more urbanized areas?* Our analysis gives a positive answer to this question for metrics that capture market access to inputs. The interaction between market access for outputs and urbanization does not appear to be a strong factor in the creation of new enterprises.

- *Does the above "urbanization gradient" exist also for the creation of female owned enterprises, and does it differ from male owned enterprises?* We do not find significant gender differentiation in the impact of the interaction between market access and urbanization on enterprise creation. But this is for market access metrics that are themselves not gender differentiated.

- *Is there a differential impact of female specific market access compared to male specific market access, on female owned enterprise creation in the informal sector?* The analysis in this paper suggests significant gender differentiation in input based market access metrics. The female-owned industrial distribution of a location as a source of inputs matters for creation of female owned enterprises, and the male owned industrial distribution of a location as a source of inputs matters for creation of male owned enterprises. However, this is not the case for industrial distribution as a destination for the output of an enterprise.

- *Does the effect of gender specific market access vary with the degree of urbanization?* Gender specific market access matters, but it does not necessarily matter more in more urbanized areas. In this sense, therefore, the gender gradient in impact of market access on enterprise creation is not sharpened by an urbanization gradient, in the same way that the urbanization gradient in the impact of market access on enterprise creation is not sharpened by a gender gradient.

A simple way of summarizing the results above is to start with the basic result of Ghani, Kerr and O'Connell (2013)—that market access affects enterprise creation positively. This paper has shown that (i) this effect is stronger in more urbanized areas; (ii) this effect is gender differentiated—female market access aids female owned enterprise creation more; (iii) however, the urbanization effect and the gender differentiation effects do not further interact with each other.

What are the policy implications of these results if the objective is to encourage the creation of new enterprises in the informal sector? Keeping in mind the preliminary nature of the results, the following tentative conclusions can be drawn:

- Urbanization interacts with market access to inputs so as to encourage informal enterprise creation, and it does so equally for female and male enterprises. Thus informal enterprise creation, and especially informal female enterprise creation, has nothing to fear from urbanization per se.
- Female specific market access, especially access to inputs, is important for female owned enterprise creation in the informal sector. Given the persistence of the informal sector, and given the policy importance of female owned enterprise creation for the goal of gender equity, policy measures to enhance access to inputs for female owned enterprises are shown to be important.

The analysis presented here, and the policy conclusions, can be extended and refined in a number of directions. Analytically, one of the most important next steps is to better understand the difference that has emerged between the input based and the output based perspective of Marshallian agglomeration effects. The two types of metrics, whether gender differentiated or not, are shown to have different types of effects on enterprise creation when interacted with levels of urbanization. Higher levels of urbanization intensify the effect of the input based metric but not that of the output based metric. More research is needed to unpack the finding which our analysis has uncovered.

A second direction of research is to better understand the nature and properties of the gender differentiated market access metrics, which are shown to have gender differentiated impacts on enterprise creation. What are the determinants of gender specific market access, and how does it depend on policy instruments such as transport density, other infrastructure provision, and investment in education? These questions present a rich agenda for research and policy analysis in the future.

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Tables and Figures

Table 1: Manufacturing Employment Counts by Sector and Owner Gender

Persons Engaged in Indian Manufacturing, 1994-2005 (in 000s)

Sector	1994	2000	2005
Total	*34,424*	*40,702*	*40,336*
Organized	6,775	6,723	7,470
Unorganized	27,649	33,979	32,866
Female Proprietorship	*3,180*	*5,554*	*7,555*
Male Proprietorship	*22,813*	*26,576*	*23,265*
All Others	*1,656*	*1,849*	*2,046*

Persons Engaged in Indian Manufacturing, 1994-2005 share of total

Sector	1994	2000	2005
Total	*100%*	*100%*	*100%*
Organized	20%	17%	19%
Unorganized	80%	83%	81%
Female Proprietorship	*9%*	*14%*	*19%*
Male Proprietorship	*66%*	*65%*	*58%*
All Others	*5%*	*5%*	*5%*

Persons Engaged in Indian Manufacturing, 1994-2005 female-owned proprietorships only, by location (in 000s)

Sector	1994	2000	2005
Female Proprietorship	*3,180*	*5,554*	*7,555*
Household	2,882	4,934	6,800
Non-Household	296	619	751
Other/Unknown	2	1	4

Persons Engaged in Indian Manufacturing, 1994-2005 share of female-owned proprietorships, by location

Sector	1994	2000	2005
Female Proprietorship	*100%*	*100%*	*100%*
Household	91%	89%	90%
Non-Household	9%	11%	10%
Other/Unknown	0%	0%	0%

Source: Authors' calculations using Annual Survey of Industries/National Sample Survey

Table 2: Manufacturing Output Value by Sector and Owner Gender

Total Output in Indian Manufacturing, 1994-2005
(in MM 2005 USD at PPP)

Sector	1994	2000	2005
Total	*459,689*	*650,566*	*870,224*
Organized	384,375	501,638	705,215
Unorganized	75,314	148,927	165,009
Female Proprietorship	*3,154*	*7,142*	*10,362*
Male Proprietorship	*51,548*	*116,450*	*119,072*
All Others	*20,613*	*25,336*	*35,575*

Total Output in Indian Manufacturing, 1994-2005
share of total

Sector	1994	2000	2005
Total	*100%*	*100%*	*100%*
Organized	84%	77%	81%
Unorganized	16%	23%	19%
Female Proprietorship	*1%*	*1%*	*1%*
Male Proprietorship	*11%*	*18%*	*14%*
All Others	*4%*	*4%*	*4%*

Total Output in Indian Manufacturing, 1994-2005
female-owned proprietorships only, by location

Sector	1994	2000	2005
Female Proprietorship	*3,154*	*7,142*	*10,362*
Household	2,071	3,945	4,624
Non-Household	1,080	3,194	5,730
Other/Unknown	2	3	8

Total Output in Indian Manufacturing, 1994-2005
share of female-owned proprietorships, by location

Sector	1994	2000	2005
Female Proprietorship	*100%*	*100%*	*100%*
Household	66%	55%	45%
Non-Household	34%	45%	55%
Other/Unknown	0%	0%	0%

Source: Authors' calculations using Annual Survey of Industries/National Sample Survey

Table 3: Manufacturing Employment Counts by Sector and Employee Gender

Persons Engaged in Indian Manufacturing, 1994-2005
(in 000s)

Sector	1994	2000	2005
Total	*34,420*	*40,701*	*40,333*
Organized	*6,775*	*6,723*	*7,470*
Female workers	652	654	728
Male workers	3,702	3,414	3,361
Supervisory/contracted/other	2,421	2,656	3,382
Unorganized	*27,645*	*33,978*	*32,863*
Female workers	9,191	10,649	11,594
Male workers	18,454	23,329	21,269

Persons Engaged in Indian Manufacturing, 1994-2005
share of total

Sector	1994	2000	2005
Total	*100%*	*100%*	*100%*
Organized	*20%*	*17%*	*19%*
Female workers	2%	2%	2%
Male workers	11%	8%	8%
Supervisory/contracted/other	*7%*	*7%*	*8%*
Unorganized	*80%*	*83%*	*81%*
Female workers	27%	26%	29%
Male workers	54%	57%	53%

Persons Engaged in Indian Manufacturing, 1994-2005
female-owned proprietorships only, by location
(in 000s)

Sector	1994	2000	2005
Female workers	*9,842*	*11,303*	*12,321*
Organized	652	654	728
Unorganized	9,191	10,649	11,594

Persons Engaged in Indian Manufacturing, 1994-2005

share of female-owned proprietorships, by location

Sector	1994	2000	2005
Female workers	*100%*	*100%*	*100%*
Organized	*7%*	*6%*	*6%*
Unorganized	*93%*	*94%*	*94%*

Source: Authors' calculations using Annual Survey of Industries/National Sample Survey

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Table 4: Within various employment size classes, what has been the growth rate over the time period?

Persons Engaged, female-owned establishments by Establishment Size

Size	1994	2000	2005	change	change %
Total	3,180	5,554	7,555	4,375	138%
1	1,112	2,925	4,160	3,048	274%
2--4	1,866	2,312	2,975	1,109	59%
5--7	125	162	221	95	76%
8--10	28	80	85	57	205%
11+	49	75	115	66	133%

Establishment Size Share of Persons Engaged Female-owned establishments

Size	1994	2000	2005	change %
Total	100%	100%	100%	
1	35%	53%	55%	20%
2--4	59%	42%	39%	-19%
5--7	4%	3%	3%	-1%
8--10	1%	1%	1%	0%
11+	2%	1%	2%	0%

Persons Engaged, Male-owned establishments by Establishment Size

Size	1994	2000	2005	change	change %
Total	22,809	26,575	23,262	453	2%
1	2,940	4,183	3,519	579	20%
2--4	14,045	16,010	12,845	-1,200	-9%
5--7	3,089	3,188	3,198	110	4%
8--10	1,195	1,330	1,393	199	17%
11+	1,540	1,865	2,306	766	50%

Establishment Size Share of Persons Engaged Male-owned establishments

Size	1994	2000	2005	change %
Total	100%	100%	100%	
1	13%	16%	15%	2%
2--4	62%	60%	55%	-6%
5--7	14%	12%	14%	0%
8--10	5%	5%	6%	1%
11+	7%	7%	10%	3%

Source: Authors' calculations using Annual Survey of Industries/National Sample Survey

Table 5: Where is the 9-->19% pattern coming from?

Persons Engaged in Indian Manufacturing, 1994-2005 (in 000s)

Sector	1994	2000	2005
Total	*34,413*	*40,701*	*40,333*
Total Urban	*13,301*	*16,529*	*16,414*
Organized	4,595	4,124	4,274
Unorganized	8,706	12,405	12,141
Female Proprietorship	*764*	*1,814*	*2,245*
Male Proprietorship	*6,892*	*9,564*	*8,820*
All Others	*1,051*	*1,026*	*1,075*
Total Rural	*21,111*	*24,172*	*23,919*
Organized	2,173	2,599	3,197
Unorganized	18,938	21,573	20,722
Female Proprietorship	*2,417*	*3,739*	*5,310*
Male Proprietorship	*15,917*	*17,011*	*14,441*
All Others	*605*	*823*	*971*

Persons Engaged in Indian Manufacturing, 1994-2005 share of total

Sector	1994	2000	2005
Total	*-*	*-*	*-*
Total Urban	*100%*	*100%*	*100%*
Organized	35%	25%	26%
Unorganized	65%	75%	74%
Female Proprietorship	*6%*	*11%*	*14%*
Male Proprietorship	*52%*	*58%*	*54%*
All Others	*8%*	*6%*	*7%*
Total Rural	*100%*	*100%*	*100%*
Organized	10%	11%	13%
Unorganized	90%	89%	87%
Female Proprietorship	*11%*	*15%*	*22%*
Male Proprietorship	*75%*	*70%*	*60%*
All Others	*3%*	*3%*	*4%*

Persons Engaged in Indian Manufacturing, 1994-2005 female-owned proprietorships only, by location (in 000s)

Sector	1994	2000	2005
Total Urban Female Prop.	*764*	*1,814*	*2,245*
Household	617	1,479	1,810
Non-Household	145	336	435
Other/Unknown	2	0	0
Total Rural Female Prop.	*2,417*	*3,739*	*5,310*
Household	2,265	3,455	4,990
Non-Household	151	283	316
Other/Unknown	0	1	3

Persons Engaged in Indian Manufacturing, 1994-2005 share of female-owned proprietorships, by location

Sector	1994	2000	2005
Total Urban Female Prop.	*100%*	*100%*	*100%*
Household	81%	81%	81%
Non-Household	19%	19%	19%
Other/Unknown	0%	0%	0%
Total Rural Female Prop.	*100%*	*100%*	*100%*
Household	94%	92%	94%
Non-Household	6%	8%	6%
Other/Unknown	0%	0%	0%

Source: Authors' calculations using Annual Survey of Industries/National Sample Survey

Table 6: Estimation of ln(entry employment)
India Unorganized Manufacturing, 2005

Dependent Variable (in natural log):	Employment in new plants	Employment in new female-owned plants	Employment in new male-owned plants
	(1)	(2)	(3)
Total incumbent employment	-0.066+++	-0.015	-0.170+++
	(0.023)	(0.013)	(0.034)
Total female incumbent employment		0.202+++	
		(0.013)	
Total male incumbent employment			0.107+++
			(0.028)
Market access index for input market	0.239+++	0.100+	0.172++
	(0.076)	(0.060)	(0.073)
Market access index for output market	0.559+++	0.176+++	0.491+++
	(0.061)	(0.044)	(0.060)
Market access index for labor inputs	0.188+++	0.062	0.157+++
	(0.060)	(0.043)	(0.059)
Observations	6985	6985	6985
R-squared	0.377	0.453	0.342
Adjusted R-squared	0.337	0.417	0.300
District fixed effects	Y	Y	Y
Industry fixed effects	Y	Y	Y

*Notes: Robust standard errors in parentheses. Regressions weighted by [log 2001 population*log employment].*

All specifications include a constant term which is not shown.

Table 7: Estimation of entrant employment across districts: density and urbanization hypotheses
India Unorganized Manufacturing, 2005

Dependent Variable (in natural log):	Employment in new plants	Employment in new plants	Employment in new female-owned plants	Employment in new female-owned plants	Employment in new male-owned plants	Employment in new male-owned plants
Sample	Whole district	Whole district	Whole district	Whole district	Whole district	Whole district
Interaction	Density (1-3)	Urb. Rate (1-3)	Density (1-3)	Urb. Rate (1-3)	Density (1-3)	Urb. Rate (1-3)
	(1)	(2)	(3)	(4)	(5)	(6)
Total incumbent employment	-0.064+++	-0.065+++	-0.013	-0.014	-0.167+++	-0.169+++
	(0.023)	(0.023)	(0.013)	(0.013)	(0.034)	(0.034)
Total female incumbent employment			0.201+++	0.199+++		
			(0.013)	(0.013)		
Total male incumbent employment					0.105+++	0.106+++
					(0.028)	(0.028)
Market access index for input market	0.086	0.037	-0.008	-0.126+	0.019	0.003
	(0.094)	(0.100)	(0.073)	(0.073)	(0.091)	(0.095)
Market access index for output market	0.591+++	0.570+++	0.160++	0.258+++	0.541+++	0.501+++
	(0.120)	(0.113)	(0.077)	(0.076)	(0.116)	(0.106)
Market access index for labor inputs	0.062	0.124	0.012	-0.018	0.032	0.134+
	(0.079)	(0.079)	(0.057)	(0.047)	(0.076)	(0.078)
Market access index for input market *interaction term	0.145+++	0.152+++	0.101+++	0.169+++	0.143+++	0.128++
	(0.052)	(0.052)	(0.039)	(0.037)	(0.051)	(0.051)
Market access index for output market *interaction term	-0.037	-0.018	0.001	-0.067	-0.049	-0.014
	(0.068)	(0.065)	(0.046)	(0.045)	(0.066)	(0.061)
Market access index for labor inputs *interaction term	0.115++	0.089+	0.050	0.104+++	0.113++	0.041
	(0.053)	(0.053)	(0.037)	(0.038)	(0.050)	(0.054)
Observations	6985	6985	6985	6985	6985	6985
R-squared	0.388	0.387	0.457	0.461	0.352	0.350
Adjusted R-squared	0.348	0.348	0.422	0.426	0.310	0.308
District fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y

*Notes: Robust standard errors in parentheses. Regressions weighted by [log 2001 population*log employment].*

All specifications include a constant term which is not shown.

Table 8: Estimation of entrant employment across districts: gender-specific market access
India Unorganized Manufacturing, 2005

Dependent Variable (in natural log):	Employment in new plants	Employment in new female-owned plants	Employment in new male-owned plants
Sample	Whole district	Whole district	Whole district
	(1)	(2)	(3)
Total incumbent employment	-0.081+++	0.030+	-0.171+++
	(0.025)	(0.016)	(0.036)
Total female incumbent employment		0.168+++	
		(0.018)	
Total male incumbent employment			0.052+
			(0.031)
Market access index for input market (based on local female-owned industrial distribution)	0.135	0.165++	-0.027
	(0.085)	(0.072)	(0.073)
Market access index for input market (based on local male-owned industrial distribution)	0.107	-0.071	0.227+++
	(0.077)	(0.058)	(0.074)
Market access index for output market (based on local female-owned industrial distribution)	0.396+++	0.071	0.299+++
	(0.045)	(0.044)	(0.046)
Market access index for output market (based on local male-owned industrial distribution)	0.423+++	0.073+	0.481+++
	(0.062)	(0.044)	(0.061)
Market access index for labor inputs (based on local female-owned industrial distribution)	0.037	0.079+	-0.032
	(0.056)	(0.045)	(0.053)
Market access index for labor inputs (based on local male-owned industrial distribution)	0.151++	-0.002	0.183+++
	(0.059)	(0.040)	(0.058)
Observations	6985	6985	6985
R-squared	0.386	0.453	0.356
Adjusted R-squared	0.346	0.418	0.314
District fixed effects	Y	Y	Y
Industry fixed effects	Y	Y	Y

*Notes: Robust standard errors in parentheses. Regressions weighted by [log 2001 population*log employment].*

All specifications include a constant term which is not shown.

Table 9: Estimation of entrant employment across districts: male/female local industrial structures + density and urbanization hypotheses
India Unorganized Manufacturing, 2005

Dependent Variable (in natural log):	Employment in new female-owned plants	Employment in new male-owned plants	Employment in new female-owned plants	Employment in new male-owned plants
Sample	Whole district	Whole district	Whole district	Whole district
Interaction	Density (1-3)	Density (1-3)	Urb. Rate (1-3)	Urb. Rate (1-3)
	(1)	(2)	(3)	(4)
Total incumbent employment	0.042+++	-0.058+	0.040+++	-0.058+
	(0.011)	(0.032)	(0.011)	(0.032)
Total female incumbent employment	0.167+++		0.163+++	
	(0.017)		(0.018)	
Total male incumbent employment		-0.032		-0.037
		(0.029)		(0.029)
Market access index for input market (based on local own-gender industrial distribution)	0.110	0.080	-0.117	0.028
	(0.090)	(0.091)	(0.096)	(0.095)
Market access index for output market (based on local own-gender industrial distribution)	-0.090	0.506+++	0.217++	0.504+++
	(0.074)	(0.105)	(0.098)	(0.095)
Market access index for labor inputs (based on local own-gender industrial distribution)	0.005	0.101	-0.042	0.164++
	(0.056)	(0.078)	(0.051)	(0.075)
Market access index for input market *interaction term	0.042	0.151+++	0.200+++	0.162+++
	(0.057)	(0.050)	(0.057)	(0.050)
Market access index for output market *interaction term	0.112++	-0.022	-0.111++	-0.002
	(0.046)	(0.060)	(0.054)	(0.056)
Market access index for labor inputs *interaction term	0.073	0.085+	0.165+++	0.046
	(0.044)	(0.051)	(0.048)	(0.052)
Observations	6985	6985	6985	6985
R-squared	0.457	0.353	0.464	0.352
Adjusted R-squared	0.422	0.311	0.429	0.310
District fixed effects	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y

*Notes: Robust standard errors in parentheses. Regressions weighted by [log 2001 population*log employment].*

All specifications include a constant term which is not shown.

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