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## Political reservations and women's entrepreneurship in India

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## ABSTRACT

We quantify the link between the timing of state-level implementations of political reservations for women in India with the role of women in India's manufacturing sector. While overall employment of women in manufacturing does not increase after the reforms, we find significant evidence that more women-owned establishments were created in the unorganized/informal sector. These new establishments were concentrated in industries where women entrepreneurs have been traditionally active and the entry was mainly found among household-based establishments. We measure and discuss the extent to which this heightened entrepreneurship is due to channels like greater finance access or heightened inspiration for women entrepreneurs.

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## 1. Introduction

The implementation of political reservations for women in India has been proven to affect many aspects of the economic, political, and social lives of women. A brief review, which we expand upon further below, links these reservations to greater local investment in infrastructure and related public goods valued by women (Chattopadhyay and Duflo, 2004b), improved perceptions of women by men when exposed to

women in leadership roles and greater aspirations for younger women (Beaman et al., 2009, 2012), greater reporting of crimes against women (Iyer et al., 2012), and more. Moreover, the available evidence suggests that these effects persist (e.g., Deininger et al., 2011). This literature is among the most powerful evidence assembled for the significant economic benefits of gender equality (Duflo, 2005, 2011; Klapper and Parker, 2011; World Bank, 2012).

This paper contributes to the literature by looking at an under-explored issue of the link between political and economic empowerment. What role, if any, have these political reservations had for women's participation in the workforce? Despite the many positive impacts associated with these reforms, their contributions to promoting women's engagement in the local economy remain uncertain. These

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relationships are critical for identifying the short- and long-term impact of such policies. Significant empowerment of women in the workforce and as business owners may be the strongest mechanism possible for entrenching and amplifying the positive impacts associated with these political reservations.

We consider in particular the role of women in the manufacturing sector from 1994 to 2005. The unorganized sector of Indian manufacturing is comprised of establishments with fewer than 10 employees (or fewer than 20 if the establishment does not use electricity). Our data report gender-based ownership and employment in unorganized manufacturing establishments by state and industry in 1994, 2000 and 2005. The unorganized sector is of particular interest as it has constituted approximately 99% and 80% of total manufacturing establishment counts and employment in India consistently since the early 1990s. We also observe gender-based employment in the organized sector, which is comprised of all plants above the indicated employment thresholds. On the whole, the female ownership share of Indian manufacturing business more than doubled during our period of study: in 1994, female-owned businesses comprised 9% of total manufacturing employment; by 2005, this share had grown tremendously to 19% (Ghani et al., 2013c). Therefore it is of crucial importance to understand more deeply the factors that have contributed to this sharp emergence of female entrepreneurship and business ownership over a relatively short time period.

Our empirical strategy follows Iyer et al. (2012) by using differences in the timing of the implementation of reservations across Indian states. We conduct a panel analysis at the state-industry level that allows us to exploit this state-level timing variation and differences in traits across industries. Industries are defined at the three-digit level within the manufacturing sector. Empirical results yield a mixed message regarding the extent to which these reforms improved women's participation in the workforce. On one hand, we do not identify that women's employment in manufacturing increased after the implementation of reservations. This limited response is true in both the unorganized and organized sectors, is observed in multiple datasets, and it holds for employment in both female- and male-owned establishments.

On the other hand, we find significant evidence that women's entrepreneurship in India increased with the implementation of political reservations. This increase occurs with a state-level timing that follows the implementation of the reservations, and the growth persists even after controlling for contemporaneous male entrepreneurship by state-industry. We also show that the state-level timing of the implementations was not linked to pre-existing differences in entrepreneurship by state, further adding to the plausible exogeneity introduced by Iyer et al. (2012), and that there is no evidence of pre-trends in the age structures of women-owned manufacturing businesses in 1994. We describe below, however, some important limitations in the degree to which we can fully measure pre-trends, with our evidence often being indirect.

We also see evidence of this entrepreneurship response when looking along state borders as to how long adjacent district pairs have been exposed to the reservations. This state border strategy helps with omitted concerns, but it is not a panacea for all potential identification challenges. The approach better controls for local differences in income, climate, culture, social norms, and demographics, for example, to the degree to which these factors are common between neighboring districts. Also, the approach requires that identification come through differential changes for states on one border versus another that are appropriately timed with the adoption of reservations. However, the approach may not isolate the impact of the reservations from other changes that states may have made with similar timing. Thus, if the political reservations were consistently bundled into a package of reforms implemented by states (e.g., alongside large independent investments in women's education), the border approach will not be able to differentiate the specific role of the reservations.

We further investigate the channels through which this entrepreneurship flourishes. The heightened start of women-owned establishments is

concentrated in industrial sectors in which women have traditionally owned establishments. Equally as important, the greater entrepreneurship is mostly concentrated in household-based enterprises, rather than establishments opening as independent facilities.

We then discuss the potential channels through which this effect occurs, providing both quantitative and qualitative evidence. We do not find much evidence that the entrepreneurship is linked to changes in reporting or to greater access to government-sponsored contracts and business. Likewise, improved financing conditions appear to play a modest role, as the increase in female-owned loan-holding establishments is weaker than the total effect registered and suggests that financing accompanied the increased entry rather than caused it. We then discuss how entry patterns could be consistent with increases at the local level of public goods and infrastructure favored by women (e.g., Besley et al., 2004; Chattopadhyay and Duflo, 2004a, b; Pande, 2003) or greater aspirations of women towards entrepreneurship (e.g., Beaman et al., 2012). We discuss how these stimuli could have produced the industry patterns observed, to the extent that women entrepreneurs built upon sectors where women have traditionally been active (e.g., Ghani et al., 2013b) and at a household-based scale of operation that was feasible to achieve.

This study contributes to three strands of academic literature. Most directly, our work connects to prior studies of the impact of political reservations for India and women's economic outcomes. To our knowledge, we are the first in this literature to quantify the entrepreneurship effects in a panel setting that uses state-level variation in implementation timings for identification, with Beaman et al. (2010) providing related evidence using micro-data from West Bengal.<sup>1</sup> Second, our work builds upon prior studies of gender differences in entrepreneurship<sup>2</sup> and studies of the spatial distribution of entrepreneurship in India.<sup>3</sup> Third, and more broadly, we contribute to a larger literature on women's advancement.<sup>4</sup>

These findings are also important for Indian policy makers and business leaders. By 2011, India had achieved significant acknowledgement for the level of gender parity in political participation and empowerment. For example, India ranked 19th out of 135 countries in women's political empowerment in the 2011 Global Gender Gap Report (Hausmann et al., 2011). Yet despite India's many economic advancements since liberalization began, the role of women in the Indian economy still lags well behind that of advanced economies. This paper quantifies the strengths and limits of the political reservations in closing this gap.

The next section of this paper describes the political reservations enacted in India and the state-level implementations that we exploit. Section 3 outlines our data and provides some basic descriptive statistics, and Section 4 provides evidence on the exogenous timing of the political reservations to the women's entrepreneurship that we study. Section 5 provides our core empirical analysis, and Section 6 discusses the potential mechanisms behind our results. The last section concludes.

<sup>1</sup> Beaman et al. (2010) show an increase in the number of self-help groups with their own bank accounts after the implementation of reservations, and that these groups had on average larger bank accounts. To the extent to which these self-help groups are associated with more entrepreneurship, this increase would be consistent with our findings. We further discuss this study below.

<sup>2</sup> Examples of this work include Rosenthal and Strange (2012), Estrin and Mickiewicz (2011), Minniti (2009, 2010), and Minniti and Naudé (2010). Parker (2009) and Klapper and Parker (2011) offer a comprehensive review of this literature and further references.

<sup>3</sup> Ghani et al. (forthcoming) and Mukim (2011) provide spatial analyses of manufacturing entrepreneurship in India with our data, and Ghani et al. (2013a) consider gender differences in entrepreneurship for India specifically.

<sup>4</sup> Examples include Mammen and Paxson (2000), Dhaliwal (2000), Mitra (2002), Ghosh and Cheruvalath (2007), Amin (2010), Field et al. (2010), Pillania et al. (2010), Jensen (2010), Verheul et al. (2006), Bruhn (2009), Munshi (2011), Kobeissi (2010), and World Bank (2008).

## 2. Political reservations for women in India

### 2.1. History of political reservations

The increased role and status of women seen in the 20th century has contributed substantially to the changing economic and political fabric of developing and developed countries alike. While much of this progress has come about organically, many governments have implemented policies to increase the speed at which gender parity is achieved along various social and economic dimensions. One popular policy has been the reservation of positions for women (quotas) within governmental bodies. In particular, there have been significant efforts in recent decades to increase the political participation of women in countries where women's involvement in politics has traditionally been low: by 2001, quotas for women in parliaments were in force in more than 30 countries (Duflo, 2005).

India presents one such case: at the national level, reservations for women in elected bodies originated with the 73rd and 74th Indian Constitutional Amendment Acts. These Amendments gave national support to the formalization and implementation of a historical decentralized governance structure known as the panchayat (or, more formally, Panchayati Raj Institutions). Traditionally, panchayats operated at the village level and consisted of a small number of individuals chosen by a village to oversee various local affairs. However, panchayats were neither standardized in their structures, organization, operations, or responsibilities, nor necessarily elected bodies. By the mid-20th century, panchayats were widely recognized to embody “concealed forms of social prejudice, oppression, and exploitation that were firmly rooted in local power structures” (Government of India, 2008). In the latter half of the 20th century, there was support for the revival of a reformed system, with some states indeed restructuring their local government systems to provide for the decentralized panchayat system. By 1989 there was strong support at the national level to give constitutional status to a broadly-implemented panchayat system.

In 1993, two pieces of national legislation came into effect: the 73rd Constitutional Amendment Act instituted a three-tiered system of local government at the village, sub-district (block), and district levels in rural areas of the country, while the 74th Constitutional Amendment Act instituted a revised local governance structure in municipalities (hereafter referred to as “the Amendments”). The Amendments intended to provide large-scale devolution and decentralization of powers to the local bodies. Responsibilities of the panchayat include administration of state transfer programs, planning and implementation of schemes for economic development, establishment and administration of local public goods such as educational and medical facilities, oversight of local infrastructure (water, sewage, roads, etc.), and the monitoring of civil servants (Duflo, 2005). Furthermore, the Amendments stipulated that members of the local governance bodies were to be elected at five-year intervals, and at least one-third of all seats at each governance level were required to be filled by women.

The Amendments required states to adjust or amend local elections to comply with the provisions of the Amendments, and all states amended the existing laws or passed new laws to be compliant within one year of the passing of the Amendments. Compliant elections were eventually held by most states/union territories (UTs), and there was considerable variation in the timing of “effective implementation” (i.e., the first election held which implemented the provisions of the Amendments) across states. This implementation timing varied exogenously primarily due to state authorities waiting for the term of the existing elected local governing bodies to expire before conducting compliant elections. Upon implementation, local bodies were randomized for the initial implementation of the reservation system such that the one-third goal of seats for women was reached. For each appropriate level of government, the reservations subsequently rotate over the included bodies to maintain the one-third level.

Fig. 1 shows the considerable variation in timing of effective implementation of the Panchayati Raj across states/UTs. Beyond the visible

variation in timings, two features are important to note. First, two states incorporated provisions regarding political reservations for women before the Amendments. Andhra Pradesh provided for 22% to 25% reservations for women in 1964; Karnataka introduced a similar level of reservation for women in 1985 (Government of India, 2008).<sup>5</sup> Second, reservations were not implemented in all Indian states/UTs during our sample period. Some states (Meghalaya, Mizoram and Nagaland) were explicitly excluded from the purview of the Amendments. Jammu and Kashmir introduced reservations at a level consistent with the Amendments via state-level legislation, but the election of panchayats under its own Act has not yet taken place. In the empirical section we describe steps to take these features into account.<sup>6</sup>

### 2.2. Literature review

A number of studies have examined aspects of the Panchayati Raj and its effect on economic and social outcomes. Using state-level variation in India over four decades, Pande (2003) identifies how the mandated reservations of legislative positions for minority members of Scheduled Caste/Scheduled Tribe (SC/ST) individuals increased the redistribution of resources towards these groups, demonstrating enhanced policy influence. Related, Besley et al. (2004) find that the reservation of leadership positions for SC/ST individuals increased access among SC/ST households to infrastructure or services via government schemes. Chattopadhyay and Duflo (2004a) use information on the location of public goods to show that when an area has leadership positions reserved for SC individuals, the share of public goods going to that group is significantly higher. Chattopadhyay and Duflo (2004b) use village-level variation in political reservations for women to predict the types of public goods provided in 265 reserved and unreserved areas in West Bengal and Rajasthan, finding that leaders invest more in infrastructure that is directly relevant to the needs of their own genders. Ghani et al. (2013a) find that areas that have had more exposure to women leaders in the Panchayat system allocate a higher share of public works employment to constituent women. This importance of representation to policy outcomes extends to many other contexts (e.g., Clots-Figueras, 2011; Powley, 2007; Washington, 2008). Overall, the studies show that the group identity of political leaders matters for the type of public goods provided under the purview of the governing body, with studies using the Indian experience being especially prominent in this literature.

Women leaders may also affect their institutional environment. Topalova and Duflo (2004) find that women leaders in India are less likely to take bribes than their male counterparts. Duflo and Topalova (2004) and Beaman et al. (2009) note that while the public goods provided by reserved women leaders are in greater abundance and at least equal in quality to other villages, residents may express lower satisfaction with the provided goods. Another strand of literature looks at how attitudes towards women change once quota policies are in effect. Hoff and Stiglitz (2010) develop a conceptual framework to show how changes in power, technology, and contacts with the outside world matter especially because they can lead to changes in ideology. Beaman et al. (2009, 2012) show how perceptions of women improve once men are exposed to women in leadership roles, providing substantial evidence of the framework regarding attitudes and bias implicit in Hoff and Stiglitz (2010).

<sup>5</sup> Kerala and West Bengal restructured their institutions of local government before the passing of the 73rd Act (in 1991 and 1992, respectively), but elections implementing these reservations were not held until after enforcement in 1993. Bihar was prevented from implementation due to legal issues regarding certain provisions of the Amendments (Iyer et al., 2012).

<sup>6</sup> Data on the timing of political reservations comes from several publications documenting the implementation and progress of the reservations (Government of India, 2008; Iyer et al., 2012; Mathew, 1995, 2000). Appendix Table 1 lists years. Beginning with Bihar in 2006, several states increased their reservations for women above the 33% required by the Amendments. These changes occur after our sample period ends in 2005.

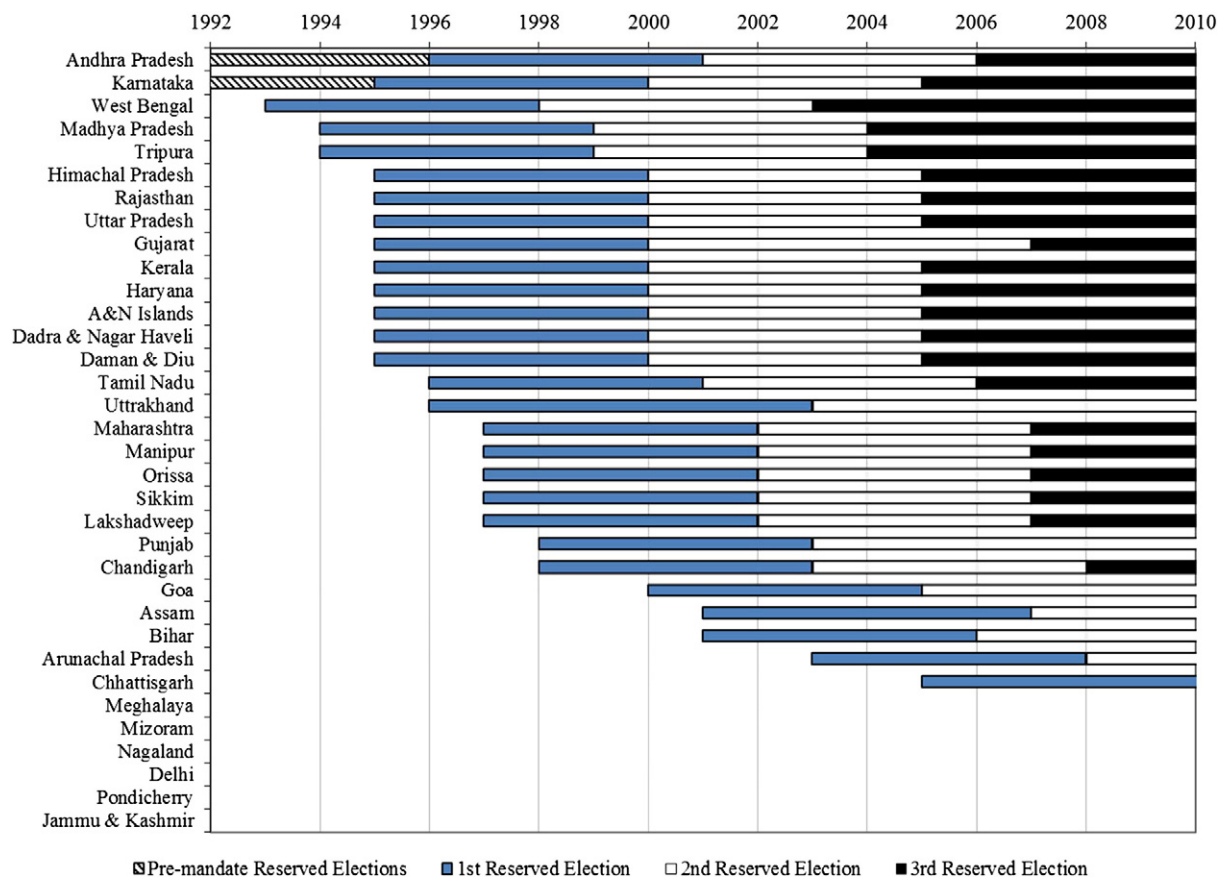


Fig. 1. Implementation of Indian political reservations. Timeline of state-level implementation of the 73rd Amendment reservations for women.

Duflo (2005) provides an assessment of the case for political reservations for women and other historically underrepresented groups. Using evidence from India, Duflo (2005) concludes that reservations have been shown to incur a significant reallocation of public goods towards the preferred allocation of the group in power. Pande and Ford (2011) provide a more recent comprehensive review of the literature on gender quotas. They conclude that the political reservations led to a significant increase in women's leadership and influence on policy outcomes, while noting at times more mixed evidence on some outcomes. This review also highlights the need for greater study of economic consequences.

The above studies primarily use the cross-sectional nature of the randomized reservation system to identify treatment effects. However, variation in the timing of the implementation of the 73rd Amendment was also plausibly exogenous, as noted above and further tested later in this paper. Iyer et al. (2012) use this state-level variation to investigate the effects of political representation on crime against women, finding significant evidence that political empowerment resulted in greater reporting of crimes against women.

### 3. India manufacturing data

Our primary data sources are repeated cross-sectional establishment-level data from surveys of the unorganized manufacturing sector carried out by the Government of India. The data are taken from surveys conducted in fiscal years 1994, 2000, and 2005.<sup>7</sup> This section describes

some key features of these data for our study, and we refer readers to Ghani et al. (2013b, forthcoming), Nataraj (2011) and Kathuria et al. (2010) for greater details and general descriptive statistics on these manufacturing surveys.

Our work mainly considers the portion of the Indian economy surveyed by the National Sample Survey Organisation (NSSO). The NSSO periodically collects information on a representative sample of the unorganized manufacturing sector. A manufacturing establishment is considered part of the unorganized sector if it has fewer than ten employees and uses electricity. If the establishment does not use electricity, the threshold is 20 workers. As of 2005, the unorganized sector accounts for approximately 99% of the Indian manufacturing establishments, 80% of the Indian manufacturing employment, and 16% of the Indian manufacturing output.

Establishments are surveyed by the NSSO with state and four-digit National Industry Classification (NIC) stratification. Using the provided sample weights, we construct population-level estimates of establishments and employment, and we aggregate the cross-sectional micro-data to the state and three-digit NIC level. This allows observation of state-industry cells at three periods during which political reservations were implemented differentially by state. This time variation provides for our differences-in-differences identification strategy.

The outcome measures of business ownership and creation (as well as the control variables) are based on the number of observations in each state-industry cell multiplied by the sampling weight. In the estimations which use an employment-based measure of entrepreneurship, we consider the total employment at an establishment to consist of working owners plus any paid and unpaid employees.

We detect the gender of the business owner based on a survey field which captures details regarding the ownership of the establishment. The NSSO surveys since 1994 include questions which classify the ownership of each establishment among several types (1994 titles): proprietary

<sup>7</sup> In all cases, the survey was undertaken over two fiscal years (e.g., the 1994 survey was conducted during 1994–1995), but we will only refer to the initial year for simplicity. We utilize the 1989 version of the NSSO survey to check for pre-trends in women's employment in manufacturing by state, but this dataset unfortunately lacks the key business ownership variables upon which we build our entrepreneurship metrics.



(male), proprietary (female), partnership with members of the same household, partnership between members not of the same household, cooperative society, public sector, limited company (outside public sector), or other/unknown. We focus primarily on the establishments listed as either male proprietary or female proprietary, which constitute 98% of establishments in the unorganized manufacturing sector. The information captured in this field is an outcome of the survey and not a factor in the stratification design.

In our later analysis, we also investigate specifically household-based establishments by employing a survey question which captures details regarding the premises of the establishment. The establishment premises can be listed as any of the following (1994 titles): no fixed premises, premises same as household's residence, and premises independent of household's residence. Household-based establishments are defined using the second group above.<sup>8</sup>

Our analysis primarily considers recent women entrepreneurs, who are a subset of women establishment owners. We identify entrepreneurs using a survey field which asks about the growth status of the enterprise over the past three years: expanding, stagnant, contracting, or operated for less than three years. Those owners who answer as having operated their business for less than three years constitute our subset of recent entrepreneurs. We also describe in the next section how the survey collects age information for older establishments.

It is important to note that the NSSO sampling frame is primarily built off India's periodic Economic Censuses, and is enumerated across households. The core sample is comprised of unregistered (unorganized) plants. Unorganized sector firms in India are not required to register or pay taxes, and thus the sampling of the NSSO does not depend upon these types of data. As we discuss later, this data collection and sampling approach provides confidence that the economic patterns we observe are real and not the artificial consequence of changes in reporting behavior (e.g., switching tax status).<sup>9</sup>

We supplement our investigation into women's labor market dynamics using data from the Annual Survey of Industries (ASI). The ASI provides microdata on the organized manufacturing sector of the economy, which is not covered by NSSO. The two surveys are designed to be perfect complements in joint coverage of the entire manufacturing sector. We use ASI surveys from the same fiscal years as the NSSO data described above to investigate the employment of women in the organized sector. ASI surveys have a similar design<sup>10</sup> and stratification as the NSSO surveys, and we construct population-level estimates of employment in the organized sector at the state-industry level similar to above. We capture separate men's and women's employment in the organized sector based on fields in the ASI reporting plant employment by gender. We also use the 1989 ASI to check for pre-trends in women's employment by state in the organized sector.

<sup>8</sup> The categories listed for the ownership and premises fields are taken from the 1994 survey instrument. Later surveys expanded the listed categories to include additional ownership categories that do not overlap with the primary male/female proprietary categories used in this work. There have been recent efforts to better measure and classify home-based work (Chen and Raveendran, 2012), and it is possible that some household-based workers that were previously considered business owners may be reclassified as wage workers in future surveys. Adjustments during our sample period are very small, if present at all, and would apply uniformly to states in a way that would not bias a differences-in-differences strategy.

<sup>9</sup> The sampling frame for the NSSO is comprised of two frames: the list frame and the area frame. The list frame is used only among urban areas, and is comprised of approximately 8000 larger unorganized manufacturing units on the basis of census data for manufacturing enterprises. These plants meet one of three detailed size criteria (available from the authors). All units in the list frame are surveyed, and these units are excluded from the list of enterprises in the area frame. The area frame is applied to both urban and rural areas. Village lists from the census form the frame for rural areas, and the frame for urban areas is taken from the latest Urban Frame Survey blocks. The ultimate stage units are households/unorganized-manufacturing enterprises in both areas, as available from the most recent economic census.

<sup>10</sup> The ASI sampling frame is based on business registers rather than the Economic Census.

Unfortunately, ASI surveys do not collect the gender of the establishment owners, and so we can only examine ownership and entrepreneurship outcomes in the unorganized sector. Even within the unorganized sector, our results below emphasize household-based establishment entry rather than independent facilities. This pattern suggests that the lack of ownership data in the ASI is not a material concern as it is unlikely that we would observe heightened women's entrepreneurship in the organized sector.

Table 1 provides descriptive statistics on our sample. The first three columns provide aggregate establishment counts, employment, and output for each year across all of India. Since we have data on the timing of political reservation implementation for all states and territories in India, we do not restrict our sample geographically. These aggregates are broken down into organized- versus unorganized-sector contributions. For the unorganized sector, we further report women-owned establishments and then household- versus non-household-based establishments for women. Columns 4 and 5 describe the growth rate of each economic activity from 1994 to 2005, and Columns 6–8 provide shares relative to the total.

As noted earlier, the unorganized sector accounts for a large share of establishment counts and employment. Moreover, these shares are very persistent, as discussed further in Ghani et al. (2013c). Women-owned establishments in the unorganized sector account for a small share of the total manufacturing activity: in 2005, they represent 36% of establishments, 19% of employment, and 1% of output. Most of this activity is household based. For example, 90% of employment in women-owned establishments was in household-based operations in 2005.

While being a small share of total activity, women-owned establishments have experienced much more rapid growth during the 1994–2005 period than the manufacturing sector as a whole. While manufacturing employment generally grew 17% from 1994 to 2005, employment in women-owned establishments in the unorganized sector grew 138%, roughly doubling the share of total activity accounted for by these establishments. As the second break-out for employment data highlights, this ownership growth is substantially stronger than even the employment growth for women in the unorganized sector, which expanded 26%. Our study analyzes in part the extent to which political reservations for women can account for this strong performance on the ownership margin.

Among the major states, those with the highest share of new proprietary businesses in the unorganized sector owned by women in 1994 are Karnataka, Tamil Nadu, Andhra Pradesh, and Kerala. Those with the lowest share of female entrepreneurs are Uttar Pradesh, Haryana, Maharashtra, Madhya Pradesh, and Rajasthan. Similar patterns hold across states when comparing overall business ownership rates by gender. All but one state (Sikkim) saw an increase in the share of new businesses owned by women during the period we study.

Women's entrepreneurship and business ownership rates relative to men are highest among traditional and low-technology industries such as tobacco, paper, textiles, and wood products. These same industries comprise the industries in which most women-owned businesses are found in absolute terms. During our sample period, more than 90% of new female-owned businesses were found in 6 of 22 broad two-digit industries: textiles, tobacco, wood products, food products, furniture, and chemical products. At the two-digit level, nine industries saw an increase in the share of new businesses created by women between 1994 and 2005, with the largest increases for female entrepreneurship being among these traditional industries.

Our final data source is comprised of six rounds of the NSSO's household-level Employment–Unemployment survey conducted from 1983 to 2009. The sampling frame for these surveys captures a representative sample of the Indian population, and aggregate figures are calculated based on the sampling weights provided with the data. The surveys lack the ownership fields required to study entrepreneurship, but they do contain information that allows us to model women's employment in unorganized manufacturing. In the typical survey, 3%–4%

**Table 1**

Descriptive statistics.

Authors' calculations using the Annual Survey of Industries and National Sample Survey Organisation – Employment/Unemployment Survey (various rounds).

	Levels			Growth, 1994–2005		Shares of total activity		
	1994	2000	2005			1994	2000	2005
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Establishment counts (000s)</i>								
Total	12,125	16,986	16,948	4823	40%			
Organized sector	93	99	105	11	12%	0.8%	0.6%	0.6%
Unorganized sector	12,032	16,887	16,843	4811	40%	99.2%	99.4%	99.4%
Women-owned establishments	2037	4419	6176	4139	203%	16.8%	26.0%	36.4%
Household based	1919	4146	5818	3899	203%	15.8%	24.4%	34.3%
Non-household based	118	273	358	240	203%	1.0%	1.6%	2.1%
<i>Employment (000s)</i>								
Total	34,424	40,702	40,336	5912	17%			
Organized sector	6775	6723	7470	695	10%	19.7%	16.5%	18.5%
Unorganized sector	27,649	33,979	32,866	5217	19%	80.3%	83.5%	81.5%
Women-owned establishments	3180	5554	7555	4375	138%	9.2%	13.6%	18.7%
Household based	2882	4934	6800	3918	136%	8.4%	12.1%	16.9%
Non-household based	298	620	755	457	153%	0.9%	1.5%	1.9%
Organized sector	6775	6723	7470					
Male production workers	3702	3414	3361	–342	–9%	10.8%	8.4%	8.3%
Female production workers	652	654	728	76	12%	1.9%	1.6%	1.8%
Others (supervisory, contractors, etc.)	2421	2656	3382	961	40%	7.0%	6.5%	8.4%
Unorganized sector	27,649	33,979	32,866					
Male persons engaged	18,458	23,330	21,272	2814	15%	53.6%	57.3%	52.7%
Female persons engaged	9191	10,649	11,594	2403	26%	26.7%	26.2%	28.7%
<i>Output (MM 2005 USD at PPP)</i>								
Total	459,689	650,566	870,224	410,535	89%			
Organized sector	384,375	501,638	705,215	320,840	83%	83.6%	77.1%	81.0%
Unorganized sector	75,314	148,927	165,009	89,695	119%	16.4%	22.9%	19.0%
Women-owned establishments	3154	7142	10,362	7208	229%	0.7%	1.1%	1.2%
Household based	2071	3194	5730	3659	177%	0.5%	0.5%	0.7%
Non-household based	1083	3948	4632	3549	328%	0.2%	0.6%	0.5%

of women are employed in manufacturing, with over 60% of women listing domestic activities. We specifically use the designation of the respondent's employer as an Own Account Enterprise (OAE) to proxy for the unorganized sector. These surveys aid our empirical work in three ways: 1) providing a second set of estimations regarding women's employment in manufacturing during our core sample period, 2) allowing us to assess whether pre-trends exist with respect to this employment, and 3) providing us insight about whether the changes that we observe with respect to the manufacturing sector appear to be pulling from other sectors.

#### 4. Analysis of reform timing and pre-existing entrepreneurship

Iyer et al. (2012) introduce the technique of using state-level variation in the timing of effective implementation of the Indian reservations. Iyer et al. (2012) further provide evidence that the effects that they document of the reservations on state-level reporting of crime against women follow after the implementations with timing that indicates that the reservations were implemented in a manner plausibly exogenous to their outcome of interest. This section provides similar evidence with respect to our measures of women-owned establishments.

Fig. 2 first analyzes the initial economic conditions of states in 1994 and the order in which states implemented the reservations. The upper left panel starts with a cross-sectional plot of the log count of women-owned establishments per capita in the state on the vertical axis against the year of reservation implementation by state on the horizontal axis. Bubble size indicates the size of the state using log population. States that never adopt the reforms are excluded from this analysis and the similar one for Fig. 3.

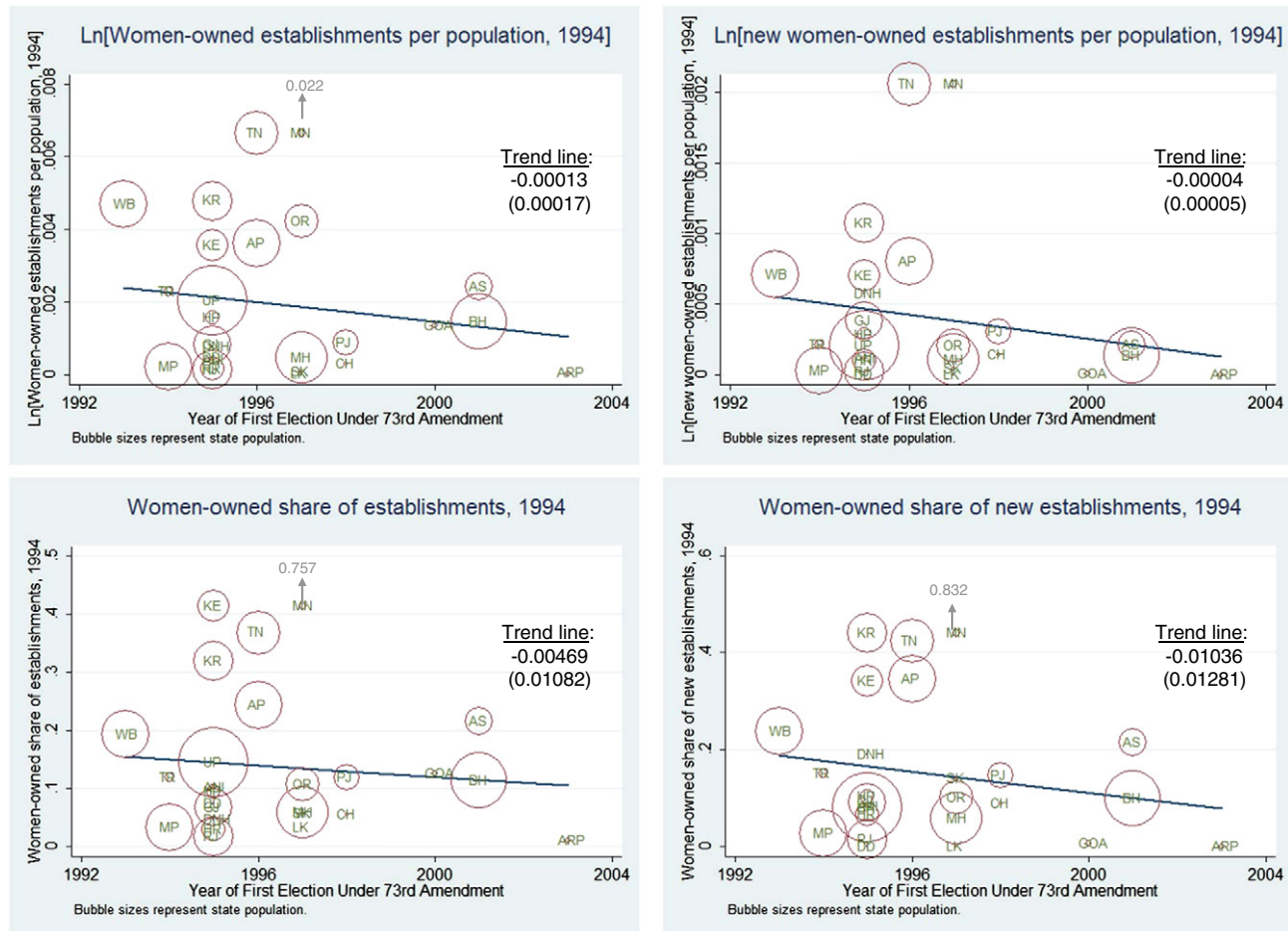
The trend line in this panel is flat, indicating that the timing of implementation was not linked to the initial prevalence of women-owned manufacturing establishments in the state. The same holds in the lower left panel, which considers the shares of unorganized manufacturing

establishments that are women owned. The two right panels provide similar graphs of initial women's entrepreneurship for manufacturing in the states using new establishments from the NSSO. Again, the relationship is very limited, if any exists at all. The t-statistics for all trend lines are less than one with robust standard errors.

As Manipur is a persistent outlier on these graphs, we cap its value at the second highest state's value for visual ease. Given Manipur's very small size and mid-point timing for implementation of political reservations, this treatment does not affect the trend lines calculated. Likewise, the very small state of Arunachal Pradesh shows very low initial activity by women in manufacturing and very late implementation. We have confirmed that all results in the paper hold if Arunachal Pradesh is excluded.

We conduct much of our empirical analysis at the state-industry level. Fig. 3 repeats Fig. 2 at this disaggregated level. The horizontal axis continues to be the timing of each state's implementation, while the vertical axis documents pre-existing women's entrepreneurship on a per-worker basis or as a share of activity. For the left two panels on women's ownership shares, there is again little evidence of a relationship to the sequence of state implementations. The added data variation allows for more precise trend lines, but we continue to reject the hypothesis that the trend lines are different from zero. For the right two panels on new establishments, we do see more evidence that later-adopting states have lower entrepreneurship when each industry is treated separately. These trend lines are statistically significant. On the whole, however, they are very small in size relative to the magnitudes that we will estimate due to the reforms.

As a complement to these levels of activity and shares in 1994, we would ideally be able to examine changes in women's entrepreneurship and ownership rates over the period immediately before 1994 to check whether there are pre-trends in the data that correlate with the relative timing of state implementations. We are unfortunately not able to conduct this analysis directly because 1994 is the first survey to collect gender-differentiated ownership information. We are, however, able



**Fig. 2.** State-level initial conditions and timing of implementations. 1994 women's ownership and entrepreneurship versus timing of state-level implementations. Notes: Figure plots traits of states in 1994 with respect to women's ownership and entrepreneurship against the timing of each state's implementation of the 73rd Amendment to provide political set-asides for women leaders. Trend lines are calculated with robust standard errors.

to achieve the spirit of this check for pre-trends in two complementary ways.

First, the 1994 NSSO data include the ages of plants beyond the 0–3 years-old group that we use to define entrepreneurship.<sup>11</sup> One approach to testing for pre-trends is to look at the age structure of women-owned businesses in 1994 by the dates at which states will implement the elections. If there are substantial pre-trends for early adopters in the years immediately before 1994, one might anticipate seeing an abnormal profile for early adopters indicative of a pre-trend in entry levels.

Fig. 4 shows that early and late adopters of the political reform have similar plant age profiles for women-owned businesses overall. In each panel, the horizontal axis provides seven age groups for establishments: 0–1 years, 2–3 years, 4–5 years, 6–7 years, 8–9 years, 10–25 years, and 26+ years.<sup>12</sup> We divide our sample into states implementing reservations before 1996, states implementing reservations in 1996 and afterwards, and states never implementing reservations. There are equivalent numbers of states in these groups at 11, 11, and 10 states, respectively.

Panels A and B provide the cumulative distribution function (CDF) for female- and male-owned establishments across the establishment age categories, respectively. As a whole, the differences between the three groups are quite limited. Moreover, what differences do exist do

not display a particular ordering that would cause concern—states that implement reforms prior to 1996 are positioned between the states that will later adopt the reforms versus those that do not adopt the set-asides at all during our sample period.

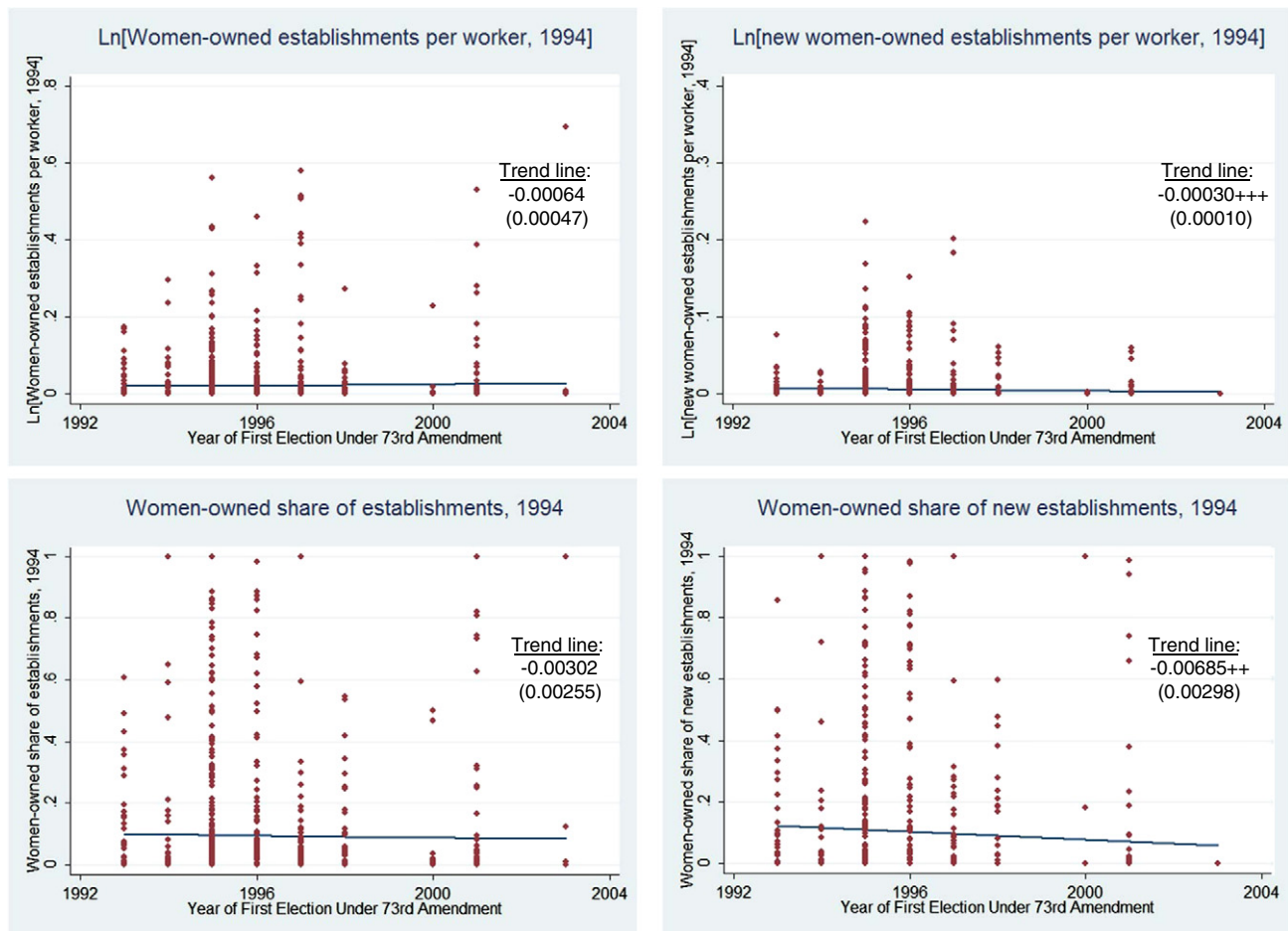
Panel C next documents within each establishment age category the share of plants that are owned by women in 1994 for the three groups. The overall penetration of women-owned businesses is higher in 1994 for younger establishments, peaking with the group that is 4–5 years old. This is also visible in Panels A and B by noticing the upward shift at the lower end of the distribution for the women-owned CDF compared to the male-owned CDF. All three groups display this property of a larger relative presence for women-owned business among early establishments, although the distribution is smoother for the never-adopting states. Panel D shows this uniformity even more sharply by dividing these shares by the average of each group across all age buckets (with the overall averages having been the subject of Figs. 2 and 3). In this normalized format, there is an extremely close correspondence between states adopting before 1996 and those adopting 1996 and afterwards. A Pearson chi-squared test for Panel D does not reject the null hypothesis that the states adopting before 1996 and those adopting 1996 and afterwards are similar.

Overall, Fig. 4 suggests that the age structure is quite similar for establishments across different groups of states that will be adopting the reforms at different times. Examining the age distribution for evidence of pre-trends is not a perfect test, as it could be that new entrants go out of business so rapidly as to not influence the medium-run age distributions of plants. Likewise, 1994 is of differing distances from the reform dates for states, which may limit the potential to detect pre-

<sup>11</sup> This age detail was dropped from the questionnaire in later rounds of the survey.

<sup>12</sup> Appendix Fig. 1 shows an alternative grouping of 0–3, 4–6, 7–9, 10–15, 16–25, and 26+ years.





**Fig. 3.** Fig. 2 at the state-industry level. 1994 women's ownership and entrepreneurship versus timing of state-level implementations. Notes: Figure plots traits of state-industries in 1994 with respect to women's ownership and entrepreneurship against the timing of each state's implementation of the 73rd Amendment to provide political set-asides for women leaders. Trend lines are calculated with robust standard errors.

trends. While acknowledging these limitations, it is reassuring to note that the sizes of the 4–5 and 6–7 year-old groups are as large as the 0–1 and 2–3 year-old groups (in absolute terms and relative to men). This indicates that tremendous churn at the entry margin is unlikely to be occurring, providing evidence against pre-trends that are influencing the timing of elections. Based upon Fig. 4's deviations for never-adopting states, we will specifically test below that our results are robust to this group's inclusion or exclusion.

As a second approach, we look for pre-trends in women's involvement in manufacturing on dimensions other than entrepreneurship. We can do this with respect to women's raw employment in manufacturing and their share of manufacturing employment in three ways: the unorganized sector through the 1989 and 1994 NSSO surveys, the organized sector through the 1989 and 1994 ASI surveys, and the household surveys from 1987 to 1993. Appendix Table 2 reports an analysis similar to that in Figs. 2 and 3.

We examine the degree to which the log growth in women's employment by state or state-industry in the years preceding our sample period correlates with future election timing. These estimations find no evidence that changes in women's employments in manufacturing in the pre-period predict the ordering of implementations across states. These tests are also admittedly imperfect, as we do not later observe a strong response on this margin, and we unfortunately cannot measure the entry margin similarly. Nonetheless, the combination of these tests with those of the 1994 establishment age distributions do provide substantial support to our identification assumption that the election timings are exogenous. After we introduce our estimation strategy, we further examine dynamic estimations that also show that the responses

in women's entrepreneurship follow the reforms in a timing that is consistent with the reservations causing the increased entry rates.

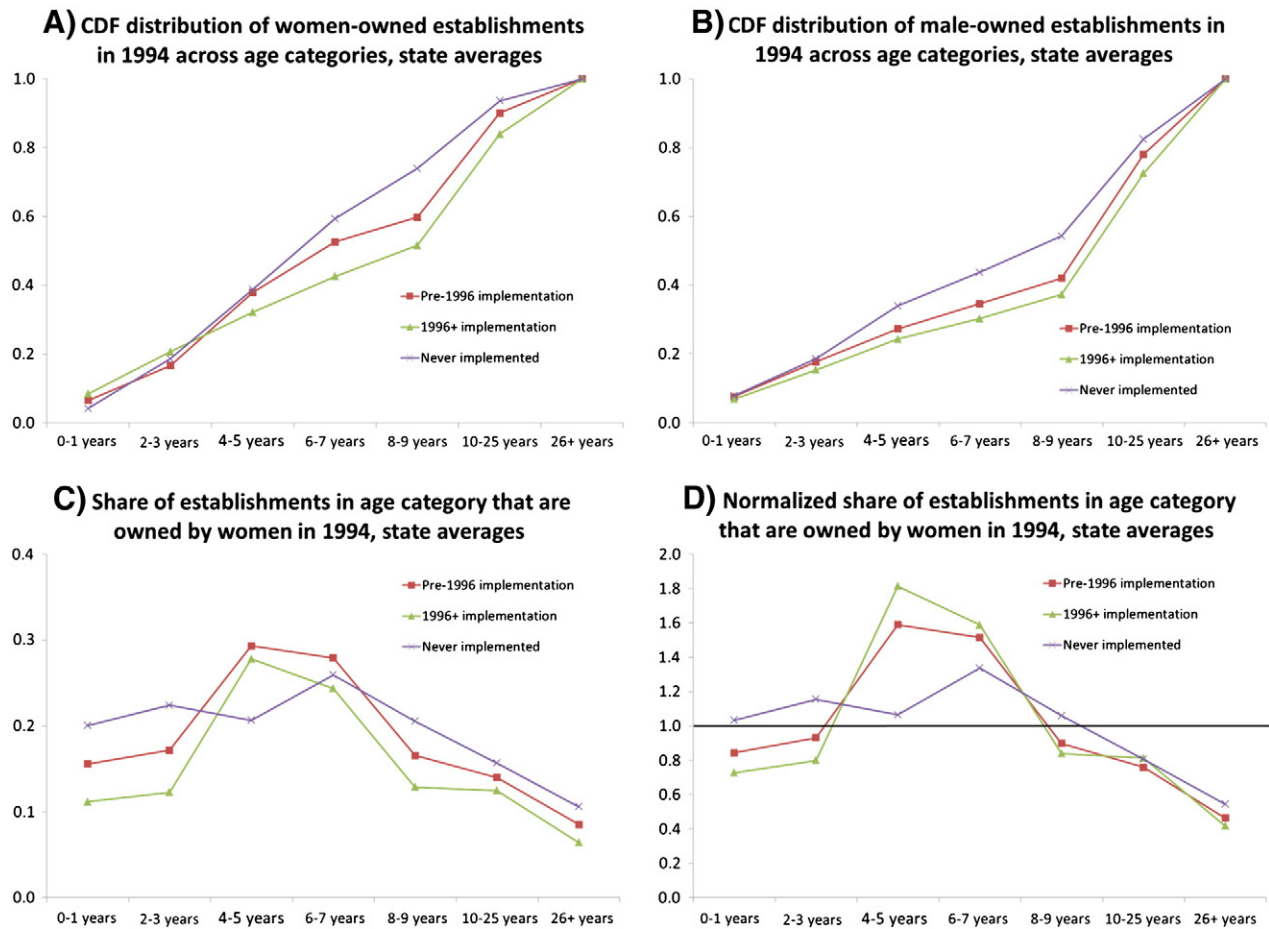
## 5. Empirical analysis

This section provides our core empirical results. We begin with a broad analysis of the impact for women in manufacturing that includes wage employment and establishment ownership. After observing the concentrated impact on entrepreneurship, we conduct a focused analysis on the industry differences and household-basis of the entrepreneurship finding. We close with an analysis of district pairs along state borders. The next section will test several hypotheses about channels through which this effect operates.

### 5.1. State-level patterns

Table 2 provides a broad analysis of women's role in the manufacturing sector following the implementation of political reservations. We have 3606 observations that come from 32 states (pre-2001 definitions) and 59 three-digit NIC industries.<sup>13</sup> We weight regressions by the log initial employment in the state-industry and cluster standard errors by state. Outcome variables are in logs. As we encounter some zero-

<sup>13</sup> The total number of possible cells, in this case, would be 5664 from interacting 32 states with 59 industries and 3 time periods. This theoretical count is reduced to 3606 unique state-industry-year cells due to a number of state-industry cells not reporting any data in certain years. Nearly all of the remaining state-industry cells (95%) have a full panel among the final 3606 observations.



**Fig. 4.** Age structures in 1994 of plants by state election timing. Age distr. of establishments (A, B) and women's shares by age group (C, D). Notes: Figure depicts women's ownership rates across the establishment age distribution. Each line provides the unweighted average of states within the group specified. Panels A and B document the CDFs of women- and male-owned establishments across the age distribution. Panel C provides the share of establishments in each age category that are owned by women. Panel D presents a normalized version of Panel C that divides ownership shares by the average for each group overall.

valued cells, we add one to all outcome variables before taking logs. This maintains a consistent sample over outcomes, and it is not an important factor given our weights of initial employment in state-industries.

Following the empirical approach developed by Iyer et al. (2012), our primary regressor is similar to an indicator variable that takes a value of zero before the implementations and a value of one afterwards. We additionally take into account the initial conditions of the two states with earlier, partial set-asides by assigning those states an initial value equal to their reserved share compared to the mandated level after the Amendments. This approach captures that the changes caused by the Amendments in these states were smaller than the discontinuities in other states that did not have prior set-asides.<sup>14</sup>

We conduct our regressions at the state-industry-year level to allow for an easy segue to the industry differences that we later study. This approach also allows us to control directly for industrial composition by state and changes in women-owned establishment activity that would be predicted by secular trends in industries nationally. We include in our estimations a vector of state-industry fixed effects and a vector of industry-year fixed effects. State-industry fixed effects remove aggregate level differences across our sample in terms of the outcome variables, focusing on within-cell changes with the implementation of

political reservations. Industry-year fixed effects control for common patterns across states for each industry.

Outcome variables are indicated by column headers. Panel A models an indicator variable for a state-year observation where political reservations have been implemented in the state. Panel B includes an additional control variable that is the male-owned establishment analog specific to the outcome variable studied. Thus, the dependent variable in the first column is the log count of new women-owned establishments in the unorganized sector measured by state-industry-year, and the additional regressor is the log count of new male-owned establishments in the unorganized sector in the same state-industry-year. This additional control provides a very powerful test by quantifying the relationship of reservations and women-owned establishments over-and-above contemporaneous male-owned business activity.

The results in Table 2 have a mixed message. On one hand, Columns 1 and 2 show a solid connection between the implementation of political reservations and women's entrepreneurship. The elasticities suggest a growth in new women-owned establishments and associated employment of approximately 40% after political reservations were implemented. New women-owned establishments account for on average 15% of all women-owned establishments. In Column 3, this growth in entry is associated with a positive response in the total counts of women-owned establishments, but this response is imprecisely estimated. This smaller aggregate response may be due to the relatively short time frame for these changes to accrue; it may also indicate that some of the induced entry is short-lived.

Column 4 considers the log employment of women overall in manufacturing for the state-industry, and Columns 5–7 separately

<sup>14</sup> Specifically, rather than code these two states as 0 and 1 before and after the reforms, we code them as 0.758 before the reforms and 1 after the reforms. The 0.758 comes from calculating the share of the overall reservations that have already been implemented—that is,  $0.758 = 25\%/33\%$ . This approach takes into account that these states receive meaningful additional reform from the Amendments, but that they are already three-quarters of the way to the mandated level compared to their neighbors at the start of the period. Our results are robust to alternative approaches as noted below.

**Table 2**

Estimations of main effects of state political reservations on women's economic activity.

	Log count of new women-owned establishments in unorganized sector	Log employment in new women-owned establishments in unorganized sector	Log count of women-owned establishments in unorganized sector	Log women employed	Log women employed in male-owned establishments in unorganized sector	Log women employed in women-owned establishments in unorganized sector	Log women employed in organized sector
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>A. Base estimation</i>							
(0,1) state has political reservations	0.391 + (0.214)	0.421 + (0.242)	0.215 (0.289)	0.015 (0.311)	0.075 (0.266)	0.137 (0.299)	0.039 (0.154)
Observations	3606	3606	3606	3606	3606	3606	3606
Adjusted R-squared	0.733	0.701	0.818	0.825	0.817	0.808	0.838
Controls	State × industry and industry × year fixed effects						
<i>B. Panel A including male analog of activity in state-industry-year</i>							
(0,1) state has political reservations	0.333 + (0.194)	0.359 (0.216)	0.233 (0.262)	0.089 (0.205)	0.122 (0.182)	0.001 (0.200)	−0.004 (0.110)
DV analog for male-owned establishments in state-industry-year	0.118+++ (0.024)	0.111+++ (0.024)	0.216+++ (0.030)	0.442+++ (0.048)	0.389+++ (0.055)	0.515+++ (0.043)	0.366+++ (0.048)
Observations	3606	3606	3606	3606	3606	3606	3606
Adjusted R-squared	0.737	0.706	0.824	0.853	0.840	0.865	0.855
Controls	State × industry and industry × year fixed effects						

Notes: Regressions quantify adjustments in women's entrepreneurship and employment in India surrounding the implementation of state-level political reservations for women. Column headers indicate dependent variables. Regressions contain 3606 state-industry observations and include state  $\times$  industry and industry  $\times$  year fixed effects. Panel A includes a modified indicator variable for the period after a state implements political reservations. The modification allows for fractional values in two states that had pre-existing reservations that were below the level mandated by the Amendments. Panel B further includes a control for the analog of the dependent variable for male-owned establishments. Regressions are weighted by log initial employment in state-industry in 1994 and cluster standard errors by state. +++, ++, and + indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

consider employment in male-owned unorganized establishments, female-owned unorganized establishments, and the organized sector. While point estimates tend to be positive, there is no measurable evidence that political reservations increased women's employment in manufacturing. Thus, the implementation of political reservations in India connects to the heightened entry of women-owned establishments but not to increased employment generally of women in manufacturing.<sup>15</sup> From here on, we report exclusively the entrepreneurship findings (excepting for the border analysis) as this null finding for wage work generally holds in the additional tests below.

Table 3 uses this same framework to consider several segments of the unorganized entry response. The first column repeats the total entry response for women-owned businesses from Column 2 of Table 2. In Columns 2 and 3, we separately estimate the log growth in new women-owned establishments that are household based versus those opened in separate facilities. As the industry-year effects can adjust across the columns, the coefficient estimates do not necessarily bracket the total effect. This segmenting suggests that the entry is especially concentrated in household-based businesses. Columns 4 and 5 likewise highlight that the entry is higher among smaller establishments. This intriguing heterogeneity that favors small and household-based businesses will be expanded upon shortly when considering the traits of industries. The final two columns show that entry is higher among businesses that do not rely on external financing, which we return to when discussing channels that promote the heightened entry rates in Section 6.

Having noted the concentrated entry among small and household-based establishments, it is very intriguing to return to Table 1's descriptive tabulations. One striking feature of these tabulations not noted earlier is that the growth in women-owned establishments (4.1 million) is numerically more than the growth of women engaged in manufacturing (2.4 million). The latter measure includes business owners, so the aggregate traits strongly suggest that women are switching from wage work into business ownership within the manufacturing sector itself. While cross-sectional data cannot verify this directly, this switching

would be very consistent with the small scale nature of the entry observed and reflective of the path of many entrepreneurs to start businesses in sectors where they were previously employed. At the aggregate level, this observation also connects to a sharp growth in women being employed in women-owned firms. Whereas 31% of women employed in the unorganized manufacturing sector in 1994 were employed in women-owned businesses, this share is 62% in 2005. This shift is so strong that the share of female employees in women-owned firms increases from 86% to 92% across the period, as a 250% increase in women employed in women-owned plants (including owners) swamps an otherwise robust 40% increase in men employed in women-owned plants.<sup>16</sup>

## 5.2. Dynamics patterns of entry and state-level election timing

Fig. 5 provides a dynamic analysis of the entrepreneurship patterns to see if they possess a timing that links them to the implementation of political reservations. The estimations continue with the estimation approach of Table 2, but we introduce four indicator variables for the timing of the elections: 1–3 years before the state's elections, 0–1 years after the elections, 2–4 years after the elections, and 5+ years after the elections. Coefficients on these variables are relative to the period four or more years before the state's elections and non-adopting states. The solid lines are the coefficient estimates and the dashed lines give the 90% confidence bands. The dependent variable in Panel A is the log count of new women-owned businesses by state-industry-year; the dependent variable in Panel B is similarly defined for male-owned entrants. Estimations cluster standard errors at the state level and include state-industry and industry-year fixed effects. Appendix Table 3 reports the base estimates graphed in Fig. 5.

The coefficient pattern for women-owned businesses is encouraging for our estimation design. There is no evidence of abnormal patterns for states in the 1–3 years before the elections were held, and the entry increase remains slight in the year of the political reform or immediately

<sup>15</sup> We confirm this limited employment response for women in manufacturing using the NSSO Employment–Unemployment survey stretching from 1983 to 2009. The estimates in the formats of Panels A and B of Table 2 would be 0.088 (0.353) and 0.089 (0.352), respectively, quite similar to Column 6.

<sup>16</sup> The share of male employees in male-owned firms is stable at 97% during the period. This extreme and growing segregation of the employment bases by the gender of business owner is a particularly important topic for future research.

**Table 3**  
Disaggregating the form of new women-owned establishments in the unorganized sector.

	DV is log count of new women-owned establishments in unorganized sector by state-industry:						
	Total	Household based	Non-household based	With three or fewer employees	With four or more employees	Without external financing	With external financing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Base estimation							
(0,1) state has political reservations	0.391+ (0.214)	0.336+ (0.192)	0.063 (0.145)	0.336+ (0.198)	0.173 (0.126)	0.376+ (0.203)	0.144 (0.130)
Observations	3606	3606	3606	3606	3606	3606	3606
Adjusted R-squared	0.733	0.743	0.528	0.737	0.355	0.732	0.457
Controls	State × industry and industry × year fixed effects						
B. Panel A including male analog of activity in state-industry-year							
(0,1) state has political reservations	0.333+ (0.194)	0.264 (0.170)	0.042 (0.139)	0.286 (0.187)	0.158 (0.120)	0.336+ (0.186)	0.132 (0.121)
DV analog for male-owned establishments in state-industry-year	0.118+++ (0.024)	0.113+++ (0.023)	0.071+++ (0.019)	0.099+++ (0.025)	0.047+ (0.024)	0.092+++ (0.031)	0.049+ (0.027)
Observations	3606	3606	3606	3606	3606	3606	3606
Adjusted R-squared	0.737	0.748	0.531	0.740	0.358	0.734	0.459
Controls	State × industry and industry × year fixed effects						

Notes: See Table 2.

afterwards. This null result connects to the lack of pre-trends noted in the prior section, and it extends that earlier work to look specifically at pre-activity immediately before each state's elections (rather than, for example, the trends over states from 1989 to 1994).

Thereafter, we observe a heightened entry rate for 2–4 and 5 + years after the reform. This entry rate is statistically significant for the 2–4 year period and falls just short of conventional significance levels for 5 + years. The lower panel shows no response for male-owned entrants other than a dip in pre-period. While our three data surveys do not have sufficient power to estimate year-by-year interactions with state-level clustering of standard errors, these estimates provide some supportive evidence that the timing of these entry patterns is consistent with the reserved election of the female political leaders.<sup>17</sup>

### 5.3. Industry variation and household-based businesses

To help understand this entrepreneurship response, Table 4 quantifies the industry traits associated with greater establishment entry rates. For all columns in Table 4, the outcome variable is the log count of new women-owned establishments in the state-industry-year. The column headers of Table 4 indicate various industry traits that we measure at the national level in 1994 by industry. The key explanatory variable is an interaction of the implementation of state-level political reservations with the indicated industry trait.

By tapping into industry heterogeneity, we can provide further structure to our estimation framework by including state-year fixed effects. These fixed effects control for the aggregate changes in activity by state in each year, including the main effects for state implementation that we quantified in Table 2. Thus, we only identify the effects in Table 4 by looking at whether women-owned establishment entry in industries with a given trait responded more compared to other

industries in the same state. We cluster standard errors by state-industry to reflect the fact that our estimates are exploiting this heterogeneity across industries within states.

Column 1 shows that the state-level entry response to the political reservations was stronger in industries where women-owned establishments represented a larger share of establishments nationally in 1994. Appendix Table 4 documents these shares at the two-digit industry level across manufacturing industries, which range from over 40% in chemical products and tobacco products to less than 5% in over half of the two-digit industries. Estimations exploit variation at the three-digit NIC level that is similarly large. The increase in entry rates for women-owned establishments is 3% higher for each 10% increase in the extent to which women have traditionally owned establishments in the sector.

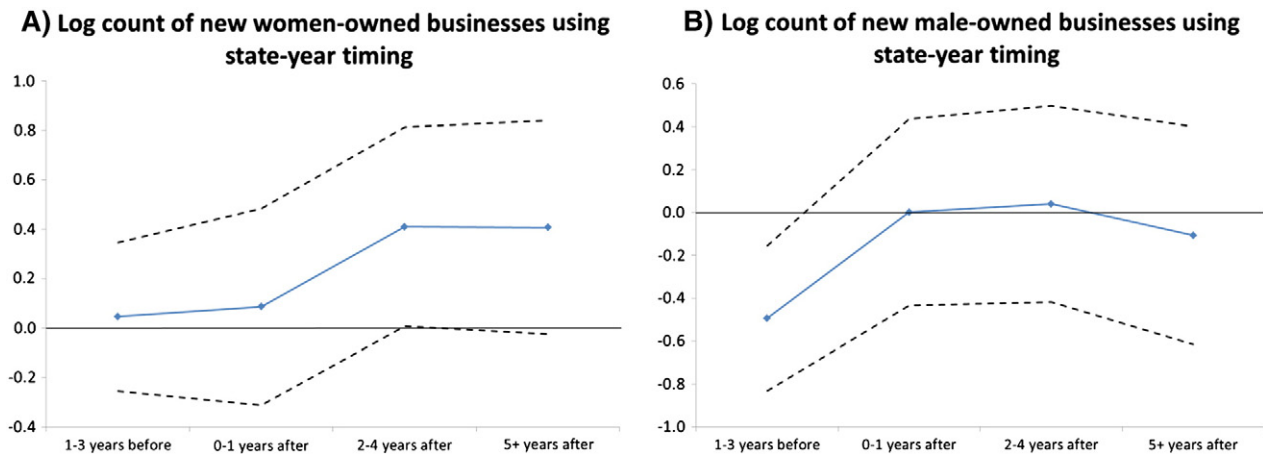
Column 2 finds heightened entry in industries that traditionally centered on household-based establishments, and Column 3 connects the first two results with those noted in Table 3 by modeling the intensity of women-owned household-based establishments by industry in 1994. For every 10% increase in the degree to which an industry nationally is populated by women-owned businesses based in the household, the entry response is 4% higher. Columns 4–6 show the corollary to Columns 1–3 that the heightened women's entrepreneurship is weaker in industries with larger average establishment sizes, value-added per worker, and fixed capital intensity. These negative patterns continue to hold when calculating these three industry traits using only female-owned establishments in 1994.

The skewness of the traditional women-ownership shares raises concern that the strong patterns in Columns 1–3 may be driven by just a few outlier industries. Appendix Table 5 tests this concern by considering different formats for the industry interaction, building upon the estimations in Column 3 of Table 4. We report estimations that utilized the raw shares of establishments in industries owned by women operating out of households, these shares expressed in unit standard deviation, and indicator variables for terciles of share intensity. Similar results are found in these variants, and the indicator variable approach in particular suggests that the most important difference occurs between the bottom tercile of ownership (the excluded group) and the upper two terciles.

Table 5 tests other variations on these key estimations. Column 2 shows very similar results when using the Iyer et al. (2012) coding strategy that does not consider fractional values for the two states that have partial early adoption. Column 3 likewise shows similar results when excluding these two states entirely. Column 4 shows marginally stronger

<sup>17</sup> Appendix Fig. 2 shows our raw data and provides some evidence on these reservations using major states within India. For each state and survey, we calculate the ratio of entering female-owned establishments in the unorganized sector compared to male-owned entrants. We then plot this ratio across years, with each state centered so that the vertical black line at zero represents the year when the state implemented the reservations. While some deviations exist, in most states the ratio is stable prior to reservation implementation, and then the ratio increases after implementation. Fig. 5 quantifies these responses more precisely, but the raw data depiction provides additional assurance that the entrepreneurship response is broad-based and not the product of a few outlier states.





**Fig. 5.** Dynamic timing of entry response to elections. Coefficient estimates and 90% confidence bands. Notes: Figure reports a dynamic analysis of the entrepreneurship patterns to see if they possess a timing that links them to the implementation of political reservations. The estimations approach follows that of Table 2 but introduces four indicator variables for the timing of the elections: 1–3 years before the state's elections, 0–1 years after the elections, 2–4 years after the elections, and 5+ years after the elections. Coefficients on these variables are relative to the period four or more years before the state's elections and non-adopting states. The dependent variable in Panel A is the log count of new women-owned businesses by state–industry–year; the dependent variable in Panel B is similarly defined for male-owned entrants. Estimations cluster standard errors at the state level and include state–industry and industry–year fixed effects. App. Table 3 provides regression estimates.

results when excluding non-adopting states.<sup>18</sup> Column 5 shows robustness to excluding the two industry groups with the highest women's ownership shares in 1994. This exclusion is performed at the two-digit level to remove industries related to chemical products and tobacco products. Column 6 shows that precision at the 10% level continues to hold when instead clustering standard errors at the state level. Column 7 shows very similar results when excluding the state–year fixed effects and instead controlling again for the main effects of the political reforms.

#### 5.4. State border discontinuity analysis

Before turning to an evaluation of the mechanisms that lie behind these patterns, we confirm the importance of the political set-asides in a novel manner using district pairs along state borders. One question that we have attempted to address throughout this study is whether early-adopting states were growing in systematically different ways with respect to women's participation and entrepreneurship than later adopters that led them to endogenously adopt first. A second concern that we have been battling with is the possibility that states implemented other changes at the same time as they implemented the political reservations. We worked to alleviate the first concern with the exercises in Section 4 and our dynamic specifications, and we relied on stringent fixed effects, industry variations, and male analogs for outcome variables to get after the second set of concerns.

Many papers in the literature exploit another identification technique by looking at which villages receive randomized assignments for women set-asides. Even in a cross-sectional format, this randomization is very attractive due to how it addresses the above concerns. Unfortunately, we have not identified any data sources that combine village- or panchayat-level information on our outcomes of interest and these reservations. The most disaggregated spatial identifier in

the Indian data is instead the district.<sup>19</sup> This level does not provide us the appropriate randomization since the randomization is undertaken across villages within each district, and thus each district within a state is receiving a similar treatment.

We can, however, replicate the spirit of the village-level tests by looking at district pairs along state borders. The idea is to take two adjacent districts, one located in state A and the second in state B, and look at their relative rates of women's entrepreneurship or manufacturing employment in 2005. If state A adopted the reservations well before state B, we would expect the women's outcome variables in state A to be higher. Moreover, because state A borders other states, this gap in implementation can be different for other districts in state A and their adjacent pairs in state C or D. This approach thus achieves some of the randomization and localization that the village-level studies capture, despite the fact that reservations for the districts in state A are all implemented at the same time and across the same share of panchayats.

We identify 352 unique, adjacent district pairs that are located in neighboring states. We alphabetically assign districts the roles of District 1 and District 2, and our specification below does not depend upon this assignment. We then calculate the log ratio in 2005 of the women's outcomes in the two districts—for example,  $\ln([\text{new women-owned establishments, district 1}] / [\text{new women-owned establishments, district 2}])$ . We then regress these outcomes on the difference in cumulative exposure to reservations as of 2005:  $[\text{years since implementation, district 1}] - [\text{years since implementation, district 2}]$ . We also include fixed effects for each state that makes up the district pair and a control for what the ratio being studied as the dependent variable was in 1994.

A positive coefficient connects longer relative exposure to the political set-asides with a greater gap in women's outcomes along the border in 2005, controlling for what the gap was in 1994. As noted in the Introduction, this test is not a complete resolution of all identification concerns, however. Most importantly, if other policies are implemented in a consistent pattern across states at the same time as the political reservations, we will not be able to separate these effects. We cluster standard errors by pairs of states to reflect the common variation being exploited when a state pair has multiple adjacent district pairs. We

<sup>18</sup> We also examine the possibility that the timing of elections was chosen endogenously depending upon the desire of the state to implement the reforms. For 21 states, we are able to reasonably ascertain the year of the first pre-scheduled election after the Act passed. This group shows an OLS coefficient of 0.343 (0.139) +. When using the pre-scheduled election as an instrument for the actual election, we achieve a second-stage elasticity of 0.402 (0.176) +. We do not reject the null hypothesis that OLS and IV are the same. These results and related reduced-form exercises suggest that this endogenous scheduling concern is not critical, but we remain overall cautious about strong claims in this dimension. First, we found conflicting reports regarding the years of pre-1993 elections and terms of office for some of the states, necessitating judgment calls in these cases. Second, the 21 states for which we could obtain data may not be representative of the full set of states.

<sup>19</sup> Districts are administrative subdivisions of Indian states or territories that provide meaningful local economic conditions. The average district size is around 5500 km<sup>2</sup>—roughly twice the size of a U.S. county—and there is substantial variability in district size (standard deviation of ~5500).

**Table 4**  
Estimations of industry traits associated with increased entry of new women-owned establishments.

	DV is log count of new women-owned establishments in unorganized sector by state-industry						
	Industry trait used in interaction, calculated in 1994 at the national level:						
	Log share of unorganized establishments owned by women	Log share of unorganized establishments that are household-based	Log share of unorganized establishments that are household-based and women-owned	Log average establishment size	Log average value-added per worker	Log average fixed capital per worker	Log average financial liabilities as a share of output
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Base estimation							
(0,1) state has political reservations × industry trait in column header	0.332++ (0.129)	0.224+ (0.121)	0.399+++ (0.135)	−0.291++ (0.133)	−0.192 (0.146)	−0.280+ (0.151)	0.110 (0.092)
Observations	3606	3606	3606	3606	3606	3606	3606
Adjusted R-squared	0.737	0.736	0.738	0.735	0.735	0.735	0.736
Controls	State × industry, state × year, and industry × year fixed effects						
B. Panel A including male analog of activity in state-industry-year							
(0,1) state has political reservations × industry trait in column header	0.335+++ (0.128)	0.211+ (0.119)	0.390+++ (0.134)	−0.263++ (0.132)	−0.184 (0.145)	−0.277+ (0.150)	0.108 (0.091)
DV analog for male-owned establishments in state-industry-year	0.098+++ (0.031)	0.096+++ (0.031)	0.096+++ (0.031)	0.105+++ (0.036)	0.107+++ (0.036)	0.107+++ (0.036)	0.097+++ (0.031)
Observations	3606	3606	3606	3606	3606	3606	3606
Adjusted R-squared	0.740	0.739	0.740	0.738	0.738	0.738	0.739
Controls	State × industry, state × year, and industry × year fixed effects						

Notes: Regressions quantify industry traits associated with adjustments in women's entrepreneurship in India surrounding the implementation of state-level political reservations for women. The dependent variable is log count of new women-owned establishments in the unorganized sector by state-industry. Regressions contain 3606 state-industry observations and include state × industry, industry × year, and state × year fixed effects. Panel A includes a modified indicator variable for the period after a state implements the political reservation interacted with the industry trait from 1994 given in the column header. The modification allows for fractional values in two states that had pre-existing set-asides that were below the level mandated by the Amendments. Fixed effects absorb the main effects of the interactions. Industry traits are expressed in logarithms. Panel B further includes a control for the analog of the dependent variable for male-owned establishments. Regressions are weighted by log initial employment in state-industry in 1994 and cluster standard errors by state-industry. +++, ++, and + indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

weight estimations by the interaction of log initial employment in the two districts.<sup>20</sup>

Table 6 presents the estimations in a format similar to Table 2. Panel A includes state fixed effects, the 1994 ratio control, and the focal measure of gap years in implementation duration. Even more powerfully, Panel B also controls for the ratio of the outcome variable in 2005 using male-owned establishments in the district pair. These estimations again link higher women's participation in 2005 to how long the reservations have been in place, even in the presence of the male-owned plant controls. They provide stronger evidence that women's employment increases in manufacturing than our earlier approaches, but this remains tentative overall. Most importantly, they again confirm the particularly heightened nature of women's entrepreneurship and new business ownership that is closely timed with the political reservations, subject to the identification limitations noted above.

## 6. Discussion of mechanisms

Section 5 finds substantial growth in women's entrepreneurship after the state-level implementations of political reservations for women leaders. This growth was concentrated in industries where women have traditionally owned establishments and in a form that favored household-based enterprises. This section discusses potential mechanisms that could be behind these results.

Before considering these channels, it is helpful to depict a little more closely the types of entrants that we are observing and the extent to which they may be drawn from one activity versus another. This discussion also sheds light on whether these patterns of entrepreneurship in the unorganized sector represent advancements for women. This notion has been somewhat implicitly held through the discussions, but it

should be delineated more carefully. Recent work stresses the potential heterogeneity of businesses and opportunities in the unorganized sector and how that can influence policy perspectives (e.g., Gunther and Launov, 2012).

Table 7 compares women-owned business in the unorganized sector to those owned by men. In Panel A, we present the average values for five metrics over the 1994–2005 period by gender and their ratio. Women-owned businesses have about 18% of the output (measured as the value of total establishment shipments or sales) of their male counterparts, 60% of the employment, and 32% of the asset base. It is clear that women-owned businesses are typically smaller. The last two columns further show that they are less productive and capital intensive on a per-employee basis. Panel B shows these ratios over time. The ratios for shipments and employment have declined from their 1994 values to 2005, while fixed assets have been stable. The labor productivity measure has also declined. Capital intensity improved, but only because average employment declined.

The general rapid expansion in business ownership for women during the 1994 to 2005 period has been at a very small business size that widened the gap between women- and male-owned enterprises in the unorganized sector. In 2005, this entry margin was perhaps a third of the size of the typical unorganized sector business. Our estimations and their focus on small, household-based businesses link well with this margin. Moreover, this reinforces the need for channels that support this entry to operate at the very small scale.<sup>21</sup>

In terms of mechanisms, the online appendix provides evidence on three potential channels that we can directly test—reporting bias, access to government contracts and business, and access to finance. We are cautious about emphasizing any particular channel given the data

<sup>20</sup> We drop the industry dimension for this exercise to have well-populated cells, given that the surveys are undertaken with state-industry stratification. We also focus on just the unorganized sector given the greater difficulty for aligning ASI district codes for 1994.

<sup>21</sup> Appendix Table 6 provides additional tabulations that are consistent with the induced entry from outside manufacturing that we are observing to have come from unpaid domestic work or from shifts away from agriculture/mining.

**Table 5**

Variations on Table 4's estimation design and sample composition.

	DV is log count of new women-owned establishments in unorganized sector by state-industry						
	Baseline estimation from Column 3 of Table 4	Using the coding scheme of <a href="#">Iyer et al. (2012)</a>	Dropping Andhra Pradesh and Karnataka	Dropping all non-adopting states	Dropping the two industry groups with the largest women-ownership shares	Clustering standard errors at the state level	Dropping the state $\times$ year fixed effects and controlling for unreported main effect
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>A. Base estimation</i>							
(0,1) state has political reservations $\times$ log women HH share, 1994	0.399+++ (0.135)	0.397+++ (0.129)	0.335++ (0.140)	0.443+++ (0.154)	0.378+++ (0.142)	0.399+ (0.202)	0.388+++ (0.135)
Observations	3606	3606	3300	2834	3358	3606	3606
Adjusted R-squared	0.738	0.738	0.724	0.738	0.723	0.738	0.735
Controls	State $\times$ industry, state $\times$ year, and industry $\times$ year fixed effects						
<i>B. Panel A including male analog of activity in state-industry-year</i>							
(0,1) state has political reservations $\times$ log women HH share, 1994	0.390+++ (0.134)	0.388+++ (0.127)	0.327++ (0.139)	0.428+++ (0.153)	0.374+++ (0.143)	0.390+ (0.197)	0.378+++ (0.133)
DV analog for male-owned establishments in state-industry-year	0.096+++ (0.031)	0.096+++ (0.031)	0.106+++ (0.033)	0.094+++ (0.035)	0.078++ (0.032)	0.096+++ (0.027)	0.116+++ (0.031)
Observations	3606	3606	3300	2834	3358	3606	3606
Adjusted R-squared	0.740	0.740	0.728	0.740	0.725	0.740	0.739
Controls	State $\times$ industry, state $\times$ year, and industry $\times$ year fixed effects						

Notes: See Table 4.

constraints and that several channels may be working simultaneously. Nonetheless, these extensions help articulate how the political reforms may have had an impact on local women entrepreneurs. While financing appears to be the strongest of these three channels, we also find that external finance cannot explain the majority of the increased female entrepreneurship that we observe. It is clear that more women-owned establishments with financial backing enter after the reforms, but this increase is only part of a general expansion for female entrepreneurship, rather than the sole driver.

What else could play a role? While we cannot offer a definitive explanation, our results are consistent with two likely hypotheses that

we cannot directly test—provision of local infrastructure and inspiration for women entrepreneurs. To understand these candidates, it is helpful to first discuss why we believe that the differences in entry rates across industries particularly favored those industries where women-owned businesses previously existed. This feature is likely a reflection of a more general pattern for female entrepreneurs to select sectors where existing women-owned businesses are strong due to local networks (e.g., Ghani et al., 2013b). The household scale of these new establishments following the political reforms is a more novel pattern and follows partly from the fact that most women-owned establishments in unorganized manufacturing are household based.

**Table 6**

Border discontinuity analysis of state political reservations on women's economic activity.

	DV is the ratio of the indicated trait across the bordering districts					
	Log count of new women-owned establishments in unorganized sector	Log employment in new women-owned establishments in unorganized sector	Log count of women-owned establishments in unorganized sector	Log women employed in unorganized sector	Log women employed in male-owned establishments in unorganized sector	Log women employed in women-owned establishments in unorganized sector
	(1)	(2)	(3)	(4)	(5)	(6)
<i>A. Base estimation</i>						
Gap in years of implementation	0.555+++ (0.139)	0.732+++ (0.157)	0.226++ (0.105)	0.212+++ (0.062)	0.033 (0.043)	0.347+++ (0.101)
Observations	352	352	352	352	352	352
Adjusted R-squared	0.271	0.296	0.398	0.573	0.481	0.383
Controls	State fixed effects and the ratio of the specified DV in 1994 for the bordering districts					
<i>B. Panel A including male analog of activity in district pair</i>						
Gap in years of implementation	0.458+++ (0.130)	0.664+++ (0.147)	0.178+ (0.098)	0.002 (0.067)	−0.287+++ (0.072)	0.184+ (0.100)
DV analog for male-owned establishments in 2005	0.502+++ (0.085)	0.505+++ (0.073)	0.956+++ (0.140)	0.806+++ (0.100)	0.992+++ (0.156)	0.288+++ (0.058)
Observations	352	352	352	352	352	352
Adjusted R-squared	0.387	0.424	0.507	0.714	0.676	0.503
Controls	State fixed effects and the ratio of the specified DV in 1994 for the bordering districts					

Notes: Regressions consider the impact of state political reservations using district pairs along state borders in 2005. Column headers indicate dependent variables, which are constructed as log ratio of the two variables in the adjacent districts. Regressions contain 352 unique district pairs, include fixed effects for the two states from which the district pair is drawn, and include the specified dependent variable as calculated in 1994 for the district pair. Panel A includes a variable that measures the gap in years between how long the two states have implemented reservations. A positive coefficient indicates that a longer history of implementing the reservations for one district on the border is associated with a greater gap in that district's values for women's manufacturing outcomes compared to its adjacent pair. Panel B further includes a control for the analog of the dependent variable in 2005 for male-owned establishments along the two districts. Regressions are weighted by an interaction of log initial employment in each district in 1994 and cluster standard errors by the bordering state pair. +++, ++, and + indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 7**  
Average establishment traits by gender of owner.

	Total shipments	Total employment	Fixed assets	Output per employee	Assets per employee
	(1)	(2)	(3)	(4)	(5)
<i>A. Averages over the 1994–2005 period</i>					
Female-owned establishments	1614	1.35	909	810	635
Male-owned establishments	8802	2.26	2841	2818	1151
Female-to-male ratio	18%	60%	32%	29%	55%
<i>B. Trend in ratio during the 1994–2005 period</i>					
Ratio in 1994	29%	67%	31%	37%	38%
Ratio in 2000	17%	58%	34%	29%	58%
Ratio in 2005	15%	54%	31%	24%	53%

Notes: Tabulations depict traits of establishments by gender of business owner taken from NSS.

This related work about the specificity of local industrial networks among women-owned businesses is important for understanding the type of local stimulus we should be considering. Specifically, the stimulus following the elections can be neutral towards industries in its form and still match our cross-industry differences. That is, the stimulus does not necessarily need to target industries favored by women-owned businesses. In fact, the more neutral the orientation of the stimulus, the more likely we are to observe the industry patterns exhibited, with the added twist in this case that industries with a strong household-based nature are particularly affected. This is because a neutral stimulus can prompt entry rates that build upon and extend the existing foundation of women-owned businesses.

So what could be the local, neutral factor? We have two candidate explanations, neither of which we can definitely confirm. The first explanation descends directly from the celebrated studies that began this literature about how reserved leadership positions can influence the allocation of local resources (e.g., [Besley et al., 2004](#); [Chattopadhyay and Duflo, 2004a, b](#); [Pande, 2003](#)). This work highlights how the Indian political reservations stimulated greater provision of funds towards infrastructure and public goods favored by the minority group and/or greater access to existing infrastructure. This heightened provision of infrastructure and public goods specific to women could have lowered the cost of entrepreneurship for women, resulting in higher entry rates. To this end, a very consistent finding in studies of Indian entrepreneurship generally (i.e., male and female combined) is the important role of local infrastructure ([Ghani et al., 2013b, forthcoming](#); [Mukim, 2011](#)). Thus, a greater general provision of infrastructure and public goods towards women can match both the entry response and the cross-industry differences. It is important to note that this provision would need to have assisted women disproportionately compared to men in order for us to have observed entry rates in excess of the baseline responses of male-owned businesses. Overall the village-level evidence developed in the prior studies would be consistent with our work.

A second candidate explanation is that the political reservations inspired women to start their own businesses. The striking findings of [Beaman et al. \(2012\)](#) are that female leadership reservations in local areas through the set-aside programs increased the desire of women for more educational attainment and stronger careers. It is possible that our results are a reflection of these greater aspirations. An inspiration stimulus would again be mostly neutral, and thus could align well with the industry patterns that we observe. A strong factor favoring this channel is that an inspiration account would also naturally connect to the smaller-scale nature of our entry patterns given that the inspiration stimulus is plausibly most likely to influence entry choices at the smaller end of establishment sizes (i.e., those who would not have otherwise entered without the inspiration are likely to be those starting smaller firms than those who would enter regardless).

While both of these hypotheses are appealing, we are cautious to note that we cannot differentiate between them. We likewise cannot completely separate them from other state-year factors that could be

tied to the reservations (e.g., women-oriented policies promoted by local governments). Our comparative advantage in this project compared to the emerging literature stream overall is that we are able to quantify the economic patterns for the full Indian manufacturing sector. Administrative datasets, however, have natural limits for measuring subtler factors like women-oriented public goods or inspiration. We hope to encourage future research at the village level to pick up on these entrepreneurship dimensions. To date, we are not aware of any village-level studies that have collected information about women's entrepreneurship, and our study highlights the high potential return for doing so.

## 7. Conclusions

The implementation of political reservations had strong effects for empowering women in India in many spheres. While we do not see much evidence that this has increased women's employment in manufacturing, we do identify that women are more likely to start new establishments in the unorganized sector after the reforms. This growth in entrepreneurship was concentrated in industries that women have traditionally been active in and at the household-establishment scale.

This study provides among the first evidence of how political reservations can affect economic outcomes for women. This linkage is important given that many long-term gains and entrenchment of the empowerment benefits from political reservations can be aided by better economic opportunities that grow in parallel with political voice. These linkages may also affect economies in other ways, given the rise in women's participation. In related work for example, [Ghani et al. \(2013c\)](#) find evidence that growing women's entrepreneurship can support the persistence of the informal sector in which many of these business start. We hope that future work considers other economic outcomes and evidence from outside of India on these important issues.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jdeveco.2014.01.008>.

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