Financial Access and Gender-wise Entrepreneurship: Evidence from Rural India[1]

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Abstract

Does improved access to financial sources improve women's entrepreneurship? To explore this issue, we construct a novel data of village-level financial access defined as distance of each un-banked village to the nearest banked-centre, and merge it with village-level enterprise data from Economic Censuses. Using a difference-in-difference research design, we find that proximity to a banked-centre within 5km of an un-banked village increases female entrepreneurship in non-agricultural sector which is driven by uptake of institutional credit. The male enterprises shift from agricultural to non-agricultural sector. Results are robust to several additional tests.

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Introduction

A vast literature has studied the constraints faced by women-owned businesses. Businesses led by women are usually lesser in number; smaller in size of output, sales and employment; concentrated in less efficient and labor-intensive sectors; and have lower survival rates than male-owned businesses (Coleman 2002; Fairlie and Robb 2009, Bardasi et al. 2011).

Several factors may explain the lower presence and growth of women-owned businesses such as lack of prior work experience, lower start-up capital (Fairlie and Robb 2009) or adverse behavioural self-perception (Langowitz and Minniti 2007).

The problem in acquiring financial resources is found to be one of the most important barriers to women entrepreneurship (Raghuvanshi, Agarwal and Ghosh 2017; Kairiza et al. 2017, and Panda 2018). Specifically, some studies show that women-owned firms are less likely to receive a loan and more likely to pay higher interest rates than male-owned firms (Muravyev et al. 2009; Chaudhuri et al. 2020; Aristei and Gallo 2016; and Presbitero et al. 2014). A significant gender gap could also arise if women raise less demand for formal credit. Bardasi et al. (2011) find that women are more demand constrained in Eastern and Central Asian countries as they do not seek formal finance even when they need it. Ongona and Popov (2016) show that, in countries with higher level of inherited gender bias, women tend to opt out of the loan application process. Mallick and Dutta (2022) show that firms with majority female ownership perceive more constraints on accessing finance.

A counter-evidence suggests that inadequate access to finance may not be gender specific. Instead, characteristics of the firm such as size and age of the firm, industry type, foreign ownership, location etc., and factors outside financial markets, such as level of literacy, occupation, age, education, intra-household status etc., could also prevent women from accessing formal finance (Coleman 2002; Aterido et al. 2013; Ghosh and Vinod 2017). This raises a pertinent question—whether improving access to financial services such as bank branches can improve entrepreneurship of women through uptake of formal loans.

The research so far, has mainly focussed on the identification of gender bias in access to credit and in entrepreneurship of women. Less attention has been paid to the issue on whether and how an improvement in proximity to source of finance impacts women's entrepreneurship. In this paper, we examine this issue at the village-level in India. Two prior studies are closest to our objective. First, Bruhn & Love (2011) shows that, in Mexican municipalities with a new Azteca bank branch, women's income increased by a higher margin (9%) compared to men's

(4.8%); a higher proportion of women worked as wage earners; and a lower proportion of women self-reported as unemployed. However, the study does not test the credit or saving mechanisms behind the observed impact. Second, Menon and Rodgers (2011) find evidence that improved credit access during social banking period in 1970s in India encouraged women's self-employment as own-account workers and employers.

To identify the relationship between access to banks and gender-wise entrepreneurship, we use the withdrawal of Service Area Approach (SAA) in 2005 where RBI lifted the restrictions on bank operations. In 1989, RBI had adopted a Service Area Approach (SAA) in 1989 in which a group of 15-25 villages was assigned to each branch to meet the credit needs of the villages. These villages were called the service area of that branch. Availing credit from a non-service area branch required a 'no dues' certificate from the service area branch before providing credit. Devarajan (2004) and Basu (2005) found that the restrictive norms of SAA limited the entry of newer and innovative branches in credit markets in rural India. Owing to these concerns, RBI finally withdrew SAA in 2005 (RBI 2005).

Figure 1 shows the rapid expansion of bank branches from 2005 onwards, which was substantially higher in rural areas. We exploit this sudden growth in rural bank branches as our natural experiment. We develop a novel village-bank branch matched dataset where we compute the distance of each village to its nearest village/town with a bank branch (banked-centre) for each year from 1950 to 2019. We use this measure as a proxy for physical access to the nearest bank branch. Using the SHRUG data set prepared by Asher et al. (2019), we merge our data on distance to banks with the data on village-level data of entrepreneurial activity obtained from three rounds of Economic Census (EC) 1998, 2005 and 2013 and village-level socio-economic indicators from two rounds of Population Census (PC) 2001 and 2011.

To identify the causal impact of proximity to bank branches on entrepreneurship, we rely on a Difference-in-Difference (DID) research design. Our analysis focuses on the impact on unbanked villages. We compare outcomes of un-banked villages which received a bank branch in its *neighbourhood* of 5 km after 2005 (Treatment Group) against the villages where the nearest banked centre remained more than 5 kms away in 1998, 2005 and 2013 (Control Group) Our threshold of 5kms is motivated by RBI's latest financial inclusion strategy of establishing a bank branch within 5km of every village in India by the year 2022 (RBI 2019). We also change the threshold to 3kms as a robustness check.

We find the following results. The proximity to a bank branch for a village improves female entrepreneurship, with most of the increase occurring in the non-agricultural sector. For male enterprises, we find a shift from agricultural to non-agricultural sector—a village has 0.431 lesser agricultural firms and 0.484 more non-agricultural firms owned by males after proximity to a bank branch improves.

We test whether credit channel explains these results. EC records whether or not an enterprise has availed formal finance as major source of credit. We use the number of enterprises with formal finance in a village as a control variable in our main specification. Our results confirm the presence of formal credit channel for females. In particular, when a bank branch becomes proximate, higher formal credit uptake by women enables them to be entrepreneurs in the non-agricultural sector. Our results do not confirm this formal credit channel for male enterprises. Thus, proximity to a bank branch works for women who are likely to be restricted from accessing distant credit facilities. On the other hand, large distance to banks does not appear to be a barrier for males to access formal credit. However, it is possible that proximity to bank branches also works at the intensive margin; i.e., it allows male-owned enterprises to borrow higher *volumes* of credit. Since EC does not capture the volume of loans take by enterprises, testing this particular mechanism is out of the scope of this paper.

We conduct several additional checks to validate our identification strategies. First, we test for the parallel trends between treated and control group observations prior to the treatment. Statistical tests reject divergence in the pre-treatment trends. Second, our results are qualitatively similar when we use 3kms threshold or use employment in these enterprises as an outcome variable. Third, we segregate the treated group villages by the duration of exposure to a bank branch. As expected, a village which gets treated in the years closer to 2013 (2006) has lower (higher) observed impacts.

We contribute to several areas. First, we contribute to the overall literature of financial development as we study the role of supply side interventions and test the role of formal credit channel. Financial inclusion is considered as a key sustainable development goal (Demirguc-Kunt, et. al. 2014; 2015; 2017). While policy makers attempt to expand financial services, some papers argue that low demand for formal finance may make such interventions ineffective (Kochar 1997; Kumar, Pal, and Pal 2019). We show in this paper that supply side interventions can be effective in increasing the formal finance net. Second, by studying the gender-wise impact of financial development, we contribute to the literature on women empowerment and

their financial and social independence. Women, constituting nearly half of any society, remain excluded from several opportunities. This concern extends to financial inclusion as well. Third, previous studies on India have identified causal effects of bank branch establishment on poverty (Burgess and Pande, 2005; Kochar, 2011) and on economic activity (Young, 2020) at the district level. We identify the causal impact of bank branch establishment at the village-level, which is the most granular administrative unit in India. Thus, our results are more precise. Fourth, our study exploits a more recent policy shift in bank branch expansion which was introduced in 2005. Burgess and Pande (2005) and Kochar (2011) study the quota-based restrictions on bank branch opening starting from 1970s (also known as the social banking period), which were suspended in 1991. Thus, our results provide a more current insight into the subject of financial inclusion in India.

This paper also addresses a critical point on the role of finance in the economy. We show that proximity to a bank branch encourages entry of women- and men-owned firms in the non-agricultural sector. Our results support the theoretical implications in Banerjee and Newman (1993) that the financial side of the economy can lead to structural change in the economy through providing easier access to credit to be entrepreneurs.

The paper is organised as follows. In the next section, we provide institutional background on why proximity to banks is important. This is followed by a review of banking sector policies in India over the years. We then discuss our novel village-bank matched panel data, along with other datasets that we used. Methodology and results follow. Finally, we conclude after providing some additional robustness checks.

Institutional Background

Inadequate access to finance is found to be a critical issue for businesses at large (IFC)[5] and especially in poorer regions (Paulson and Townsend 2014). The upliftment of this barrier encourages the entry of new firms and growth of existing firms (Rajan and Zingales 1998; Fafchamps and Schundeln 2013; and Bruhn and Love 2014). One channel through which the proximity to bank branches leads to credit disbursement is that it enables banks to collect soft

[5]IFC reported a large unmet financing gap in Micro, Small and Medium Enterprises (MSMEs) sector across the world, which was found to be particularly high in the developing world. The study estimated that 21 percent micro enterprises world-wide are fully financially constrained and 19 percent are partially constrained. For SMEs, these figures stand at 30 and 14 percent respectively. This problem was observed to highest for South Asia region where 56 percent (highest) of micro enterprises and 50 percent of SMEs (second highest) were fully either fully or partially financially constrained.

information on potential borrowers at lesser cost. Unlike credit scores, the soft information is difficult to quantify and transmit. Obtaining it, subsequently improves their lending decision (Peterson and Rajan 1994; Agarwal and Hauswald 2010; Ergungor 2010).

With the advent of digital means of banking, borrowers may rely less on brick-and-mortar branches. Similarly, banks may also obtain private information about the borrowers such as credit histories without being physically closer to them. Using data from the USA, Peterson and Rajan (2002) show that due to technical advancements, communication between lenders and borrowers became more impersonal which enabled banks to lend at a distance. Ergungor (2010) also finds that in Ohio, USA, when there is a bank branch in a low- to moderate-income neighbourhoods where people lack credit histories, the mortgage-based lending increases. However, no corresponding impact occurs in high-income neighborhoods where borrowers are likely to qualify for credit score-based mortgages. However, in case of developing economy like India, with large rural population, physical proximity to bank branches can hold more value. Based on a survey of 17,100 bank customers across 17 countries including India, Srinivas and Wadhwani (2019) found that branches are still the dominant channel for simple operations such as account opening and obtaining debit cards, as well as complex operations such as obtaining loans. A survey by NABARD (2016) on financial inclusion in India recorded a very low usage of online means of banking. The proportion of respondents who reported to have used mobile and internet banking was low at 1.6 percent and 0.8 percent respectively. Thus, adoption of digital banking may be limited to urban areas and at early stages in the rural parts of the country, thereby, highlighting the important role of a brick-and-mortar branch in supply of financial services.

Expansion of banking sector in India

Banking sector has expanded in urban as well as rural areas of India. Figure 1 plots the number of new branches opened in rural and urban areas year from 1950 to 2019. The pace of its expansion varied under different policy regimes of bank branch expansion. In pre-Social Banking Period (1949-1969), RBI adopted a demand-following model where it provided licenses to branches in areas with adequate demand for financial services. In the social banking period (1969-1990), RBI devised mandatory location-based quotas for establishing new branches. Specifically, banks with less (more) than 60% branches in rural areas were supposed

to open 3 (2) rural branches for every 1 urban branch (RBI, 1970). Consequently, there was a sudden jump in the rate of branch establishment in rural areas.

In 1990, quota-based restrictions were withdrawn. Instead, to serve the credit needs of rural areas, RBI adopted a Service Area Approach in 1989. Under this policy, existing branches were designated a cluster of 15-25 villages based on contiguity and proximity between villages and banks (RBI 2004a). This designated branch, known as the Service Area Branch, was responsible for meeting the credit needs of the assigned villages. However, if a borrower wanted credit from a non-service area branch, it required a 'no-dues' certificate from the service area branch.

SAA limited the scope for banking operations and did not have the desired impact on rural financial development. The branch expansion reversed to urban areas, as opposed to what was observed in the social banking period (Figure 1). A Study by Devarajan (2004) based on Kannur district in Kerala, observed a decline in credit-deposit ratio in the state after implementation of SAA. The study also recorded very low awareness among people in Kannur district about the scheme as only one-eighth out of 492 persons surveyed could identify their service area bank. Banks also didn't follow the prescribed procedure for their planning service area plan. Recording caveats of financial system for rural poor, Basu (2005) described that the SAA has restricted the newer and more innovative entrants in rural lending. The author further states that the removal of SAA could help stimulate the entry of new branches in rural areas of the country.

Taking cognizance of low entry of branches and lop-sided growth, RBI withdrew SAA in 2004. Banks were now supposed to submit annual branch expansion plans and RBI committed to evaluate the plan and responding to banks within 4 weeks. This was in stark contrast to the period from 1990 to 2005 when each application was approved on a case-by-case basis. Thus, a more predictable environment was created for banks to expand[6]. We observe the effect of these measures in Figure 1. After 2005, there is a sharp increase in bank branch establishment, especially in rural areas and also a decline in closure of bank branches (Figure 2). We exploit these changes in bank branch expansion to study its impact on rural entrepreneurship.

[6]See Young (2020)

Data

Outcome variable: Financial Inclusion and Ownership

Our outcome variables come from the Economic Census (EC) of India which enumerates all non-farm enterprises in the country[7]. It collects indicators such as gender and caste of the owner, NIC code, major source of finance, size and the gender composition of employment, among others. We include the following as outcome indicators at the village level.

First, in order to estimate the gender-wise impacts, we consider the total number of female- and male-owned enterprises. EC provides NIC code up to 3 digits for each enterprise which identifies whether the reported enterprise belongs to agricultural or non-agricultural sector. Thus, we are able to compute the number of female- and male-owned enterprises in agriculture and non-agriculture sectors. Further, the census documents the 'major source of finance' of each enterprise, where the response is one of the following: formal, informal, self-financed and government aid. We compute the number of male and female owned enterprises with formal finance as their major source of finance. This variable serves as the proxy for credit uptake and is used to test the credit mechanism.

Six ECs have been conducted so far in 1977, 1980, 1990, 1998, 2005 and 2013. However, gender-wise ownership of enterprises was recorded only in the last three rounds (1998, 2005, and 2013). To create a panel of villages from these three rounds, we use the Socioeconomic High-resolution Rural-Urban Geographic Dataset on India (SHRUG) created by Asher et al. (2019), which provides village-level identifiers compatible with Economic Censuses (1990, 1998, 2005 and 2013) and Population Census (1991, 2001, 2011) of India. The rich diversity of information present in the Economic Census combined using SHRUG IDs makes it possible to observe the trends in economic activity in a village over time. Table 2 presents summary statistics of all indicators.

Explanatory variables: Access to finance

The population census 2001 and 2011 record whether a village has a bank or not, and if not, the distance to the nearest branch. However, the distance is measured in coarse intervals of 5 km such as 0-5km, 5-10km, and so on. We use a more refined measure of village level financial

[7]The sectors not covered in EC are the following. In case of agricultural activity, establishments classified under 011 and 012 of Section A of NIC 2008; in case of non-agricultural activity, establishments engaged in Section O of NIC 2008 (public administration, defence, compulsory social security), Section T of NIC 2008 (territorial organization and bodies) and Section R of NIC 2008 (illegal gambling and betting activities)

access than the one used in other studies so far or available in these two rounds of population census. We define financial access as the straight-line distance of each un-banked village to its nearest banked village/town[8]. Using three datasets—RBI Commercial Bank Directory[9] (as on October 31, 2019), Population Census[10] 2011 and GIS-shape files[11] for boundary of Indian villages—we compute this metric from 1951 to 2019 as follows.

First, we matched location identifiers of bank branches from RBI commercial Bank Directory with Population Census to uniquely identify the location of villages/towns where each bank branch is present. The directory had a total of 154,505 bank branches including bank offices. Overall, we matched 45,911 unique villages and towns with 151,104 bank branches/offices, which gives us a match rate of 97.8% of bank branches. We define these villages as banked villages. Nearly, 603,084 villages remained un-merged, which we define as un-banked villages. This includes uninhabited villages as per PC 2011. Merging RBI data with PC 2011 also allows us to incorporate spatial data (centroid of each village) in it. This process gives us the GIS location of a village/town of every banked-village, as per the RBI directory.

The RBI directory also provides the year in which each bank branch got established among many other indicators. In the next step, we computed the distance between centroid of un-banked village data to the centroid of the banked village data from 1951-2019 using the user-written command *geonear* in STATA which identifies the nearest neighbour using geodetic distances (Picard, 2010). Specifically, the 'nearest neighbour' algorithm is first run between un-banked villages (as on October 31, 2019) and banked villages (as in 1951), which draws the nearest neighbour of each village in the former data from the latter data. For example, for each unbanked village in 2019, we obtain its nearest financial access point in 1951. Similarly, we get the nearest banked centre in 1952 for the same set of unbanked villages by replacing the second data with banked centres up to year 1952. In this iterative way, we computed the

[8] Several measures have been used in literature as proxy of access to banks/finance. First is the geographic and demographic penetration of bank branches where the total number of bank branches either divided by total area or total population (Alessandrini et al 2010; Beck et al. 2007, 2008; Zhao and Jones-Evans 2017). Recent studies have used straight line distance and travel distance to the nearest bank branch, distance that users are willing and able to travel for the service, (Koomson et al., 2020; Langford et al. 2021; and Camacho et al. 2021).

[9] The RBI Commercial Bank Directory is obtained as on October 31, 2019. It provides the details of each commercial bank branch in the country with the name of the state, district and rural centre (roughly equivalent to a village) where the branch is situated.

[10] Population Census is a decennial count of the population and its various characteristics. It is conducted by Ministry of Home Affairs, Govt. of India. It provides demographic and socioeconomic composition of the population, local amenities in rural and urban areas, among other indicators.

[11] The spatial data we use is the GIS shape files which provides us the location of each village in terms of latitude and longitudes of the boundary of each village. This data is obtained from the research team at the World Bank. These GIS shape files are compatible with Population Census 2011 (henceforth, PC 2011).

distance of unbanked villages in 2019 to the nearest banked centres in each year from 1951 to 2019.

This process provides us a panel of each village with its access to nearest banked centre from 1951-2019. The complete detail of construction of our measure of financial access is explained in Garg and Gupta (2020) along with its limitations. The average distance of unbanked villages is plotted in Figure 3. Our measure of proximity shows that the bank access in rural areas has improved drastically over the past decades, as the average distance of unbanked villages to the nearest banked centre has declined from 43.5 km in 1951 to 4.3 km in 2019.

Other variables

We obtain other indicators which could potentially influence economic activity in rural areas. One such important factor is the availability of paved roads. Few recent papers have estimated the impact of village roads on several aspects of human development such as easier access to various types of government services e.g., health and education services, labour market, goods market. Asher and Novosad (2020) show that the new paved roads in rural India led to large reallocation of labour out of agriculture sector to the non-farm work outside the village. Thus, road availability in rural areas cannot be ignored as a confounding factor in this study. Other indicators are the close substitute of a commercial bank branch in rural areas such as Primary Agricultural Credit Society (PACS). We also obtain population size, literacy rate, and availability of power at the village level. All these indicators are obtained from the population census of 2001 and 2011.

Methodology

As our objective is to analyse the impact of proximity of a village to a bank branch on its economic activity, our study group is formed by the unbanked villages. We use a difference-in-difference research design for our study by constructing the following treatment and control groups:

1. Control Group: This group consists of those unbanked villages which remained more than 5kms away from a banked centre in all years of study i.e., up to 2013. There are 187,814 such villages.

2. Treatment Group: These unbanked villages were more than 5kms away from a banked centre up to 2005, but a new branch was opened within 5kms between 2006 and 2013. This group comprises of 74,444 villages.[12]

Table 1 provides the distribution of the treatment and control group villages in our study.

Identification

Identifying the impact of bank branches on rural entrepreneurship in India is challenging. After 2005, policies introduced by RBI provided more control to banks over branch placement, which makes branch location endogenous to several unobservable village-level factors. For example, banks may enter areas which already exhibit high levels of economic activity. Additionally, banks may observe the upward trajectory in economic potential of a village to determine branch location.

Difference-in-difference research design allows for the inclusion of village-fixed effects. These address the time-constant village factors which influence bank branch location decisions such as level of the economic activity.

As suggested by Wing et. al. (2018), we address the concern of time-varying village-level factors by including time trends of pre-treatment levels of some relevant covariates of the villages.[13] We follow the literature on determinants of bank branch location to decide which covariates to include in the empirical specification). Factors such as size and density of population, level of education, the share of urban population, size of the profitable market, growth rate, unemployment rate, and level of economic activity are found to be significant drivers of bank branch availability (Alama and Tortosa-Ausina 2012; Ansong et al 2015; Crocco et al. 2010; Fernández-Olit et al. 2019; Hegerty 2016; Maudos 2017; Ghosh 2012; and Zhang et a. 2021). In particular, we first run a logit regression of the treatment indicator of a village (1 if the village received treatment and 0 otherwise) on various socio-demographic and economic covariates. Table 3 reports the marginal effects of each variable from the probit regression.

Infrastructure such as roads and domestic power; size of population, literacy rate, proximity to town, and presence of other financial service providers such as PACS are strong determinants

[12] 274,009 villages had a bank branch within 5km prior to 2005. We exclude these villages in our analysis.
[13] Ideally, we would have wanted to include these variables as controls in our estimation equation. However, these data are available only for 2001 and 2011 population census rounds, making it difficult to use as controls for variables which are available for 1998, 2005 and 2013.

of proximity to a bank branch. In particular, the presence of a road and domestic power supply increase the probability of a proximate bank branch by 2.9% and 5%, respectively. On the other hand, other lending institutions such as PACS deters proximity of bank branches by 2.4%.

Empirical Specification

Our empirical specification takes the following form:

$$y_{vdt} = \gamma . Treat_{vd} * Post_t + \varphi_v + \varphi_t + \varphi_{dt} + Z_{vd(2001)} * Trend + \varepsilon_{vdt} \ldots\ldots(1)$$

where, y_{vdt} is the outcome variable in village *v*, district *d* and at time *t*. $Treat_{vd}$ takes value '1' for villages which received treatment and '0' otherwise, $Post_t$ takes value '1' for year 2013 and '0' for pre-treatment years – 1998, 2005. The coefficient, γ, on the interaction term measures the ATE on y_{vdt} after bank branch becomes proximate within 5kms.

φ_v are village fixed effects which address time-invariant village-level unobservable factors. In addition, we saturate the specification with year fixed effects, φ_t, and district-year fixed effects, φ_{dt}. The former account for macro factors while the latter address local time-varying factors affecting the district of the village. These are crucial since RBI introduced several changes in bank branch expansion policies over time. Further, RBI's push for branch expansion centred on the size of the banked population at the district-level. $Z_{vd(2001)}$ are covariates of the village from PC 2001, namely, literacy rate, size of population, distance to town, road, presence of domestic power and PACS. The interaction term $Z_{vd(2001)} * Trend$ represents the time trend of each of these variables.

Strength of the Treatment

Before we move to the results, we discuss the strength of the treatment received by the treatment group. Table 4 reports the average distance to the nearest banked centre. In 1998, the average distance was 8.45kms and 9.81kms for treated and control villages, respectively, which remains nearly unchanged in 2005. By 2013, proximity for treated villages improves as the average distance declines to 3.25kms. In contrast, control group villages remain 8.43kms away from the nearest banked centre.

Results

Female Entrepreneurship

Table 5 provides the results of equation (1) for enterprises. Following Abadie et. al. (2017), we adjust the standard errors for heteroscedasticity within villages.

Panel A reports results for female enterprises. The coefficient on the DID interaction term in column 1 is positive at 0.117 but insignificant. Columns 2 and 3 show the effect by sector of the enterprise. We do not find a statistically significant change in the agricultural sector (column 2). However, female entrepreneurship in the non-agricultural sector increases by 0.114 which is statistically significant 1% level (column 3).

Thus, the proximity to a bank branch improves female entrepreneurship in non-agricultural sector.

Male Entrepreneurship

In panel B of Table 5, we report the corresponding results for male entrepreneurship.

Results do not show a statistically significant change in male enterprises in treated villages. The coefficient of the DID indicator is 0.059 with a standard error of 0.313 (column 1).

In columns 2 and 3, we segregate the effect by sector. We observe that the male enterprises decline in agriculture sector in treated villages. Specifically, on average, a village has 0.431 lesser male-owned agricultural firms after the village comes within 5kms of a banked center. We find an increase of a similar magnitude in the non-agricultural sector (Column 3). The coefficient of the DID interaction term is 0.484 which is statistically significant at 1% level.

Thus, with a shift towards non-agricultural sector, villages exhibit a structural transformation due to improvement in financial access. However, the mode of this transition is distinct for males and females. While women-owned enterprises increase in the non-agricultural sector, male-owned enterprises appear to shift away from agricultural and toward non-agricultural sector.

Mechanisms

Proximity to banks reduces access costs for borrowers for availing banking services. A smaller distance from the borrowers also allows banks to assess credit worthiness better (Peterson and Rajan 1994; Agarwal and Hauswald 2010; Ergungor 2010), thereby improving the decision on lending. Thus, lower distance and lower information asymmetry may be the channel behind the impacts observed in Table 5.

Here, we test for these mechanisms. The EC dataset provides the number of firms which reported whether or not they used institutional finance as a major source of finance. We use this variable as a measure for institutional credit uptake. The following specification is used where we interact this covariate with $Treat_{vd} * Post_t$ and use it as a control:

$$y_{vdt} = \gamma.Treat_{vd} * Post_t + \beta_1.Treat_{vd} * Post_t * FF_{vdt} + \beta_2 * FF_{vdt} + \sum \varphi_i + \varepsilon_{vdt} \text{ .. (2)}$$

where, as above, y_{vdt} is the number of firms of each type (by gender of owner and industry of the enterprise) and FF_{vdt} is the corresponding number of firms which reported institutional credit as a major source of finance. In addition to the variables shown, we also include all the trend of covariates and all fixed effects ($\sum \varphi_i$) from equation (1).

Our hypothesis is that if the effect of branch proximity on entrepreneurship is due to higher credit uptake, the coefficient of triple interaction term ($Treat_{vd} * Post_t * FF_{vdt}$) β_1 should be positive and significant; and the estimated effect, γ, should fall after controlling for the credit uptake behaviour of the enterprises.

We report these results for female enterprises in panel A of Table 6. For non-agricultural firms (column 3), the coefficient on the DID term reduces to 0.081 and remains statistically significant. Importantly, the coefficient of triple interaction term ($Treat_{vd} * Post_t * FF_{vdt}$) is positive and statistically significant as well. Thus, credit uptake of female (non-ag) firms mediates the estimated ATE of financial access. The credit uptake mechanism partially explains the effect on female non-agricultural firms. As compared to men, women in rural areas face stricter social norms in venturing away from the villages (Morrisson and Jütting 2005). Distant bank facilities may act as a greater barrier for women. Thus, proximity to a bank branch reduces their cost of accessing banking services.

Panel B of Table 6 reports the corresponding results for male enterprises. The estimated coefficients for agricultural and non-agricultural enterprises are -0.491 and 0.429, respectively. Further, these effects do not undergo a significant decline compared to the respective estimated ATEs in Table 5. The coefficient of triple interaction term also remains statistically insignificant in each column.

For male enterprises, the effect of bank branch proximity does not appear to be mediated by the credit uptake mechanism. What can explain these results? Unrestricted by social norms, males might access credit accounts at a greater distance. Additionally, the EC dataset does not record the *amount* of loans taken by the enterprises. While men may already have access to

banking services on the extensive margin, a proximate bank branch may still improve it on the intensive margin i.e., the amount borrowed. In particular, males could use the higher *volume* of credit to exit less productive agricultural sector and enter non-agricultural sector. However, testing this intensive margin driven mechanism is out of the scope of the current paper due to the data limitation.

Robustness and Additional Results

Assessment of Parallel Pre-Trends

We assess if the control and treated groups exhibited diverging trends in the pre-treatment period. A diverging pre-treatment trend indicates the presence of factors other than the treatment that may have led to post-treatment results.

To check for parallel pre-trends, we limit our analysis to the pre-treatment time-periods—1998 and 2005. We use the following specification:

$$y_{vdt} = \gamma . Treat_{vd} * I(2005)_t + \varphi_v + \varphi_t + \varphi_{dt} + Z_{vd(2001)} * Trend + \varepsilon_{vdt} \ldots\ldots (3)$$

where, $I(2005)_t$ takes value '1' for the year 2005 and '0' for 1998. Other variables are as defined previously. The coefficient on $Treat_{vd} * I(2005)_t$ now measures the DID estimates between the treated and control group *prior to the treatment.* A statistically significant γ would indicate diverging pre-trends.

Table 7 presents the results. γ remains insignificant for each outcome variable. All outcome variables exhibit parallel pre-trends.

Impact on Male and Female Employment

So far, our results suggest that the improved proximity to financial services increases entrepreneurship through flow of credit. We further study the impact on gender-wise employment. The EC data provides size of employment of each enterprise. We use that information to measure the impact on gender-wise employment employed in enterprises. Employment indicators should also be influenced by improved entrepreneurship since Indian rural economy is labour intensive.

Tables 8 shows the effects on labour markets by sector and gender of workers. Total number of female workers increases by a magnitude of 0.908 (column 1). While it declines in

agricultural enterprises by 0.417 (Table 8, column 2), a more than compensating increase of 1.258 occurs in the non-agricultural enterprises (column 3).

Similarly, we observe that, male workforce declines by -0.698 in the agricultural (column 5), and increases by 1.647 in the non-agricultural enterprises (column 6). Thus, labour market results reaffirm the evidence on structural transformation.

Assessment using contemporaneous covariates

Determinant of bank branch location may confound with covariates of entrepreneurship at the village level. In our main specification, we control pre-treatment determinants of bank branch proximity, each interacted with time-trend, to address this concern. In a parsimonious model, one would want to include the contemporaneous levels of these variables for the years corresponding to the data used from Economic Censuses. However, the village level socio-economic variables are only available from PC 2001 and 2011.

In this section, we restrict our analysis to the years 1998 and 2013. We regress the outcome variables on the interaction term controlling for population, literacy rates, distance to town, presence of road, PACS and power supply of the villages. We also include village, year and district-year fixed effects. Our empirical specification takes the following form:

$$y_{vdt} = \gamma . Treat_{vd} * Post_t + \varphi_v + \varphi_t + \varphi_{dt} + Z_{vdt} + \varepsilon_{vdt} \ldots\ldots(4)$$

where Z_{vdt} does not refer to the time trend of control variables as in previous equations, but it includes *near*-contemporaneous levels of these covariates from PC 2001 and 2011.

Table 9 presents the results. Similar to previous results, this model also suggests an increase in the female- and male-entrepreneurship in non-agricultural sector in treated villages in 2013. The results on employment are also qualitatively similar to the results of main specification.

Assessment of Results with 3km as Threshold to define Financial Access

Earlier, we defined the treated group as those villages which received a bank branch within 5kms. As a robustness check, we alter the threshold to 3kms to define proximity. Table 10 shows these results. Here, treated indicator takes value 1 if the village received a bank branch within 3kms after 2005. Our results remain robust. As expected, we also observe that the impacts are bigger in magnitude than the results of 5kms threshold.

For female enterprises, the coefficient of DID interaction terms is positive at 0.211 (column 1) and significant. Similar to our previous estimates, whole of this effect occurs in non-

agricultural enterprises where female enterprises increase by 0.217 (column 3), while the effect for agricultural firms is insignificant (column 2).

For male enterprise, we see an increase of 0.896 units in the non-agricultural sector (column 5) but a decline of 0.576 units in agriculture (column 6). This is consistent with our hypothesis that more proximity should allow better access, and hence, higher impact.

Conclusion

Lack of financial access acts as one of the major hinderances in economic gains for women (Raghuvanshi, Agarwal and Ghosh 2017; Kairiza et al. 2017, Panda 2018, and Chaudhuri, Sasidharan, and Raj 2020). As compared to men, women in rural areas face stricter social norms and the distant bank facilities may act as a greater barrier for women. Proximate bank branch could, thus, benefit women more. RBI's removal of Service Area Approach led to penetration of branches in rural after 2005. We used this expansion as a natural experiment to understand the gender-wise impact on entrepreneurship due to improved financial access.

We construct a novel panel dataset of enterprises in villages in India with their distance to the nearest banked-center. Results show that number of women entreprenuers increases in a village in non-agricultural sector as proximity to a bank branch improves. Male entrepreneurship shifts from agriculture to non-agriculture sector. Testing the credit channel informs us that the institutional credit uptake may be the driving mechanism for gains in female entrepreneurship. We do not observe this mechanism for the increase in male-enterprises. Our results are robust to a different threshold of proximity and different specification.

Our paper contributes to the literature on the benefits of financial development for women. Consistant with our hypothesis, proximity to a bank branch helps women more in accessing bank services. Males, on the other hand, are less bound by the regressive social norms, therefore, can access banks at a greater distance. While benefits of supply-side intervention such as higher banking access are well recorded (Rajan and Zingales, 1998; Bruhn and Love, 2011, 2014), a counter-view holds that a lack of preference by women for formal credit may prove as as an obstacle (Kochar, 2005; and Kumar et al. 2019). Our results support the supply-side argument by showing that financial infrastructure improves women's entrepreneurship. Although gender-wise impact of access to finance is studied by Bruhn and Love (2011), they

are unable to test the mechanism behind it. We are able to confirm the institutional credit channel for women and that it aids structural transformation in rural India.

Our work also suggests new areas of research. There could be other measures of financial service usage such as saving behaviour, volume of credit, collateral offered, cost of credit etc. These can be potential areas of gender discrimination holding back women's entrepreneurship. Additionally, higher economic well-being is a means to achieve the end of social well-being. What has been the impact of higher female entrepreneurship on intra-household bargaining, poverty rates, vulnerability to exogenous shocks, and social ills? Given that our measure of financial access goes back till 1950, it can be used to study other village-level outcomes. We leave this for future work.

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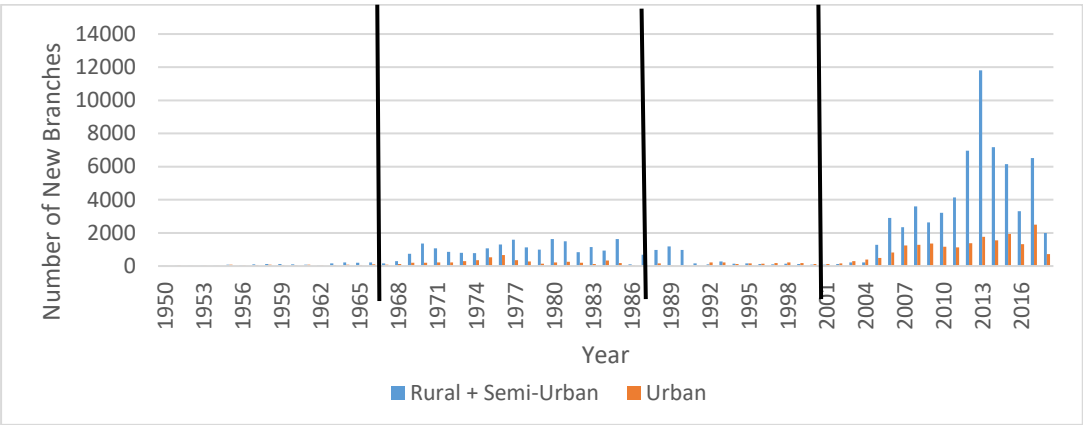
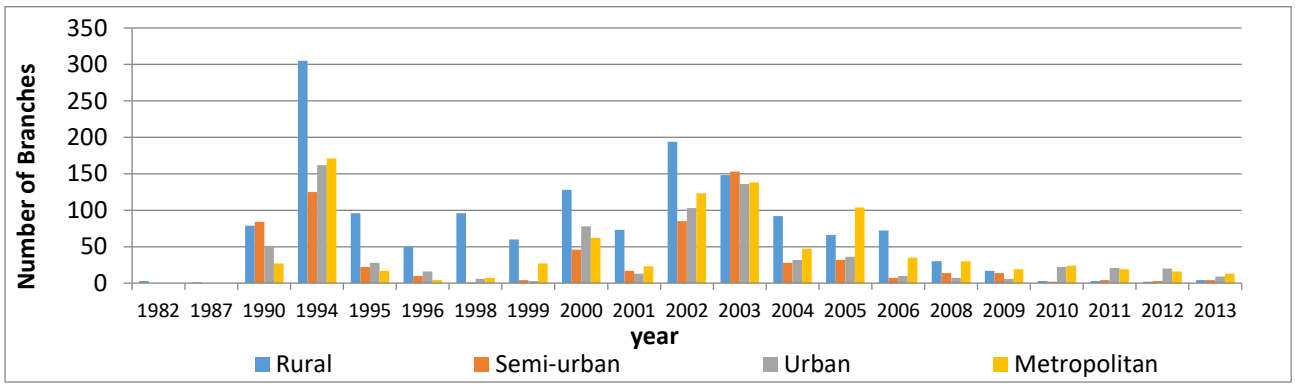
Tables and Figures

Figure 1: Number of New Branches opened each year in Rural and Urban Areas



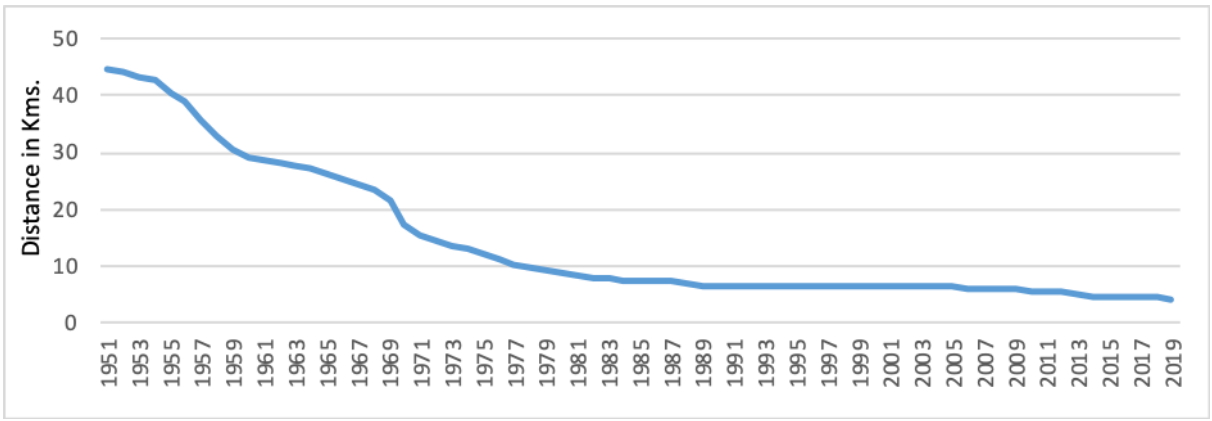
Notes: (i) Data Source: RBI Commercial Bank Directory as on October 2019.

Figure 2: The Size of Branch Closure/Merger/Conversion: All India Level



Data Source: Data obtained from RBI Branch Banking Statistics of various years.

Figure 3: Average distance to nearest village/town with commercial bank: All unbanked villages (1951-2019)



Note: (i) Data Source: Computed by authors using following data sets: (a) RBI Commercial Bank Directory as on Oct, 2019. (b) Population census 2011. (c) Spatial Database for South Asia - World Bank.

Table 1: Treatment and Control Group

	Number	Proportion*
Treatment Group	74,444	13.90
Control Group	187,814	35.06
*Proportion of villages with respect to all 535,663 villages in EC 2013.		

Notes: (i) While computing the total number of unbanked villages, we remove uninhabited villages as per PC 2011. (ii) Treatment group consists of those unbanked villages which were more than 5kms away from a banked centre up to 2005, but came within 5kms between 2006 and 2013. (iii) The control group consists of those unbanked villages which remained more than 5kms away from a banked centre in all years of study i.e., up to 2013.

Table 2: Summary Stat (1998, 2005, 2013)

	Treated		**Control**	
	Obs	Mean	Obs	Mean
Female Enterprises				
All	1,72,350	3.56	4,81,865	3.21
Non-Ag	1,72,350	1.80	4,81,865	1.55
Ag	1,72,350	1.42	4,81,865	1.39
Male Enterprises				
All	1,72,350	28.39	4,81,865	25.02
Non-Ag	1,72,350	19.77	4,81,865	16.11
Ag	1,72,350	8.10	4,81,865	8.32
Female Employment				
All Enterprises	1,72,350	22.89	4,81,865	20.46
Non-Ag Enterprises	1,72,350	15.29	4,81,865	12.71
Ag Enterprises	1,72,350	6.72	4,81,865	6.92
Male Employment				
All Enterprises	1,72,350	51.16	4,81,865	44.32
Non-Ag Enterprises	1,72,350	39.22	4,81,865	32.12
Ag Enterprises	1,72,350	10.94	4,81,865	11.16

Notes: (i) Obs refers to number of villages over three rounds of data. (ii) Mean refers to average value of respective indicator per village.

Table 3: Determinants of Treatment

Correlates of treatment dummy		
	Coefficient	SE
Literacy rate$_{2001}$	0.316***	0.008
Population (log) $_{2001}$	0.005***	0.001
Distance to nearest town$_{2001}$	-0.002***	0.0001
Pavel road dummy$_{2001}$	0.029***	0.002
Ag credit society$_{2001}$	-0.024***	0.003
Power dummy$_{2001}$	0.051***	0.003
Obs	2,33,398	
District Dummy	Yes	

Notes: (i) Table reports results form a Probit model. The dependant variable is the treatment dummy. It takes value 1 if an unbanked-villages comes within 5kms of a banked centre between 2005 and 2013 and 0 otherwise. (ii) Explanatory variables are taken from PC 2001. (iii) Results show that which kind of villages received treatment by 2013. (iv) Significance levels: * 10%, ** 5%, *** 1%.

Table 4: Mean Distance of un-banked villages to the Nearest Banked-Centre (kms)

	1998	2005	2013
Treated	8.45	8.3	3.23
Control	9.81	9.84	8.42

Data Source: The financial access is derived using spatial data, PC 2011 and RBI commercial bank directory.

Table 5: Impact on Enterprises

Panel A: Female enterprises

	Total	Agricultural	Non-Agricultural
Treated*Post 2005	0.117	0.011	0.114***
	(0.097)	(0.059)	(0.043)
$Population_{2001}$*Trend	0.002***	0.001***	0.001***
	0	(0.000)	0
$Literacy\ rate_{2001}$*Trend	0.296**	-0.162*	0.603***
	(0.14)	(0.085)	(0.065)
$Distance\ to\ nearest\ town_{2001}$*Trend	-0.005***	-0.000	-0.004***
	(0.001)	(0.001)	0
$Paved\ road\ dummy_{2001}$*Trend	0.153***	0.022	0.128***
	(0.039)	(0.023)	(0.02)
$PACS\ dummy_{2001}$*Trend	0.219***	0.098*	0.189***
	(0.085)	(0.051)	(0.037)
$Power\ supply\ dummy_{2001}$*Trend	-0.07	-0.052**	-0.008
	(0.047)	(0.026)	(0.025)
Observations	6,54,192	6,54,192	6,54,192
Adjusted R-squared	0.446	0.389	0.43

Panel B: Male enterprises

	Total	Agricultural	Non-Agricultural
Treated*Post 2005	0.059	-0.431**	0.484***
	(0.313)	(0.192)	(0.189)
$Population_{2001}$*Trend	0.006***	0.002***	0.003***
	0	(0.000)	0
$Literacy\ rate_{2001}$*Trend	-2.942***	-1.191***	-1.845***
	(0.507)	(0.291)	(0.32)
$Distance\ to\ nearest\ town_{2001}$*Trend	0.006*	0.011***	-0.007***
	(0.003)	(0.002)	(0.002)
$Paved\ road\ dummy_{2001}$*Trend	0.819***	0.194**	0.596***
	(0.147)	(0.082)	(0.096)
$PACS\ dummy_{2001}$*Trend	1.20***	1.082***	-0.29
	(0.304)	(0.170)	(0.187)
$Power\ supply\ dummy_{2001}$*Trend	0.455***	-0.029	0.555***
	(0.199)	(0.106)	(0.137)
Observations	654192	654192	654192
Adjusted R-squared	0.647	0.539	0.655

Note: (i) Panel A and B, respectively, report impact on female and male enterprises (total and sector-wise) in a village level panel for 1998, 2005 and 2013. (ii) The estimates are computed on the basis of equation (1). (iii) Top 1% of each outcome variable are winsorized. (iv) Each specification includes village fixed effects; year fixed effects; and district and year fixed effects. (v) Following Abadie et al (2017), standard errors are corrected for heteroscedasticity within villages. (vi) Values in parentheses are standard errors. (vii) Significance levels: * 10%, ** 5%, *** 1%.

Table 6: Testing the Credit Channel

Panel A: Female enterprises

	Total	Agricultural	Non-agricultural
	(1)	(2)	(3)
Treated*Post 2005	0.05	0.017	0.081**
	(0.094)	(0.060)	(0.041)
Treated*Post 2005*FO_InstFin	1.562**		
	(0.611)		
Treated*Post 2005*FO_Ag_InstFin		-0.106	
		(0.158)	
Treated*Post 2005*FO_NonAg_InstFin			0.450*
			(0.249)
Observations	6,54,192	6,54,192	6,54,192
Adjusted R-squared	0.459	0.401	0.456

Panel B: Credit Channel: Male enterprises

	Total	Agricultural	Non-ag
	(1)	(2)	(3)
Treated*Post 2005	-0.046	-0.49***	0.429**
	(0.309)	(0.187)	(0.184)
Treated*Post 2005*MO_InstFin	0.144		
	(0.194)		
Treated*Post 2005*MO_Ag_InstFin		0.683	
		(0.469)	
Treated*Post 2005*MO_NonAg_InstFin			-0.019
			(0.157)
Observations	6,54,192	6,54,192	6,54,192
Adjusted R-squared	0.658	0.547	0.673

Note: (i) Panel A and B report tests for credit channel for female enterprises (total and sector-wise) in a village level panel for 1998, 2005 and 2013. (ii) The estimates are computed on the basis of equation (2). (iii) FO_InstFin refers to the number of female-owned firms that reported institutional finance as major source of finance. Similarly, FO_Ag_InstFin, and FO_NonAg_InstFin classify those firms in agriculture and non-agriculture sectors. (iv) MO stand for male-owned. (v) Top 1% of each outcome variable are winsorized. (vi) Each specification includes village fixed effects; year fixed effects; and district and year fixed effects. (vii) Each specification includes time trend of control indicators (literacy, population size, PACS, distance to town, paved road, power). (viii) Following Abadie et al (2017), standard errors are corrected for heteroscedasticity within villages. (ix) Values in parentheses are standard errors. (x) Significance levels: * 10%, ** 5%, *** 1%.

Robustness Check

Table 7: Parallel Pre-Trends

	Female enterprises			Male enterprises		
	All	Ag	NonAg	All	Ag	NonAg
Treated*I(2005)$_t$	-0.003	0.025	-0.004	0.56	0.228	0.312
	(0.082)	(0.041)	(0.038)	(0.355)	(0.168)	(0.257)
Observations	4,16,409	4,16,409	4,16,409	4,16,409	4,16,409	4,16,409
Adjusted R-squared	0.375	0.333	0.315	0.627	0.458	0.636

Notes: (i) Table reports the results for pre-trends in pre-treatment period. (ii) An insignificant coefficient of interaction terms shows parallel pre-trends. (iii) The estimates are computed on the basis of equation (3). (iv) Top 1% of each outcome variable are winsorized. (v) Each specification includes village fixed effects; year fixed effects; and district and year fixed effects. (vi) Each specification includes time trend of control indicators (literacy, population size, PACS, distance to town, paved road, power). (vii) Following Abadie et al (2017), standard errors are corrected for heteroscedasticity within villages. (viii) Values in parentheses are standard errors. (ix) Significance levels: * 10%, ** 5%, *** 1%.

Table 8: Impact on Employment

	Female employment			Male employment		
	All enterprises	Ag enterprises	NonAg enterprises	All enterprises	Ag enterprises	NonAg enterprises
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post 2005	0.908**	-0.417**	1.258***	0.843	-0.698***	1.647***
	(0.4)	(0.199)	(0.274)	(0.564)	(0.253)	(0.426)
Observations	6,54,192	6,54,192	6,54,192	6,54,192	6,54,192	6,54,192
Adjusted R-squared	0.542	0.492	0.496	0.638	0.536	0.624

Notes: (i) Table reports the results impact on gender-wise employment in all, agricultural and non-agricultural enterprises. (ii) The estimates are computed on the basis of equation (1). (iii) Top 1% of each outcome variable are winsorized. (iv) Each specification includes village fixed effects; year fixed effects; and district and year fixed effects. (v) Each specification includes time trend of control indicators (literacy, population size, PACS, distance to town, paved road, power). (vi) Following Abadie et al (2017), standard errors are corrected for heteroscedasticity within villages. (vii) Values in parentheses are standard errors. (viii) Significance levels: * 10%, ** 5%, *** 1%.

Table 9: Model with Contemporaneous Control Variables (2001 and 2011)

Panel A: Impact on Enterprises

	Dependent variable: Number of Enterprises					
	Female Owned			Male owned		
	All	Ag	NonAg	All	Ag	NonAg
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post 2005	0.204	0.024	0.206***	0.268	-0.469	0.749**
	(0.156)	(0.092)	(0.072)	(0.508)	(0.297)	(0.316)
Observations	4,23,693	4,23,693	4,23,693	4,23,693	4,23,693	4,23,693
Adjusted R-squared	0.339	0.292	0.336	0.556	0.462	0.577

Panel B: Impact on Employment

	Dependent variable: Size of Employment of enterprises					
	Female			Male		
	All Ent	Ag Ent	NonAg Ent	All Ent	Ag Ent	NonAg Ent
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post 2005	1.335**	-0.576*	1.854***	1.187	-0.758*	1.980***
	(0.639)	(0.314)	(0.443)	(0.925)	(0.396)	(0.706)
Observations	4,23,693	4,23,693	4,23,693	4,23,693	4,23,693	4,23,693
Adjusted R-squared	0.45	0.416	0.405	0.55	0.459	0.544

Note: (i) Panel A and B report results for outcome indicators in a village level panel for 1998 and 2013. (ii) The estimates are computed on the basis of equation (4). (iii) Top 1% of each outcome variable are winsorized. (vi) Each specification includes village fixed effects; year fixed effects; and district and year fixed effects. (vii) Each specification includes time trend of control indicators (literacy, population size, PACS, distance to town, paved road, power). (viii) Following Abadie et al (2017), standard errors are corrected for heteroscedasticity within villages. (ix) Values in parentheses are standard errors. (viii) Significance levels: * 10%, ** 5%, *** 1%.

Table 10: Impact on Entrepreneurship with 3kms Threshold

	Female Owned Enterprises			Male owned Enterprises		
	All	Ag	NonAg	All	Ag	NonAg
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post 2005	0.211**	-0.061	0.217***	0.22	-0.576***	0.896***
	(0.096)	(0.056)	(0.045)	(0.314)	(0.177)	(0.212)
Observations	1,015,786	1,015,786	1,015,786	1,015,786	1,015,786	1,015,786
Adjusted R-squared	0.472	0.408	0.453	0.663	0.556	0.664

Notes: (i) Table reports the results after we change the distance threshold to 3kms. (ii) The estimates are computed on the basis of equation (1). (iii) Top 1% of each outcome variable are winsorized. (iv) Each specification includes village fixed effects; year fixed effects; and district and year fixed effects. (v) Each specification includes time trend of control indicators (literacy, population size, PACS, distance to town, paved road, power). (vi) Following Abadie et al (2017), standard errors are corrected for heteroscedasticity within villages. (vii) Values in parentheses are standard errors. (viii) Significance levels: * 10%, ** 5%, *** 1%.