Female Entrepreneurship and Gender Norms: Theory and Evidences on Household Investment Choices

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Abstract

In developing countries, many policy interventions aim to enhance female entrepreneurship by giving access to cash inflows targeting women. However, important investment decisions are usually made at the household level and may be influenced by local cultural norms about female labour force participation. Using a standard collective household model, this paper studies spouses' joint investment decisions. We show that the individual optimal investment levels are not necessarily aligned between spouses, though costly utility transfers can realign spouses' incentives. The required transfer is increasing in the stringency of the gender norm against female labour participation, making investment potentially too costly. We test these predictions using two different empirical settings and strategies. First, we exploit original data from a field experiment in India, which gave access to new investment opportunities to women through microcredit. We find that treated women belonging to castes that are relatively more favourable to women working are more likely to invest in home agricultural production and less likely to engage in casual low-wage jobs. Yet, they seem to enjoy lower utility levels in some dimensions such as health and freedom. To the contrary, we do not find any change in the occupation or independence of women belonging to castes that traditionally impose strong restrictions on women's behaviour, suggesting that investment is then too costly. Second, we exploit India's accession to the GATT in 2005 as a natural experiment and use Indian household surveys to study the effect of the termination of quotas imposed on textile exports, a female-dominated activity, on women's well-being. We find that in districts that are more suitable for cotton growing, a feminine-oriented occupation, removing the quotas increases agricultural work and decreases health indicators for women belonging to castes that are relatively more in favour of women working. Those empirical findings are consistent with our model, showing that, in the presence of gender norms, female entrepreneurship entails intra-household transfers that impact female well-being and can eventually prevent investment.

1 Introduction

Female entrepreneurship is considered an important contributor to economic growth and poverty reduction (World Bank's Female Entrepreneurs Resource Point - module I: Why gender matters). Empowering women through financial access is an important issue, as it is a major way for institutions and governments in developing countries to have a direct impact on women's well-being and households' poverty. Several initiatives such as cash transfers or micro-credit loans are targeting women.[1] However, several studies find low returns to capital in female-run enterprises (Berge et al., 2015; de Mel et al., 2008; Fafchamps et al., 2014; Fiala, 2018; McKenzie, 2017), as well as women often investing in household enterprises instead than in their individual ones (Bernhardt et al., 2019).

To understand why the returns to capital of women is lower than men, this paper explores, both theoretically and empirically, the intrahousehold dynamics that drive the decision of women to invest. Building on Field et al. (2010), we study whether traditional gender norms that exist in the household constrain the ability of both women and the household as a whole to grasp profitable investment opportunities. To answer this question, we construct a theoretical model that studies under which conditions spouses agree on the investment choices of the wife when gender norms constrain women's work, and thus her investment. When spouses disagree, utility transfers can realign spouses' incentives, unless the norm is too stringent. The model allows us to derive theoretical predictions that we test through two different empirical exercises. The predictions are the following: (i) women invest less when the norm is high; (ii) women transfer more to the husband when the norm is low as this allows them to invest; (iii) transfers increase with investment return in this case.

We first test the theoretical predictions in a setting in which women got an exogenous increase in their investment opportunities: some women in rural India got access to a microcredit program. Exploiting the caste/tribe/religion of the household head to proxy the strength of the norm against female labour force participation, we look at whether the impact of microcredit on investment and intra-household decision-making outcomes varies with the intensity of the norm. Then, we exploit spatial and temporal differences in female entrepreneurial opportunities triggered by a natural experiment: in 2005, the GATT revoked the "Multi Fibre Arrangement", making farming cotton more profitable. As cotton in India is found to be a more feminine specialization[2], we use the same proxy for conservative gender norms and explore the effect of this increase on their participation in agriculture and their health.

In our theoretical framework, we modify a standard collective model of the household to capture intra-household decision-making over investment. The spouses first have to decide whether the wife invests in a risky business or whether to work for a wage; then they consume based on their relative bargaining power. Both spouses need to agree for the wife to be able to invest. This framework allows us to identify the conditions under which individual optimal investment decisions are misaligned and to study the role of ex-ante intra-household utility transfers in reconciling these choices. The wife uses transfers to convince the husband to let her invest: this implies that when women are more willing to invest due to an increase in the profitability of their project, they pay more utility transfers. Conservative gender norms imply a negative utility cost for the husband when the wife invests: the higher the norm, the higher the transfer the wife needs to provide to the husband. We show that there exists a level of the norm after which no transfer can align the interests of the two spouses. After that level, the wife never invests in a risky profitable project. We

[1] See J-PAL Policy Briefcase "Empowering Women through Targeted Conditional Cash Transfers", October 2021 and (Okesina, 2021)

[2] Report "Women in Cotton" of the International Trade Centre

also show that, through change in bargaining power, the upper level of gender norms and the required utility transfer increase with the potential return of investment and decrease with husband's wealth.

Our first empirical exercise exploits the roll-out of a microcredit program that started in 2002 in the state of Jharkhand in rural India. 36 villages were randomized to receive the support of the NGO Pradan to introduce women-only Self-Help Groups (SHG): the NGO would first provide financial training, then help to create SHGs and, after two years connect the groups to a formal bank to access bank loans. This program constitutes an exogenous increase in the investment opportunities of women. It allows us to study how investment and intra-household transfers change, given the existing gender norms, when women are more able to invest. Using a triple difference set-up, we compare our outcomes of interest in pro-women ethnic/religious groups after the roll-out of the program to those of women in more conservative groups. The results confirm that being part of SHGs allows women to invest in more profitable businesses only in "pro-women" groups. At the same time, those women are more prone to increase fertility and reduce their freedom of movement, which seems to confirm the existence of a utility transfer from wives to husbands.

We then test how investment and transfers evolve when the profitability of businesses that are traditionally run by women increases exogenously. To do so, we again use a triple-difference set-up in India: we exploit the removal of the "Multi Fibre Arrangement" which was imposing exportation quotas on textile material to developing countries such as India. This decision increased by 23% exportation of cotton in India in 2005. We again compare our outcomes of interest in pro-women ethnic/religious groups after the removal of the agreement to those of women in more conservative groups in districts that are more prone to produce cotton as opposed to those who are not. In this case, we proxy transfers with health indicators (BMI) and investment with the probability of working in agriculture. We find that, after 2005 in areas with cotton, women in pro-women groups increased their probability of working in agriculture by 25% and experienced a reduction in their BMI of 5%. The data we use do not allow us to test for parallel trends. Instead, we run a placebo exercise in which geographical variation exploits districts that are suitable to produce rice (that is also feminine intensive but that should not have been concerned by the termination of the GATT) to those who are not. In these cases, we do not see any change in the outcomes of interest.

This paper contributes to several strands of the literature. First, we extend the collective model of decision-making in the household, introduced by Chiappori (1988) and Bourguignon et al. (1993). While the economic literature has provided extensive work to theoretically describe cooperative household decisions concerning consumption and investment in children[3], our study is the first to extend the collective model to entrepreneurship decisions within the household and to study its consequences for spouses individual welfare both empirically and theoretically. Since our outcome of interest is a dichotomous variable (whether to invest or not), standard bargaining outcomes in which outside options determine the distribution of resources in the household do not allow us to fully characterize the decision-making process. We, thus, propose utility transfers as a way to reconcile conflicting interests among spouses.

Second, it contributes to the growing literature on female entrepreneurship (Berge et al., 2015; de Mel et al., 2008; Fafchamps et al., 2014; Fiala, 2018; McKenzie, 2017; Bernhardt et al., 2019). We propose a theoretical model that rationalizes the following established empirical findings: (i) the returns on female capital are lower than those of men; (ii) women often invest in household businesses rather than their individual ones; (iii) these phenomena are stronger in context in which gender norms in term of labour market participation are worse.

Third, it contributes to the literature on the conflicts in the couple. We provide a theoretical explanation for the existence of a potential "male backlash" when programs that are meant to empower women are

[3]See both bargaining models (Lundberg and Pollak, 1993; Chen and Woolley, 2011; Manser and Brown, 1980; McElroy and Horney, 1981) and the collective model of the household, first designed by Chiappori (1988, 1992); Bourguignon et al. (1993).

put into place: non-financial transfers (i.e.domestic violence) are a way for husbands to keep control in the household when they see that their wives are gaining control over resources. In this respect, our paper relates to Anderson and Genicot (2015) that finds that wives can experience domestic violence from their husbands after a gain in bargaining through an improvement of outside options. It also relates to (Bloch and Rao, 2002) that studies how domestic violence can serve as an instrument for bargaining.

Finally, it contributes to the literature on gender norms and labour market participation of women (e.g. Fernández, 2013; Bertrand et al., 2015; Bernhardt et al., 2019; Bursztyn et al., 2020; Field et al., 2021). The paper more closely related to ours is Field et al. (2010): the paper empirically shows that the impact of a training program that boosts basic financial literacy and business skills and encourages to identify medium-term financial goals of women varies as a function of the stringency of gender norms regarding women's mobility and behaviour. We provide the first theoretical framework and empirical test that describe how restrictive norms affect the ability of the household to achieve Pareto Efficient outcomes.

The paper is organized as follows. In section 2, we expose the theoretical model and its predictions. In section 3, we test the theoretical predictions through the evaluation of the impact of PRADAN micro-credit program in rural India. In section 4, we present the country-wide empirical evidence related to the termination of the Multi Fibre Agreement in India. In section 5, we conclude.

2 Household bargaining on investment choice: a theoretical model

Consider a household composed of two members: a male ("he", h) and a female ("she", s). Both initially work for fix wages, denoted respectively w_h and w_s. The female is offered a risky investment opportunity $\mathscr{I}$ (e.g. through microcredit) upon which the household has to decide ($\mathscr{I} = \{0,1\}$). We assume that this decision is based on both (i) individual preferences and (ii) intra-household bargaining. Put another way, for the household to decide the female investing, it has to be preferable for both members given the (efficient) allocation of resources within the household. We moreover assume that gender norms translate into a utility loss $\psi \geq 0$ for the male when the female invests; and that the female may compensate him for this loss through utility transfers, denoted by $t \geq 0$.[4][5]

The household decision is then governed by the following timing:

1. **Investment decision.** The household decides the female to seize the investment opportunity if it exist a utility transfer t such that:

$$\begin{cases} \mathbb{E}u_h(\mathscr{I}=1) - \psi + t & \geq \mathbb{E}u_h(\mathscr{I}=0) \\ \mathbb{E}u_s(\mathscr{I}=1) - t & \geq \mathbb{E}u_s(\mathscr{I}=0) \end{cases} \tag{1}$$

2. **Intra-household decision.** Given investment decision, the collective resource is share efficiently based on each household's Pareto weight (i.e. according to the standard collective model):

$$\max \mu_h(\mathscr{I})\mathbb{E}u_h(\mathscr{I}) + \mu_s(\mathscr{I})\mathbb{E}u_s(\mathscr{I}) \tag{2}$$

where μ_s (resp. μ_h) represents the bargaining weight of the female (resp. the male).

[4]These transfers may correspond to concessions from the wife on various dimensions regarding for example time allocation, child planning, contraception choices among other utility transfers. **References**

[5]Our main results are robust to allowing monetary transfers, although these appear less efficient as downsizing the investment opportunity.

Remark 1. *By equation (1), the investment decision of the household is efficient.*

Following Basu (2006), in the absence of investment ($\mathscr{I}=0$), i.e. of risk, the bargaining weights correspond to the income share each spouse contributes to: $\mu_h(\mathscr{I}=0)=\frac{w_h}{w_s+w_h}$ and $\mu_s(\mathscr{I}=0)=\frac{w_s}{w_s+w_h}$.

We extend this definition to a risky environment by assuming that bargaining weights are then equal to the expected share of income the spouse is bringing to the household. This use of ex-ante weights comes to assume both perfect insurance and perfect commitment between spouses. To simplify the setting, we moreover assume that investment total net return, denoted $\tilde{R}$ follows a binary distribution $\tilde{R}=(0,1-p;R,p)$. The investment project succeeds with probability p and then generates a return (net of potential repayment) equal to R; and fails with probability $(1-p)$, generating no return. Note here that R reflect both the size of the project and its profitability. The bargaining weights of each spouse in case of investment then write: $\mu_h(\mathscr{I}=1)=\frac{w_h}{pR+w_h}$ and $\mu_s(\mathscr{I}=1)=\frac{pR}{pR+w_h}$.

We finally assume that the utility function of each spouse take a logarithmic form $u_h(c)=u_s(c)=\ln(c)$ giving rise to the following solution for the second stage of the game.

Lemma 1. *In the absence of investment, each spouse consumes its own income:* $\mathbb{E}u_s(\mathscr{I}=0)=\ln(w_s)$ *and* $\mathbb{E}u_h(\mathscr{I}=0)=\ln(w_h)$. *When the wife is investing, with endogenous ex-ante bargaining weights:*

$$\mathbb{E}u_s(\mathscr{I}=1)=p\ln\left(pR\frac{R+w_h}{pR+w_h}\right)+(1-p)\ln\left(pR\frac{w_h}{pR+w_h}\right) \tag{3}$$

$$\mathbb{E}u_h(\mathscr{I}=1)=p\ln\left(w_h\frac{R+w_h}{pR+w_h}\right)+(1-p)\ln\left(w_h\frac{w_h}{pR+w_h}\right) \tag{4}$$

The utility transfer required by the husband for accepting his wife to invest: $t^*=\psi+\mathbb{E}u_h(\mathscr{I}=0)-\mathbb{E}u_h(\mathscr{I}=1)$ when positive, then writes:

$$t^*=\psi-p\ln\left(\frac{R+w_h}{pR+w_h}\right)-(1-p)\ln\left(\frac{w_h}{pR+w_h}\right) \tag{5}$$

Remark 2. *The required transfer is positive even in the absence of norm ($\psi=0$) when $p\leq 1/2$.*

Proof. t^* is decreasing in p and, for $\psi=0$ and $p=1/2$: $t^*=-\frac{1}{2}\left[\ln\left(\frac{R+w_h}{R/2+w_h}\right)+\ln\left(\frac{w_h}{R/2+w_h}\right)\right]$ which is positive if and only if $\ln\left(\frac{R/2+w_h}{R+w_h}\right)>\ln\left(\frac{w_h}{R/2+w_h}\right)$ that is $(R/2+w_h)^2>w_h(R+w_h)$ what always holds as $R>0$. □

Remark 2 highlights that the transfer required by the husband reflects both the effect of gender norms and (even absent it) the change in bargaining power caused by female investment. This transfer then has to compensate the husband for both his utility loss after diverging from the norm and his potential loss in his bargaining power, taking into account the change in household income (positive when the investment succeeds, negative when it doesn't).

Proposition 1. *The transfers required for the husband to accept for his wife to invest is (i) increasing in the stringency of the norm ψ, (ii) increasing in investment total net return R and (iii) decreasing in the husband's wage w_h*

Proof. $t^* = \psi + \ln(pR + w_h) - [p\ln(R + w_h) + (1-p)\ln(w_h)] \Rightarrow \partial t^*/\partial R = p/(pR + w_h) - p/(R + w_h) > 0$ and $\partial t^*/\partial w_h = 1/(pR + w_h) - p/(R + w_h) - (1-p)/w_h = -(1-p)pR^2/[(pR + w_h)(R + w_h)w_h] < 0$ □

Parts (ii) and (iii) reflect the effect of female investment on spouses' bargaining power. As a higher return on investment or a lower husband's wage leads lower share of household wealth for the husband, he requires then a higher utility transfer to accept his wife's investment.

Given the structure of the decision, the investment will only be sized if the wife accepts to concede the utility transfer required by her husband; that is if her utility gain from investing exceeds the required transfer. Formally, $\mathscr{I} = 1$ if and only if $\mathbb{E}u_h(\mathscr{I} = 1) - \mathbb{E}u_h(\mathscr{I} = 0) > t^*$ that is if only if

$$\bar{t} \equiv \ln(pR) + p\ln\left(\frac{R + w_h}{pR + w_h}\right) + (1-p)\ln\left(\frac{w_h}{pR + w_h}\right) - \ln(w_s) > t^* \tag{6}$$

where $\bar{t}$ represents the highest acceptable transfer for the wife (then $\mathscr{I} = \mathbb{1}(t^* < \bar{t})$). Or equivalently if:

$$\ln\left(\frac{pR}{w_s}\right) + 2p\ln\left(\frac{R + w_h}{pR + w_h}\right) + 2(1-p)\ln\left(\frac{w_h}{pR + w_h}\right) > \psi \tag{7}$$

Proposition 2. *The wife is more likely to concede the transfers and therefore to invest as (i) the norm ψ is low, (ii) her wage w_s is low, (iii) her husband's wage w_h is high and (iv) when $p > 1/2$, as the return on investment R is high.*

Proof. Results on ψ and w_s are direct implications of (7) and the comparative statics on w_h follows from the proof of Proposition 1. Now, differentiating the left hand side of (7) with respect to R gives: $\frac{1}{R} + \frac{2p}{R + w_h} - \frac{2p}{pR + w_h}$ which is positive if and only if $pR^2(2p-1) + Rw_h(1+p) + w_h^2 > 0$, what holds when $p > 1/2$. □

Proposition 2 summarizes the effect of gender norms and bargaining power on the investment decision. Through its effect on the transfers required by the husband, gender norms reduce the likelihood of investment. This effect is however complemented by the implications of changes in bargaining power that follow investment: the wife is more likely to concede transfer in order to invest when her initial bargaining power is low (part (ii)) and as her husband requires less transfer when richer (part (iii)). Husband wage only entails an insurance / risk-sharing part (going in the same direction), and as stated in part (iv), the uncertainty behind investment also plays a key role in female investment decisions.

Propositions 1 and 2 allow us to draw several theoretical predictions on investment choice in the household and relate them with gender norms, investment return and initial wealth.

Prediction 1. *An increase in investment opportunities for women translates into investment decision only when the gender norm is low.*

Prediction 2. *Female investment entails a utility transfer from the wife to her husband. This transfer is increasing in the stringency of the norm.*

Figure 1 illustrates Predictions 1 and 2 through the impact of gender norms on the transfer required by the husband (t^*), the maximal acceptable transfer for the wife ($\bar{t}$) and the ultimate investment decision.[6] The effective transfer will equal t^* in case of investment ($\mathscr{I} = 1$) and 0 otherwise. We see in particular that, as the norm is bore by the husband it has no effect on the maximal acceptable transfer for the wife.

[6] Figure 1 has been computed for the following parameter values: $w_s = 300$, $w_h = 500$, $R = 1{,}000$ and $p = 0.7$.

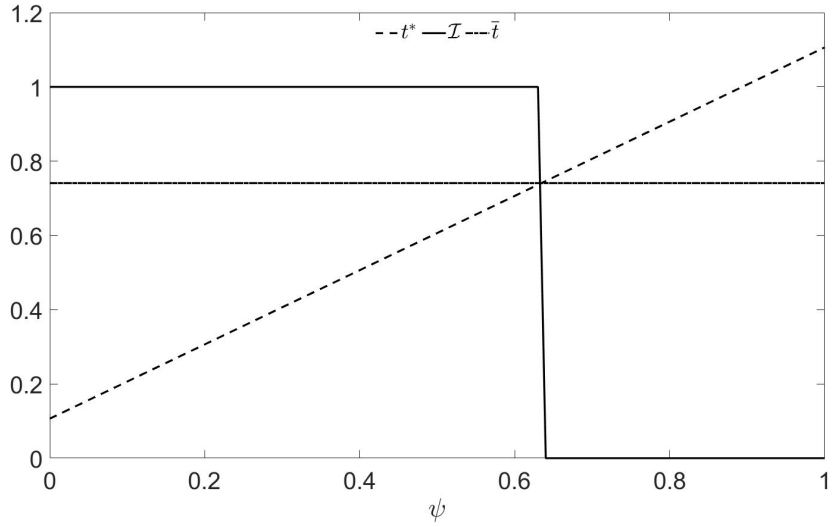

Figure 1: The impact of gender norms on transfers and investment decision

Prediction 3. *An increase in potential investment return increases utility transfer from the wife to her husband when the gender norm is sufficiently low (as illustrated in Figure 2).*

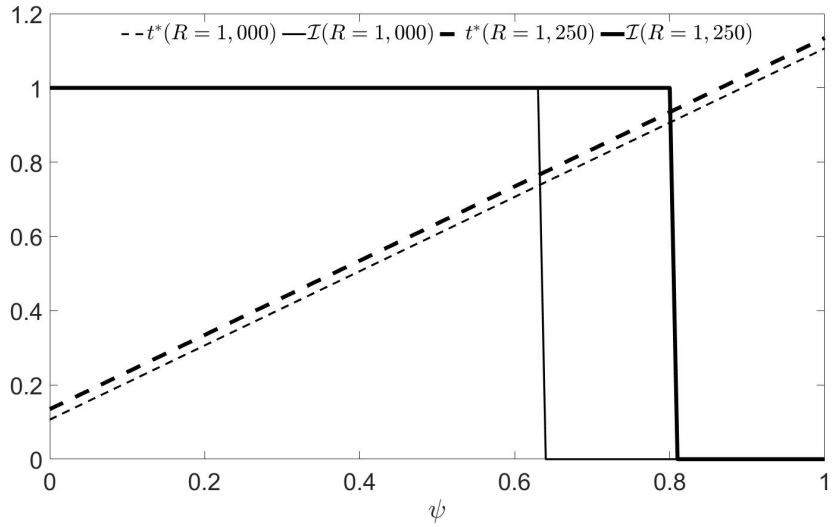

Figure 2: The impact of an increase in investment return on transfers and investment decision

Figure 2 – computed using the same parameter values as Figure 1 – highlights, as shown in Proposition 1 and 2, that an increase in R increases the transfer required by the husband and can decrease the range of norm ψ for which the wife agree to concede this transfer.

Prediction 4. *Women are more likely to take up investment opportunities when their wage is lower and when their husband is richer, and the utility transfer is decreasing in husband wealth.*

Figure 3 illustrates the second part of Prediction 4 and shows that by decreasing the transfer required by

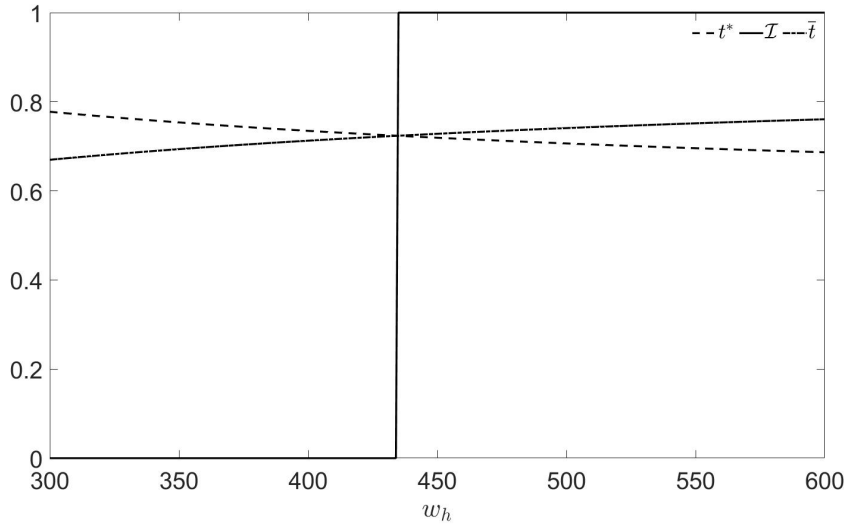

Figure 3: The impact of husband wage on transfers and investment decision

the husband and increasing the maximum transfer acceptable for the wife, an increase in husband's wage (or wealth) increases the likelihood of female investment.[7]

In the following sections, we test these four predictions using both a field experiment and a natural experiment in the Indian context. First, a field experiment on micro-credit opportunities allows us to test the predictions regarding the impact of gender norms on take-up, investment and the effect of wealth (Predictions 1, 2 and 4). Then, we leverage on natural experiment that increased the return on female investment to test Prediction 3.

3 Micro-level evidence on investment choices: a field experiment

3.1 Data and context

This section tests the above theoretical predictions in the context of rural India. It studies a setting in which women in some villages got access to microcredit, representing an exogenous increase in their investment opportunities ($\mathscr{I}$ in the model). We then use the caste/tribe/religion of the household head to proxy the strength of his norm against female work (ψ) – see details in the next section. The data used in this section come from an original longitudinal survey in villages of Jharkhand, East India, aimed at measuring the long-run impact of Self-Help Groups (SHGs) (Baland et al., 2020; Demont, 2022).

The state of Jharkhand is one of the poorest in India, with a rural poverty rate estimated at 41% in 2012 by the Planning Commission. In 2021, 29% of its population was still considered as poor according to a multidimensional poverty index, second only after Bihar (NITI Aayog, 2023). It has a strongly patriarchal culture (Eswaran et al., 2013). The female literacy rate in the 2011 Indian census was as low as 55%, ten percentage points below the national average. The state is mostly rural, with 76% of its 33 million inhabitants living in rural areas. Its population consists of about 26% tribals (mostly Adivasis) and 12% scheduled castes, known to be the most vulnerable and the lowest status groups in Indian society. Villages

[7] Figure 3 has been computed for the following parameter values: $w_s = 300$, $R = 1,000$, $p = 0.7$ and $\psi = 0.6$.

are very isolated on average, their inhabitants living chiefly on subsistence agriculture (rain-fed paddy being by far the predominant crop in the state) and seasonal labour.

SHGs are a widespread and versatile model of community-based microfinance institutions, which were initially promoted by the National Bank for Agriculture and Rural Development of India in the 1990s as women's collectives to promote microcredit, but also more general political participation and female empowerment. Today, they represent the most important source of microcredit in India, with about 12 million SHGs covering 142 million families and collateral-free loans outstanding of around 20 million dollars loans as on March 2022 (Indian Ministry of Finance, 2023).

SHGs are groups of 15-20 women from the same village and homogeneous backgrounds, who voluntarily come together to save and borrow small amounts on a regular basis.[8] The group formation starts with some initial training from an NGO. After several months of smooth functioning, a savings account is opened at a commercial bank near the village to deposit group savings, and, usually after about two years, groups showing mature financial behaviour can access bank loans (the group is then said to be *linked*).[9] At that point, groups are autonomous and the NGO's intervention is only required to solve occasional problems.

In 2002, the NGO PRADAN started to progressively introduce women-only SHGs in villages of Jharkhand chosen for their high poverty levels and the absence of any active NGO or microfinance institution. A list of 36 villages spread over the entire state were randomized into a treatment group, where the SHG program was implemented, and a control group, where no intervention took place. A random sample of a bit more than 1,000 households from those villages was then surveyed three times in 2004, 2006, and 2009, in order to estimate the impact of the SHG program. The sample was selected at the end of 2003, i.e. approximately one year after the creation of the first SHGs, to ensure that all groups were stabilized and operational. In each treated village, 18 SHG member households were randomly selected from the list of SHG members, together with 18 non-member households. In the control villages, 18 households were randomly selected from the village population.[10]

The questionnaire took the form of a Living Standards Measurement Survey, recording detailed information about household demographics, consumption, asset ownership, credit, labour market participation and self-employment of each member, migration, land ownership and agriculture, among other items. All surveys took place during the same period of the year, namely January-March, just after the winter-season harvest. Tables 15 and 16 in appendix provide descriptive and balance statistics about the sample at baseline, respectively at the household and village levels.

3.2 Empirical strategy

We follow a triple-difference strategy, which will estimate the differential evolution of households with and without access to SHG credit (the 'treatment') over time, depending on the gender norms implied by the caste/tribe/religion of the household. We focus on the balanced panel of households headed by a male, where a wife is present, and where the SHG member (if any) is the head's wife (N=2035).

Prior research has explained how the Hindu caste system[11] entails strong norms that severely limit the ability of higher-caste women to go out of home and work, in order to preserve their own 'purity' (Luke and

[8] Demont (2016) shows that SHGs display assortative matching properties in the same context.

[9] Bank loans are always made to the group as a whole, without collateral and at subsidized interest rates.

[10] Non-member and control households were selected following a standard random-walk procedure.

[11] Each Hindu person is associated with a caste (also termed jati), which is a hereditary, endogamous ethnic group. We focus on the husband's caste, although it will also correspond to the wife's caste in the vast majority of the cases given the very low rate of inter-caste marriage among the rural Hindu society (Luke and Munshi, 2011; Munshi, 2019).

Munshi, 2011; Eswaran et al., 2013; Jayachandran, 2015; Agte and Bernhardt, 2023). By contrast, women from scheduled castes are not subject to such purity concerns given their low social and economic status. Likewise, since Adivasi (scheduled tribes) are traditionally non-Hindu, they are not adhering to caste purity rules (Agte and Bernhardt, 2023). This creates important variation in households' norms against female work and investment in our data. In line with the above, we classify the following groups as relatively less in favour of women working: forward castes (FC), other backward castes (OBC), and Muslims. By contrast, the following groups are classified as relatively more in favour of women working: Adivasi and other tribes, scheduled castes (SC), and other religions (non-Hindus and non-Muslims). Table 1 gives the distribution of the different categories in our sample. Since high-caste status has historically offered clear economic advantages, we check the sensitivity of our results with and without forward castes. Moreover, in order to be closer to the theoretical mechanisms and to account for the different economic conditions, we control for the household income in all regressions (in addition to including household fixed effects).

Table 1: Distribution of households in social/ethnic/religious groups

	SHG members %	Non-SHG %	All %
Pro-women	49.7	51.2	50.5
Of which:			
- Tribal	38.0	42.9	40.8
- Scheduled caste	11.7	8.6	9.9
- Buddhist / Christian	7.6	8.0	7.8
Non pro-women	50.3	48.8	49.5
Of which:			
- Hindu & OBC / FC	45.3	45.0	45.1
- Muslim	4.9	3.9	4.3
Observations	872	1163	2035

We treat the first survey wave (2004) as 'baseline', although groups were already formed and had started to function, including extending some small loans to members, at that time. However, since they had been created roughly one year before, they were still very much in the learning and build-up phase. Importantly, none had taken an external loan from a commercial bank, involving larger amounts. In the data, we indeed observe that the average amount of annual SHG credit taken by members in the first wave is only half the value in the two subsequent waves. Moreover, we definitely expect a delay between the access to the first SHG loan and the transformation of women's bargaining position in the couple (coming through a progressive build-up of women's confidence and demands). If anything, if some positive effects on women's power were nevertheless already present in 2004, it would imply that we are estimating a conservative lower-bound treatment effect.

Our main specification takes the following form:

$$Y_{it} = \alpha + \beta SHG_i \times Post_t \times Prowomen_i + \gamma SHG_i \times Post_t + \delta Post_t \times Prowomen_i + \zeta_1 Rain_t + \zeta_2 Rain_{t-1} + \eta H_{it} + \lambda_t + \theta_i + \varepsilon_{it}, \quad (8)$$

where Y_{it} is the outcome of interest (occupation, well-being, etc.) for household i in year t, *Post* is a dummy indicating whether the outcome is measured in 2004 or in the following waves, *SHG* is a dummy taking value

one if the wife is member of an SHG (using time-invariant baseline membership), and *Prowomen* is a dummy taking value one if the husband has a relatively more favourable norm regarding female investment, based on his caste/tribe/religion as discussed above. Coefficient β is therefore main coefficient of interest, measuring the relative (dis-)advantage of households with access to SHG credit and relatively more favourable gender norms.

We include the following controls: *Rain* is the log of monsoon rainfall at the district level in years t and $t-1$[12], H_{it} is a vector of control variables at the household level, including household size in equivalent adults[13] and dummies for household income quartile[14], λ_t are time (survey wave) fixed effects that account for economy-wide shocks, and θ_i are household fixed effects that account for households' fixed characteristics, including the average outcomes of SHG members and pro-women households, as well as village fixed characteristics (thus accounting for the selection of treated villages and households).

Finally, standard errors are clustered at the household level (i.e. treatment level) to account for the correlation of standard errors across survey waves and heteroskedasticity.

3.3 Empirical results on occupation, norms, and well-being

We start by documenting important shifts in the occupation choices of wives. First, table 2 shows that wives who are members of SHGs and live in pro-women households strongly decrease their casual labour supply in the 'post' period (-75%). Those are usually poor, manual and unpleasant jobs done occasionally to complement the household income when required (less than 30 days per year on average in our sample). We do not observe the same pattern for husbands.

Second, we find in table 3 that pro-women SHG households strongly increase (by more than 350%) their vegetable production instead. The effect takes place mostly at the extensive margin. At baseline, only 6% of households cultivate vegetables, while this percentage jumps to 21% in pro-women SHG households after treatment (credit access). In the vast majority of cases, vegetable cultivation is an activity performed by women on the land close to the house. On the contrary, we find no effect on grain crop cultivation, which is much more widespread (77% of households cultivate grain crops at baseline) and always involves men (as well as other household members and neighbours at different cultivation stages).

Third, in table 4, we observe that pro-women SHG households also increase (by about 65%) their farming of small cattle (poultry, ducks, pigeons, pigs). Again, this is a female-dominated agricultural activity, as small animals are kept next to the house. By contrast, we find no effect for big cattle (cows, bullocks, buffaloes, goats, sheep, mules, horses), which are mostly bred outside of the house and managed by men.

Hence, wives who have access to credit and live in relatively pro-women households appear to decrease their casual labor supply and to invest more in female-managed agricultural activities, which are more enjoyable, healthy, and profitable on average.[15] Table 5 shows that this evolution is indeed linked to the access to (SHG) credit, as pro-women SHG households borrow much larger amounts (from all sources) in

[12] Demont (2022) shows the strong impact of rainfall shocks on household welfare in the same context, and both the last monsoon and the previous one may matter.

[13] We use the equivalence scale proposed by Townsend (1994), which computes adult male equivalent consumption according to the following age-sex weights (estimated from a dietary survey in rural Andhra Pradesh and Maharashtra): for adult males, 1.0; for adult females, 0.9; for males and females aged 13-18, 0.94 and 0.83, respectively; for children aged 7-12, 0.67 regardless of gender; for children 4-6, 0.52; for toddlers 1-3, 0.32; and for infants 0.05. Hence this measure reacts very slowly to fertility decisions, though it could vary quicker through (permanent) migration.

[14] We use wave-specific quartiles in order to account for time effects.

[15] For instance, in the last wave, the median daily wage for casual jobs held by wives is 40 rupees (0.5 USD), while the median income (per agricultural season) from selling vegetables is 800 rupees (10 USD) and the median monthly income from selling small

Table 2: Casual labour (days per year)

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Wife	Husband	Wife	Husband
Post	7.235	14.78*	5.111	15.62
	(4.517)	(8.131)	(5.451)	(9.496)
SHG × Post	3.361	-0.958	5.830	3.223
	(5.961)	(10.13)	(7.748)	(11.98)
Post × Prowomen	-2.796	-6.073	-1.731	-8.487
	(6.437)	(9.845)	(7.362)	(10.91)
SHG × Post × Prowomen	-19.97**	-11.55	-24.27**	-18.20
	(9.286)	(15.10)	(10.69)	(16.71)
Observations	2032	2032	1725	1725
baseline_mean	27.46	27.46	29.60	29.60

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

Table 3: Vegetable and grain crops production (kg)

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Veg. prod.	Grain prod.	Veg. prod.	Grain prod.
Post	0.838	60.03	-3.297	40.45
	(6.510)	(66.56)	(6.222)	(77.94)
SHG × Post	-4.775	-87.04	-13.77	36.07
	(11.06)	(86.15)	(13.20)	(106.0)
Post × Prowomen	-2.117	-36.78	4.643	5.145
	(7.197)	(72.87)	(6.688)	(80.52)
SHG × Post × Prowomen	33.27**	103.7	40.82***	-3.090
	(13.87)	(116.7)	(15.27)	(134.0)
Observations	2027	2011	1720	1709
baseline_mean	9.390	631.4	9.763	601.4

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

We trim the top 1% observations.

Table 4: Cattle farming (number of heads)

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Small cattle	Big cattle	Small cattle	Big cattle
Post	1.470***	0.348	1.409***	0.375
	(0.412)	(0.280)	(0.500)	(0.353)
SHG × Post	-1.144**	-0.406	-1.320**	-0.450
	(0.576)	(0.357)	(0.659)	(0.431)
Post × Prowomen	-1.037	0.180	-1.134	0.0299
	(0.660)	(0.352)	(0.722)	(0.403)
SHG × Post × Prowomen	2.390**	-0.418	2.720**	-0.263
	(0.995)	(0.522)	(1.075)	(0.585)
Observations	2008	2016	1703	1711
baseline_mean	3.823	4.179	4.102	4.248

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

We trim the top 1% observations.

the 'post' period (+100%). When focusing on SHG members only (double-difference estimation in columns 3 and 4), we confirm that wives living in pro-women households take more credit from SHGs than those in non-pro-women households.

In table 6, we go one step further and test the last theoretical prediction (prediction 4), and in particular that the wife's investment should be higher when the husband is richer.[16] We take land ownership at baseline and divide households below and above the median (we keep the whole sample, including forward castes, to avoid small numbers of observations). We find evidence that the investment in vegetable production is indeed higher when the husband owns large land, though it seems to matter less for small cattle farming.

In tables 7 and 8, we show that the above positive evolution in terms of occupation for SHG wives in pro-women households comes at a cost along some important female welfare dimensions. First, those wives declare using contraception less often, and wanting (expecting) more children in the future. These facts might indicate wives' fertility preferences coming closer to husbands'. Indeed, research has shown that men usually desire to have more children and that they often try to impose their preferences on wives, in particular through shorter birth spacing (Ashraf et al., 2014, 2020).[17] Second, we also find that SHG wives living in pro-women households are less likely to go out of the village on a regular basis. Moreover, they are less likely to be involved in a committee/association / social or political group (beyond SHGs). Those

cattle products is 400 rupees (5 USD).

[16]Unfortunately, given the limited number of wives who supply casual labour, it is not feasible to test robustly the part of the prediction regarding the wife's wage (e.g. by conditioning on wives' casual wage at baseline).

[17]In the context of India, the fertility preferences of men and women actually seem more aligned than in other countries (e.g. Africa countries). Yet, in the National Family Health Survey (NFHS-3) of 2005-2006 (i.e. in the middle of our survey period), 12.6% of the women declare wanting another child soon, against 14.1% for men (IIPS, 2007). Unfortunately, maternal history and health questions were asked only to women in our survey, such that we do not have direct evidence about the distance between men's and women's fertility preferences in our sample.

Table 5: Annual borrowing (INR)

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	All sources	SHG	All sources	SHG
Post	681.5	238.0	821.1*	78.88
	(422.1)	(207.8)	(419.1)	(237.5)
SHG × Post	-458.9		-720.1	
	(578.1)		(716.0)	
Post × Prowomen	-312.1	539.7*	-489.4	433.4
	(426.0)	(275.4)	(442.2)	(266.5)
SHG × Post × Prowomen	1387.2**		1512.1*	
	(672.6)		(800.8)	
Observations	2019	869	1713	717
baseline_mean	1642.4	371.6	1518.6	370.9

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

We trim the top 1% observations. Columns (3) and (4) focus on (original) SHG members.

Table 6: Female agric. investment conditional on husband's wealth

	Husband owns large land at baseline		Husband owns small land at baseline	
	(1)	(2)	(3)	(4)
	Veg. prod.	Small cattle	Veg. prod.	Small cattle
Post	-3.700	2.232***	4.048	0.592
	(12.25)	(0.738)	(7.496)	(0.454)
SHG × Post	-10.42	-1.820*	0.148	-0.717
	(21.19)	(0.946)	(9.003)	(0.705)
Post × Prowomen	5.034	-1.269	-7.294	-0.790
	(10.57)	(1.070)	(9.950)	(0.824)
SHG × Post × Prowomen	53.58**	2.690*	16.24	2.516*
	(27.20)	(1.553)	(12.74)	(1.303)
Observations	931	921	1096	1087
baseline_mean	19.12	4.828	1.112	2.979

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*p¡0.10, **p¡0.05, ***p¡0.01).

We trim the top 1% observations.

findings might be a direct consequence of their busier agricultural activity at home. Yet, they can probably be considered as a restriction of wives' freedom and mobility.

Table 7: Fertility

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Contraception use	Children desired	Contraception use	Children desired
Post	0.0265	-0.0740	0.0323*	-0.0544
	(0.0189)	(0.0588)	(0.0193)	(0.0738)
SHG × Post	-0.00913	-0.0921	0.0175	-0.144
	(0.0274)	(0.0906)	(0.0323)	(0.109)
Post × Prowomen	-0.00241	-0.118	0.00281	-0.134
	(0.0225)	(0.115)	(0.0229)	(0.126)
SHG × Post × Prowomen	-0.0697*	0.258	-0.106**	0.311*
	(0.0387)	(0.165)	(0.0438)	(0.180)
Observations	1946	1897	1652	1606
baseline_mean	0.0834	0.403	0.0769	0.416

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

Hence, we see that the welfare of wives who have access to credit and live in relatively pro-women households might have decreased along some important dimensions. This is consistent with the utility transfer from wives to husbands predicted by the model when the wife invests herself. Yet, in table 9, we see that, among SHG households, the subjective overall well-being of wives is more likely to have improved in pro-women households than in non-pro-women households. The same is not true in non-SHG households. Unfortunately, this question was not available in the two first survey waves, so we cannot implement the same econometric analysis as for other outcomes. Nevertheless, the formulation of the question does imply a time evolution, and we take the reported test as evidence that the overall welfare of SHG women in pro-women households does increase over time. This would imply that the bargaining of spouses is indeed incentive-compatible.

Table 8: Women's involvement in activities outside home

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Out of village freq.	Participation	Out of village freq.	Participation
Post	-0.0576	-0.0162*	-0.0511	-0.00901
	(0.0418)	(0.00964)	(0.0485)	(0.00903)
SHG × Post	0.0379	0.0186	0.0641	0.0116
	(0.0547)	(0.0143)	(0.0674)	(0.0185)
Post × Prowomen	0.0188	0.0132	0.0371	0.0136
	(0.0554)	(0.0128)	(0.0603)	(0.0143)
SHG × Post × Prowomen	-0.125	-0.0730***	-0.177*	-0.0688**
	(0.0819)	(0.0279)	(0.0925)	(0.0314)
Observations	2032	2032	1725	1725
baseline_mean	0.360	0.0230	0.374	0.0259

The outcome in col. 1 and 2 a dummy indicating that the wife goes outside of the village more than twice a month.

The outcome in col. 2 and 3 is a dummy indicating that the wife participates in any social or political group (excl. SHG).

OLS estimation. All equations include time and household fixed effects.

All equations control for rainfall in t and t-1 as well as household size and income quartile.

Std errors clustered at the household level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

Table 9: Wife's subjective well-being improvement in last survey wave

	Pro-women	Non pro-women	p-value[1]	Observations
	%	%		
Wife is member of an SHG (at baseline)	25.8	14.5	0.024**	255
Wife is not a member of an SHG (at baseline)	20.6	22.5	0.669	335
Observations	299	291		590

The percentages give the proportion of wives who chose the first answer option to the question:

"Over the last years, has your own situation... (1) gone better, (2) gone unchanged, or (3) deteriorated?"

[1] T-test for difference in means (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

4 Country-wide evidence on well-being and occupation: a natural experiment

To test the predictions of the model that relate to the increase o potential investment returns of women in a natural setting, we exploit the end of the Multifiber Arrangement by the General Agreement on Tariffs and Trade (GATT) on January 1st, 2005.

4.1 Data and context

4.1.1 Removal of the GATT's imposed quotas on textile for Developing Countries

In the post-colonial era, numerous developing countries were left with developed textile industries known for low-wage salaries. This prompted developed countries, operating within the framework of the General Agreement on Tariffs and Trade (GATT), to introduce the Multi Fibre Agreement (MFA) in 1974. The MFA imposed textile export quotas on several developing economies, including India, to prevent competition. Two decades later, the Uruguay Round of the GATT in 1995 marked the decision of the termination of the MFA, leading to the actual removal of quotas on January 1, 2005.

In this paper, we suggest this policy shift contributed to an increase in the expected and potential returns for female entrepreneurs in India, grounded in two key factors. Firstly, the cessation of the MFA signifies an enhanced increase in returns for Indian cotton farmers. The Lopez-Acevedo and Robertson (2012) report studied that India's apparel and textile exports grew strongly post-MFA, with the support of a large pool of unskilled and also skilled workers, local entrepreneurship, and relatively supportive government policies. Additionally, Suresh et al. (2014) study for the period spanning 2002 to 2009 a notable escalation in the ratio of output value to paid-out costs for Indian cotton farmers, attributed to amplified output. In the absence of definitive confirmation linking the termination of the Multi Fibre Agreement to a direct escalation in net income, it is reasonable to infer that, during the globalization of export markets, net revenue for Indian cotton farmers experienced an upward trajectory. We provide comprehensive statistical insights such as yield, production, quantity harvested, and prices in Table 17.

Secondly, the textile farming landscape in India is marked by a pronounced feminine-oriented specialization. 70% of planting cotton farmers and 90% of picking cotton farmers in India are women [18]. Consequently, the upswing in cotton revenue following the MFA's termination aligns with an elevation in returns for female entrepreneurs.

We assume that this reform's effect corresponds to an increase of potential female entrepreneurship returns in cotton-growing areas in India, so an increase in the parameter R in our model. According to Prediction 3 of our theoretical model, such an increase in R should entail an increase in the transfers when the gender norm is low, i.e. where acceptance of women's labour force participation is higher.

4.1.2 Data

The Indian Human Development Survey (IHDS) is a nationally representative panel survey of Indian households, with two waves. The first one, in 2004-5, constituted a multi-topic survey encompassing 215,754 individuals from 41,554 households across India. The second wave, in 2010-11, included 204,569 individu-

[18] According to the International Trade Centre report "Women in Cotton"

als from 42,152 households across India. Samples were selected through stratified random sampling. IHDS Round II re-interviewed 83% of the original households, including split households residing within the same village from Round I (Desai et al., 2005, 2012, 2015).

It has precise data concerning health, education, employment, economic status, marriage, fertility, gender relations, and social capital. We restrict our sample to the married women present in both rounds, where we can follow the income of the household, their occupation, health variables and the caste they belong. We end up with a sample of 10,312 women present in both waves, so a total sample of 20,624 observations. Column (1) of Table 10 shows the baseline summary statistics of the whole sample.

Table 10: Summary of outcome, treatment and control variables

	Whole sample		Without forward castes	
	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean
BMI	2.13	2.28	2.11	2.27
Specialisation in agriculture	.196	.18	.20	.20
Cotton	.51	.51	.48	.48
Caste prowomen	.34	.34	.38	.38
Rice	.51	.51	.51	.51
Total income	40484.42	105525.4	37089.54	99874.35
Number of children	2.97	3.21	3.03	3.29
Age	34.37	41.71	34.23	41.55
GDP	16382.42	54697.82	15963.04	53106.38
Observations	10312	10312	9044	9044

This table shows the descriptive statistics of the 10,312 women present in the both waves of the Indian Human Development Survey for whom we have all the relevant information.

Source: Descriptives Sample drawn from the Indian Demographic and Health Survey. See the section 4.1.2 for more details on the dataset and sample criteria.

The timing of the Indian Human Development Survey is ideal to study the impact of the MFA's termination. The initial wave was conducted just before the removal of quotas, and the subsequent wave took place 6 years later, enabling us to explore the medium-term implications of the reform.

Treatment variables: Cotton intensity and castes in favour of women working

We use the FAO's Global Agro-Ecological Zones (GAEZ) dataset to compute the land suitability of cotton. Suitability is generated for each crop and cell using models that integrate location characteristics such as climate data (e.g., rainfall and temperature) and soil attributes along with crop-specific features. We keep suitability for cotton and compute the average suitability at the district level. The key advantage of these data lies in the exogeneity of crop suitability concerning shifts in local conditions and global demand, as it is not contingent on actual production. We then define cotton-intensive districts as the ones with suitability above the median of the sample, 12.78%, presented in Figure 4.

We use the same measure of societal norms on gender roles as in Section 3. We use caste affiliation as a proxy, given that prior research has demonstrated variations among castes in their support for women's participation in the workforce (Luke and Munshi, 2011; Eswaran et al., 2013; Jayachandran, 2015; Agte and Bernhardt, 2023). This makes the dataset and India itself an ideal context for examining and modelling these dynamics. Castes in favour of women working are the Adivasi (scheduled tribes), the Dalit, the Sikh and the Jain. Castes where female labour force participation is less accepted include Brahmin, High Castes,

Table 11: Summary of outcome, treatment and control variables by cotton intensity

	Cotton intensive		Not cotton intensive	
	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean
BMI	2.15	2.26	2.12	2.30
Specialisation in Agriculture	.16	.16	.21	.20
Cotton	1	1	0	0
Caste prowomen	.34	.34	.33	.335
Rice	.30	.30	.73	.73
Total income	43323.73	110825	37564.68	100075.8
Number of children	3.19	3.47	2.75	2.955
Age	34.47	41.91	34.27	41.51
GDP	17177.5	56938.96	15564.81	52393.21
Observations	5228	5228	5084	5084

This table shows the descriptive statistics of the 10,312 women present in the both waves of the Indian Human Development Survey for whom we have all the relevant information.

Source: Descriptives Sample drawn from the Indian Demographic and Health Survey. See the section 4.1.2 for more details on the dataset and sample criteria.

Other Backward Castes, and Muslims. We also restrict the sample to castes without the forward castes.

Outcome variables: Body Mass Index (BMI) and Specialization in Agriculture

Prediction 3 suggests that an increase in the expected return of female entrepreneurship, R, would increase the transfer she would have to offer her husband. Extensive literature finds an improvement in the BMI after receiving transfers. Lagarde et al. (2009) summarized 10 reports associated with 6 different cash transfer programs, and they are all associated with an improvement in health indicators. As in our model, wives make transfers to their husbands and do not receive them, we choose the Body Mass Index as a proxy for utility transfers the wife gives. A lower BMI would indicate higher transfers directed towards her husband.

Table 12: Raw Diff-in-Diff of BMI - IHDS

	Before GATT	After GATT	Diff A-B
Treated	2.09	2.18	0.09
			(0.021)
Control	2.13	2.30	0.17
			(0.012)
Diff T-C	−0.04	−0.12	−0.08
	(0.013)	(0.018)	(0.021)

As motivating evidence, Table 12 shows the raw evolution of the body mass index between the first and second waves of the Indian Human Development Survey. The treated group corresponds to women living in districts with the prevalence of cotton, belonging to a caste in favour of women contributing to the workforce. All the women living in other districts and belonging to other castes are in the control group. The

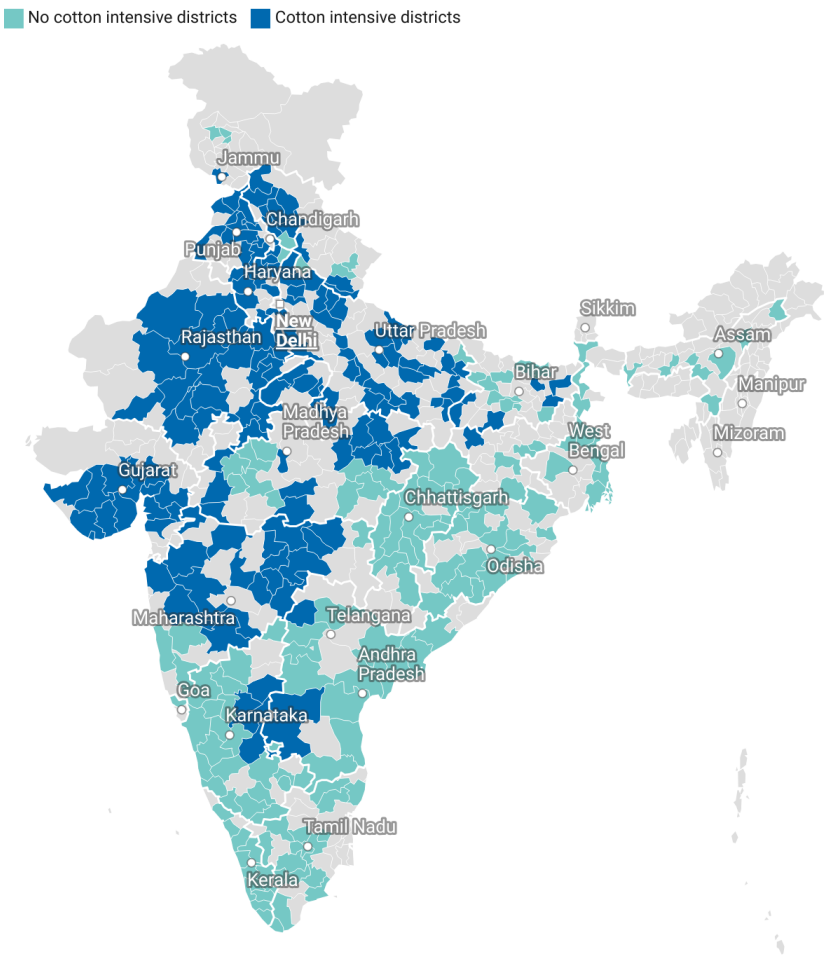

Figure 4: Map of cotton-intensive districts present in the Indian Human Development Survey

Notes: This map represents the geographical variation of one of the treatment variables, cotton intensity, focusing on the districts present in the two waves of the Indian Human Development Survey. The darker shade indicates a share of crops suitable to cotton growing higher from the median value, 12.78%.

BMI of the women in the two groups follows different trends. While the mean of both groups is relatively close before the GATT removal of quotas, the gap between the two groups deepens post-reform.

Finally, we use wive's specialization in agricultural activities, to check if a possible transfer the wife would give to her husband is associated with a different specialization. In the model, a transfer will only occur if the wife invests in her entrepreneurship project, i.e. specializes more in agriculture in this context. The variable takes if the women answered they are agricultural workers as their occupation.

Control variables: We control for several time-variant characteristics that may influence the outcomes variables, such as the age of women and the square of this variable, the Gross Domestic Product per capita of the State she resides in, and the number of children she has. Tables 10 and 11 show the descriptive statistics of outcome, treatment and control variables.

4.2 Empirical strategy

We restrict our sample to the married women present in both waves of the Indian Human Development Survey, where we can follow the income of the household, their occupation, health variables and the caste they belong. We end up with a sample of 10,312 women present in both waves, so a total sample of 20,624 observations. We use a triple differences strategy, to study the impact of the GATT's reform on outcome variables, with time and individual fixed effects.

$$\begin{aligned} y_{i,t,d} = \alpha + \beta_1 Prowomen_i \times Cotton_d \times Post_t + \beta_2 Prowomen_i \times Post_t + \\ + \beta_3 Cotton_d \times Post_t + \beta_4 Post_t + \beta_5 X_{i,d,t} + \eta_i + \delta_t + \varepsilon_{i,d,t} \end{aligned} \tag{9}$$

The dependent variable $y_{i,d,t}$ alternatively takes the Body Mass Index (BMI), and a dummy variable for whether the wife is working in agriculture. The variable $Cotton_d$ takes 1 for a cotton-suitable district above the median, 12.78%, presented on Figure 4, 0 otherwise. The variable $Prowomen_d$ takes 1 if the wife belongs to a caste in favour of female labour participation, and 0 otherwise. $Post_t$ is a dummy variable that takes 1 for the 2nd wave, post-treatment. Then β_1, the coefficient of the interaction term of the 3 treatment variables targets the effect of an increase in female entrepreneurship return in districts with possible female investment capacity on well-being and occupation. Individual and time-fixed effects η_i and δ_t allow us to isolate the impact of this reform as it controls for all time-invariant individual characteristics. The error terms are clustered at the district level.

4.2.1 Threats to identification

The triple-difference strategy outlined in Equation 9 hinges on the parallel-trends assumption, requiring that women in the treatment groups exhibit similar trends in BMI and specialization in agriculture prior to 2005. Unfortunately, the Human Development Survey lacks data preceding 2004, precluding the examination of pre-existing trends.

To address this concern, we initially assert that both cohorts exhibited comparable levels of Body Mass Index in the first wave, with a substantial discrepancy emerging post-program, as detailed in Table 11.

Subsequently, to discern whether our findings solely reflect a natural trend toward female specialization in agriculture rather than bargaining dynamics, given cotton's female-intensive nature, we replicate the analysis using rice suitability as an alternative. Since rice cultivation also leans toward feminized labour (Hazarika, 2022), comparable outcomes in this placebo test would suggest a general rise in female agricultural engagement. Findings from this robustness check are presented in Section 4.4. The geographical rice-suitability is presented in Table 5.

4.3 Empirical results on occupation, norms, and well-being

Table 13 shows the estimation of equation 9. In columns (1) and (2) where we estimate the equation on the whole sample, we see that women living in districts with higher suitability for cotton and belonging to castes in favour of women working increase their probability of working in agriculture by 25%. We also observe a negative coefficient associated with their body mass index, significant at 15.8%, hinting at a potential transfer towards her husband. In columns (3) and (4), we restrict the sample to castes without forward castes and see a significant decrease of 5% in the body mass index of women living in districts with

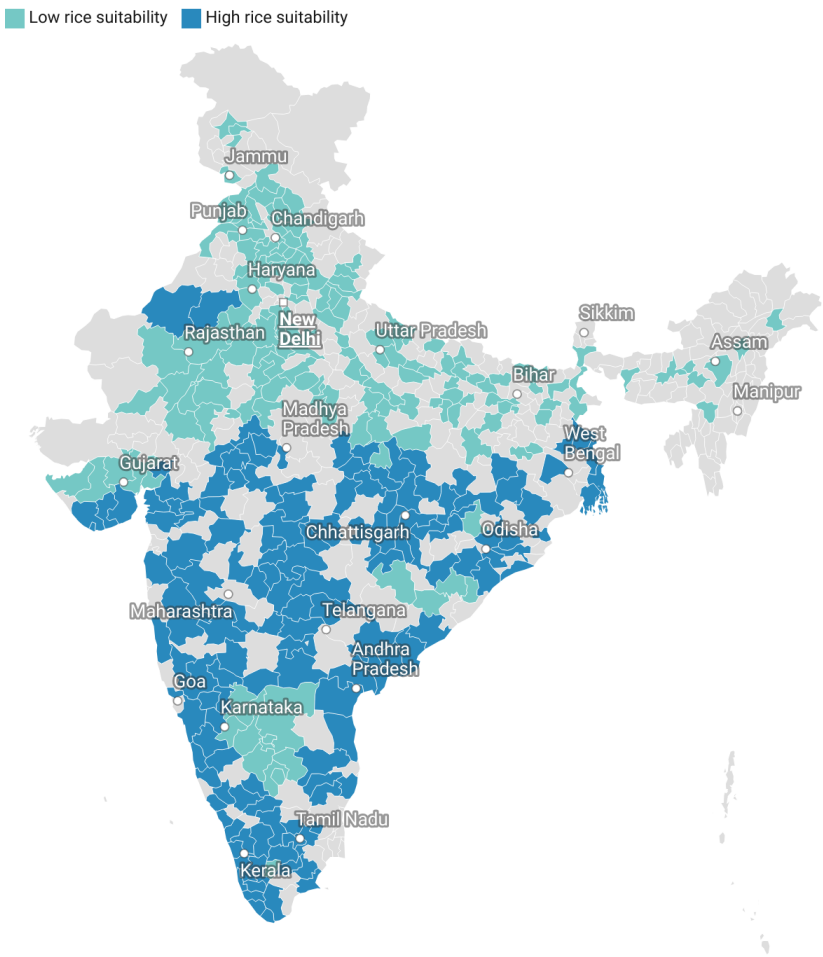

Figure 5: Map of rice-intensive districts present in the Indian Human Development Survey

Notes: This map represents the geographical variation of the placebo treatment variable, rice intensity, focusing on the districts present in the two waves of the Indian Human Development Survey. The darker shade indicates a share of crops suitable to rice growing higher from the median value, 19%.

cotton, belonging to castes in favour of women working. For this sample, we observe a positive coefficient of specialization in agriculture, significant at 13.1%.

In line with the theoretical prediction 3, the empirical findings herein indicate that an augmentation in the prospective return on investment for females leads to an increase in specialization among women in the agricultural sector the level of norm is low, meaning in castes in favour of women working. In this case, the model predicts that she will transfer utility to her husband, and we see that those women indeed have a lower body mass index, suggesting a transfer happening.

Table 13: Impact of the GATT reforms on BMI and work in agriculture

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Body Mass Index	Agriculture	Body Mass Index	Agriculture
Post	0.0912*	-0.0527**	0.0772	-0.0784***
	(0.0465)	(0.0229)	(0.0496)	(0.0249)
Cotton × Post	-0.0376	-0.0123	-0.0157	0.00176
	(0.0314)	(0.0169)	(0.0309)	(0.0174)
Prowomen × Post	0.0657	-0.0349*	0.0676	-0.0336
	(0.0736)	(0.0198)	(0.0746)	(0.0201)
Cotton × Prowomen × Post	-0.117	0.0599**	-0.143*	0.0438
	(0.0818)	(0.0285)	(0.0814)	(0.0286)
Observations	20624	20624	18088	18088
Mean at baseline	2.13	0.2	2.11	0.2

Triple differences results from equation 9. All equations include time and household fixed effects.

All equations control for the number of children, the age of women and this variable squared and the GDP of the regions she resides in at the state level

Std errors clustered at the district level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

4.4 Placebo test with rice-suitability

In this section, we run the same specification as in equation 9, using rice-suitability from the FAO database rather than cotton suitability. We create the dummy variable *rice* that takes 1 if the district has a suitability of rice higher than the median value, 19%, presented in Figure 5.

Table 14: Impact of the GATT reforms on BMI and work in agriculture on Rice crops

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Body Mass Index	Agriculture	Body Mass Index	Agriculture
Post	0.0735	-0.0492**	0.0743*	-0.0692***
	(0.0450)	(0.0205)	(0.0422)	(0.0218)
Rice × Post	0.0323	-0.0400***	0.0159	-0.0401**
	(0.0352)	(0.0147)	(0.0353)	(0.0178)
Prowomen × Post	0.0283	-0.00136	0.00971	-0.00820
	(0.0646)	(0.0161)	(0.0616)	(0.0169)
Rice × Prowomen × Post	-0.0477	-0.00390	-0.0330	-0.00516
	(0.0709)	(0.0287)	(0.0698)	(0.0289)
Observations	20624	20624	18088	18088
Mean at baseline	2.13	0.2	2.11	0.2

Triple differences results from equation 9. All equations include time and household fixed effects.

All equations control for the number of children, the age of women and this variable squared and the GDP of the regions she resides in at the state level

Std errors clustered at the district level in parentheses (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

We see in Table 14 that estimating equation 9 using rice suitability at the district level rather than cotton

has no impact on the Body Mass Index nor the specialisation of women in agricultural labour, for the whole sample and the sample without forward castes. This result suggests that our estimation strategy is not capturing natural trends in feminine specialization in agriculture.

5 Conclusion

This paper explores, both theoretically and empirically, the intrahousehold dynamics that drive the decision of women to invest. We study whether traditional gender norms that exist in the household constrain the ability of both women and the household as a whole to grasp profitable investment opportunities. To answer this question, we construct a theoretical model that studies under which conditions spouses agree on the optimal investment choices of the wife when gender norms that prescribe women to work exist. When spouses disagree, utility transfers can realign spouses' incentives, unless the norm is too stringent. The model allows us to derive the following theoretical predictions: (i) women invest less when the norm is high; (ii) women transfer more to the husband when the norm is low as this allows them to invest; (iii) conditional on investing, transfers increase in the intensity of the norm.

We first test the theoretical predictions in a setting in which women got an exogenous increase in their investment opportunities: some women in rural India got access to a microcredit program. Exploiting the caste/tribe/religion of the household head to proxy the strength of the norm against female work, we look at whether the impact of microcredit on investment and intra-household decision-making outcomes varies with the intensity of the norm. The results confirm that being part of SHGs allows women to invest in more profitable businesses only in "pro-women" groups. At the same time, those women are more prone to increase fertility and reduce their freedom of movement, which seems to confirm the existence of a utility transfer from wives to husbands.

Then, we exploit spatial and temporal differences in female entrepreneurial opportunities triggered by a natural experiment: in 2005, the GATT revoked the "Multi Fibre Arrangement", making farming cotton more profitable. As cotton in India is found to be a more feminine specialization[19], we use the same proxy for conservative gender norms as before and we explore the effect of this increase on their participation to agriculture and health. We find that, after 2005 in areas with cotton, women in pro-women groups increased their probability of working in agriculture by 25%, while experiencing a reduction in their BMI of 5%.

[19] Report "Women in Cotton" of the International Trade Centre

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6 Appendix

6.1 Descriptive statistics about sample of SHG study

Table 15: Descriptive statistics and balance at baseline (2004): Household-level variables

	(1)	(2)	(3)	(2)-(3)	(4)	(5)	(6)	(5)-(6)	(1)-(4)
		Non-member households				SHG-member households			
	All	Non pro-w.	Pro-women	t-test	All	Non pro-w.	Pro-women	t-test	t-test
	Mean/(SE)	Mean/(SE)	Mean/(SE)	Mean diff.	Mean/(SE)	Mean/(SE)	Mean/(SE)	Mean diff.	Mean diff.
Head's age	43.793	45.349	42.194	3.155***	41.769	41.849	41.664	0.185	2.024**
	(0.555)	(0.785)	(0.772)		(0.559)	(0.780)	(0.808)		
Spouse's age	38.123	39.314	36.863	2.450**	36.506	36.617	36.364	0.253	1.617**
	(0.529)	(0.756)	(0.730)		(0.520)	(0.755)	(0.718)		
Nb of over 14 years old	3.520	3.726	3.308	0.418***	3.388	3.521	3.256	0.264	0.132
	(0.074)	(0.104)	(0.105)		(0.090)	(0.134)	(0.120)		
Nb of 6-14 years old	1.322	1.430	1.210	0.221*	1.545	1.627	1.450	0.177	-0.224**
	(0.058)	(0.087)	(0.076)		(0.072)	(0.102)	(0.103)		
Nb of 0-5 years old	1.018	1.065	0.969	0.096	1.027	1.059	1.000	0.059	-0.010
	(0.048)	(0.069)	(0.067)		(0.057)	(0.082)	(0.080)		
Female ratio children	0.371	0.346	0.398	-0.052	0.433	0.423	0.446	-0.023	-0.062**
	(0.016)	(0.022)	(0.024)		(0.019)	(0.024)	(0.030)		
Head's education (years)	3.240	3.143	3.339	-0.196	4.100	3.627	4.625	-0.998**	-0.860***
	(0.182)	(0.256)	(0.258)		(0.232)	(0.305)	(0.348)		
Spouse did not go to school	0.870	0.861	0.879	-0.019	0.818	0.834	0.800	0.034	0.052**
	(0.016)	(0.023)	(0.022)		(0.021)	(0.029)	(0.032)		
Land owned (acres)	1.787	1.871	1.701	0.171	2.046	1.941	2.154	-0.212	-0.259
	(0.120)	(0.208)	(0.118)		(0.191)	(0.284)	(0.255)		
Nb of house rooms per capita	0.535	0.543	0.527	0.016	0.540	0.531	0.551	-0.020	-0.005
	(0.016)	(0.022)	(0.022)		(0.019)	(0.028)	(0.027)		
Officially below poverty line	0.460	0.426	0.496	-0.069	0.536	0.527	0.550	-0.023	-0.076**
	(0.023)	(0.033)	(0.033)		(0.027)	(0.039)	(0.039)		
Cons. and inc. below median	0.278	0.217	0.339	-0.122***	0.273	0.225	0.319	-0.094*	0.005
	(0.021)	(0.027)	(0.032)		(0.025)	(0.032)	(0.037)		
Particip. in Lok Sabha elections	51.943	57.572	46.164	11.408***	54.962	60.193	49.781	10.412**	-3.019
	(1.964)	(2.666)	(2.846)		(2.284)	(3.040)	(3.390)		
Hindu	0.665	0.909	0.415	0.494***	0.688	0.911	0.456	0.455***	-0.023
	(0.022)	(0.019)	(0.033)		(0.026)	(0.022)	(0.040)		
Observations	454	230	224		330	169	160		

Table 16: Descriptive statistics and balance at baseline (2004): Village-level variables

	(1)	(2)	(3)	(2)-(3)	(4)	(5)	(6)	(5)-(6)	(1)-(4)
		Non-member households				SHG-member households			
	All	Non pro-w.	Pro-women	t-test	All	Non pro-w.	Pro-women	t-test	t-test
	Mean/(SE)	Mean/(SE)	Mean/(SE)	Mean diff.	Mean/(SE)	Mean/(SE)	Mean/(SE)	Mean diff.	Mean diff.
Last monsoon std deficit	0.909	1.033	0.781	0.252***	0.801	1.040	0.558	0.483***	0.107*
	(0.039)	(0.057)	(0.053)		(0.042)	(0.060)	(0.051)		
Nb of HH	146.268	135.017	157.819	-22.802***	147.933	137.320	159.484	-22.165***	-1.666
	(3.645)	(4.971)	(5.240)		(3.163)	(4.590)	(4.180)		
All-weather road	0.184	0.212	0.155	0.058**	0.186	0.144	0.230	-0.086**	-0.002
	(0.013)	(0.020)	(0.016)		(0.017)	(0.022)	(0.025)		
Electrified	0.368	0.462	0.271	0.191***	0.430	0.534	0.322	0.212***	-0.062*
	(0.020)	(0.031)	(0.025)		(0.025)	(0.034)	(0.034)		
Water pump	0.339	0.349	0.330	0.019	0.213	0.279	0.144	0.135***	0.127***
	(0.013)	(0.019)	(0.017)		(0.013)	(0.020)	(0.014)		
Primary school	0.791	0.796	0.786	0.010	0.823	0.864	0.778	0.086**	-0.032
	(0.017)	(0.024)	(0.025)		(0.018)	(0.020)	(0.030)		
Middle school	0.381	0.411	0.350	0.060	0.429	0.337	0.522	-0.185***	-0.048
	(0.020)	(0.028)	(0.027)		(0.021)	(0.027)	(0.032)		
Distance to bus stop (km)	3.023	3.280	2.759	0.522**	3.698	4.041	3.322	0.720**	-0.675***
	(0.131)	(0.196)	(0.174)		(0.159)	(0.248)	(0.194)		
Distance to market (km)	5.083	4.874	5.298	-0.424	5.337	4.643	6.097	-1.453***	-0.254
	(0.143)	(0.174)	(0.228)		(0.196)	(0.228)	(0.313)		
Observations	454	230	224		330	169	160		

6.2 Evolution of cotton yield, production, quantity harvested and price

Table 17: Evolution of cotton-farming indicators in India from 2002 to 2009

Year	Yield (hg/ha)	Production(t)	Quantity Harvested(ha)	World Price (cts/lb)
2002	5974	4582000	7,669,700	83,84
2003	9600	7,294,000	7,597,900	111,74
2004	9933	8,728,000	8,786,600	73,79
2005	11326	9,828,000	8,677,100	85,83
2006	13151	12,000,000	9,142,000	90,24
2007	14613	13,800,000	9,410,000	105,66
2008	12576	11,800,000	9,410,000	84,22
2009	12377	12,800,000	10,300,000	116,58

Columns 2, 3 and 4 : FAO data base, column 5: World Prices.