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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 investing are more likely to engage 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 specialization in garments 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.

JEL Classification Numbers: C71, D13, D81, J16, C93.

Keywords: Female Entrepreneurship, Gender Norms, Intra-household allocation.

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1 Introduction

Female entrepreneurship is considered an important contributor to economic growth and poverty reduction (The World Bank, 2014). Empowering women through financial access is one of the main way institutions and governments in developing countries use to directly impact women's well-being and households' poverty. Several initiatives such as cash transfers or micro-credit loans are targeting women.[1] However, studies usually 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). The literature has suggested that this gender gap is partly explained by the fact that women are more vulnerable to expropriation or "kin taxes" (De Mel et al., 2009; Jakiela and Ozier, 2016; Fiala, 2018), and that women often invest their capital in their husband's enterprise rather than their own (Bernhardt et al., 2019).

To understand why female entrepreneurship remains low, especially for married women, this paper explores, both theoretically and empirically, the intrahousehold dynamics that drive the decision of women to invest. Building on Field et al. (2010)[2], we study whether traditional gender norms against female mobility and independence 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 for the wife to invest when gender norms constrain women's freedom, and thus her ability to invest. When spouses disagree, utility transfers can realign spouses' incentives, unless the norm is too stringent: these transfers allow spouses to ex-ante commit to a mutually beneficial decision in which both spouses are better-off and the household enjoy a Pareto improvement in expected utility. The model allows us to derive theoretical predictions that we test through two different empirical exercises. In particular it shows that: (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.

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; and then 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. Even when investment is resources enhancing (and Pareto efficient) the husband may be reluctant for her wife to invest due to both gender norms and a potential decrease in his bargaining power. The wife then uses transfers to convince the husband to let her invest. This implies in particular that when women are more willing to invest due to an increase in the profitability of their project, they have to pay more utility transfers through the effect of investment on bargaining power (more profitable investment increases wives' outside option and therefore their bargaining power). Moreover, 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 also show that, through a change in bargaining power, the level of gender norms that prevent women from investing and the required utility transfer increase with the potential return of investment and decrease with the husband's wealth.

[1] See J-PAL (2021) and Okesina (2021).

[2] Field et al. (2010) show the existence of a link between "traditional religious and caste institutions that constrain women's mobility and behavior" and the "business activity" of women (p.125). While women facing more restrictions have higher returns to capital as they are missing more investment opportunities, those who suffer from extreme social restrictions are not able to grasp those opportunities even when they are exogenously offered the information and some resources to do so.

We test the theoretical predictions from the model using two different empirical strategies in the context of India. India offers a particularly relevant case, as the country notoriously falls well below the global average with respect to equal access to economic resources and protection from gender-based violence (Anderson, 2024). We first exploit 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 and religion of the household head to proxy the strength of the norm against female investment (Field et al., 2010; Eswaran et al., 2013; Agte and Bernhardt, 2023), we look at whether the impact of microcredit on investment and intra-household decision-making outcomes varies with the intensity of the norm. Second, 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[3], we use the same proxy for conservative gender norms and explore the effect of this increase on their specialization in garments and their health.

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 to those of women in more conservative groups, after the removal of the agreement in districts that are more prone to produce cotton as opposed to those that are not. In this case, we proxy transfers with health indicators (BMI) and investment with the probability of working in garments. We find that, after 2005 in areas with cotton, women in pro-women groups doubled their probability of working in garments and experienced a reduction in their BMI of 15%; confirming that women can seize investment opportunities only when gender norms on women's investment are less conservative, but then need to concede utility transfers to their husband. 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 health indicator, and we see a decrease of specialisation in garments.

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[4], our study is the first to extend the collective model

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

[4]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).

to entrepreneurship decisions within the household in a context where strong gender norms exist 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 female entrepreneurship 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 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 and investment of women (e.g. Fernández, 2013; Bertrand et al., 2015; Bernhardt et al., 2019; Bursztyn et al., 2020; Field et al., 2021; Afridi et al., 2022). 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 organised as follows. In section 2, we expose the theoretical model and its predictions. In section 4, we test the theoretical predictions through the evaluation of the impact of PRADAN microcredit program in rural India. In section 5, we present the country-wide empirical evidence related to the termination of the Multi Fibre Agreement in India. In section 6, we conclude.

2 Household bargaining on investment choice: a theoretical model

We now develop a theoretical framework that helps understand the link between gender norms, female investment and women's well-being in the household.

2.1 Environment

Consider a household composed of two members: a male ("he", h) and a female ("she", s). Prior to investment the income they bring to the household are denoted respectively w_h and w_s. This represents any source of income each spouse may bring to the household, through labor or initial wealth. The female is offered an 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.

Gender norms We posit that gender norms manifest as a utility loss $\psi \geq 0$ for the husband when the wife invests. This assumption is aligned with existing literature on culture and female investment in developing countries, particularly in India. It suggests that women's participation in the workforce, in particular through investment, is perceived as a status loss for the family, primarily borne by the husband, as it is viewed as "pollution" or a compromise of "purity" (Bardhan, 1985; Bayly, 2001; Chen, 1995; Eswaran et al., 2013; Jayachandran, 2015; Agte and Bernhardt, 2023; Cassan and Vandewalle, 2021). Especially, Field et al. (2010) highlight the presence of varying levels of social barriers among different social groups in India against female investment, preventing them from grasping profitable opportunities. ψ can be interpreted as a psychological cost, diminishing the husband's well-being and, consequently, his utility.

Transfers The wife may compensate the husband for his utility loss (due to the gender norm or to the decrease in his bargaining power). She does so through utility transfers, denoted by $t \geq 0$.[5] Based on endogenous bargaining weights, these transfers are used to insure the participation of both spouses. They can then be understood as adjustments of bargaining weights (see Chiappori and Mazzocco (2017)). Still, to simplify our setting and ease identification in our empirical investigations, we model utility transfers outside the bargaining weights. Such transfers may correspond to concessions from the wife on various dimensions regarding for example time allocation, child planning, and contraception choices, among others. Utility transfers have been documented theoretically and empirically (Koopmans and Beckmann, 1955; Shapley and Shubik, 1971; Galichon and Salanié, 2023; Chiappori, 2010; Salanié and Chiappori, 2021; Ashraf et al., 2020b; Baland et al., 2016).

Decision making structure The household decision is governed by the following timing:

1. *Investment decision.* The household decides the female to seize the investment opportunity if there exists 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 shared efficiently based on each household's Pareto weight (where the bargaining weights depend on each spouse's outside option, 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).

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

[5] We would obtain symmetric results with the husband transferring utility to his wife for her to invest if the gender norm would be supported by the female. This case appears less empirically relevant.

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 assumes 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 $\tilde{R}=(0,1-p;R,p)$, and that the female bring no other income to the household when investing (she then gives up initial wage w_s).[6] 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 takes a logarithmic form $u_h(c)=u_s(c)=\ln(c)$, giving rise to the following solution for the second stage of the game.

2.2 Equilibria

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:[7]

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

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 $\ln\left(\frac{R/2+w_h}{R+w_h}\right)>\ln\left(\frac{w_h}{R/2+w_h}\right)\Leftrightarrow(R/2+w_h)^2>w_h(R+w_h)$, which 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

[6] Our results hold without assuming that activity supporting the norm is risky. However, risky investment is in line with the literature highlighting that gender norms prevent female investment and female entrepreneurship (Eswaran et al., 2013; Agte and Bernhardt, 2023; Jayachandran, 2021). This also allows us to draw predictions on the effect of an increase in the riskiness of the activity (which are not presented here given that they cannot be directly tested with the data at hand).

[7] One can see from equation (5) that adjustment in bargaining weights would give qualitatively same results. The modeling of utility transfer has the advantage of providing simpler comparative statics and easier identification.

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 does not).

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 income 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 income 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 income w_s is low, (iii) her husband's income 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 income also 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.

2.3 Testable predictions

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

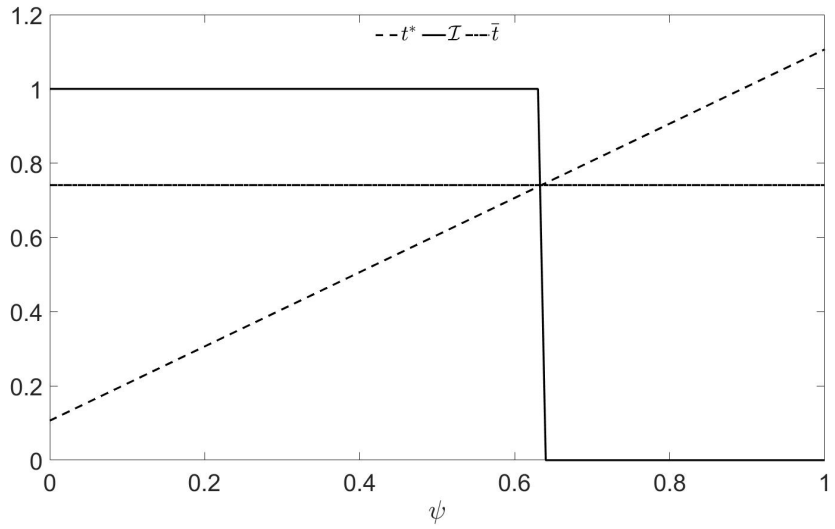

Figure 1: The impact of gender norms on transfers and investment decision

Figure 1 illustrates Prediction 1 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.[8] 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 borne by the husband it has no effect on the maximal acceptable transfer for the wife.

Prediction 2. *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 – 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 3. *Women are more likely to take up investment opportunities when the husband is richer, and the utility transfer is decreasing in husband income.*

Figure 3 illustrates the second part of Prediction 3 and shows that by decreasing the transfer required by the husband and increasing the maximum transfer acceptable for the wife, an increase in husband's income (or wealth) increases the likelihood of female investment.[9]

In the following sections, we test these four predictions using both a field experiment and a natural experiment in the Indian context. First, we present the empirical background on female investment and castes in India. Then, we present 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 and 3). Finally, we leverage on natural experiment that increased the return on female investment to test Prediction 2.

[8] Figure 1 has been computed for the following parameter values: $w_s = 300$, $w_h = 500$, $R = 1,000$ and $p = 0.7$.
[9] Figure 3 has been computed for the following parameter values: $w_s = 300$, $R = 1,000$, $p = 0.7$ and $\psi = 0.6$.

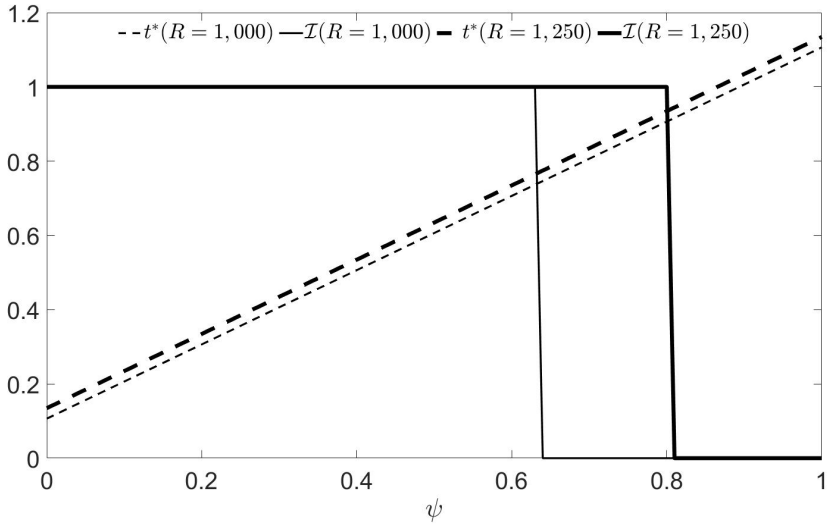

Figure 2: The impact of an increase in investment return on transfers and investment decision

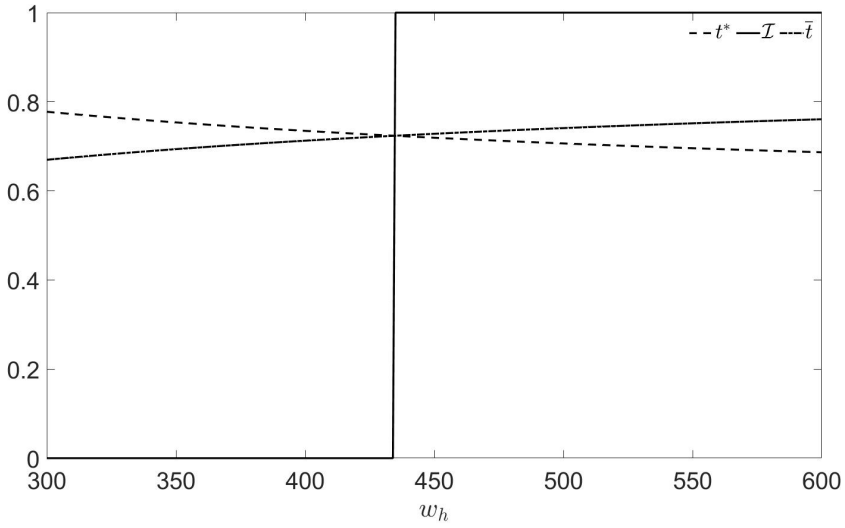

Figure 3: The impact of husband income on transfers and investment decision

3 Empirical background: female investment and the caste system in India

Prior research has explained how the Hindu caste system[10] entails strong norms that severely limit the ability of higher-caste women to go out of home and work, in order to avoid 'pollution' and preserve their own 'purity' (Bardhan, 1985; Chen, 1995; Field et al., 2010; Luke and Munshi, 2011; Eswaran et al., 2013; Jayachandran, 2015, 2021; Cassan et al., 2021; Agte and Bernhardt, 2023). As a symbolic gesture of seclusion, women often cover their faces and bodies in front of people outside their families ('purdah' system). In the middle of the caste hierarchy, the 'other backward castes (OBC)' also frequently adopt some purity norms,

[10]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).

as a means to increase their social status by emulating upper castes (a process sometimes called Sanskritization, e.g. Bayly (2001)). By contrast, women from scheduled castes are not subject to such purity concerns given their low and harder-to-escape social and economic status. It is also much less affordable to withdraw women from the labor market for poorer households (Kapadia, 1997; Field et al., 2010). Likewise, since Adivasi (scheduled tribes) are traditionally non-Hindu, they are not adhering to caste purity rules (Agte and Bernhardt, 2023). Beyond Hinduism, much Islamic doctrine similarly endorses the practice of purdah, or female seclusion, which contributes to the low female employment rate of Muslim women (Field et al., 2010; Jayachandran, 2021).

The literature has demonstrated that social norms of this nature significantly influence women's investment opportunities. For instance, Field et al. (2010) highlight the presence of varying levels of social barriers among different social groups in India. These barriers can hinder the responsiveness of upper castes or Muslim women to business training compared to scheduled castes.

In the following two empirical exercises, we utilise the caste system to introduce heterogeneity in the perception of female investment, serving as a proxy for gender norms in India.

4 Micro-level evidence on investment choices: a field experiment in India

4.1 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). 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 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.[11] The group formation starts with

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

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*).[12] 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.[13]

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 18 and 19 in appendix provide descriptive and balance statistics about the sample at baseline, respectively at the household and village levels.

4.2 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).

In line with the gender norms and the literature presented in Section 3, we classify the following groups as relatively less in favour of women working in our data: 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.

Our model predicts that accessing investment opportunities through microcredit should have stronger effects for women in households with relatively more favourable norms, for whom the utility transfer to the husband required for investment is not too high.[14] Given the unique nature of Self-Help Groups (SHGs),

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

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

[14] Field et al. (2010) find that a two-day business and aspirations training in urban India has a non-monotonic effect on borrowing and income of female participants, one to four months after the training. Specifically, the treatment effects are significant and positive only for upper-caste women, while it is lower (zero or even negative) for Muslim women and SC women. They interpret the findings as evidence that the training helped women whose businesses had been held down by social restrictions (upper castes), but women subject to extreme restrictions (Muslims) had too little agency to easily change their aspirations or activities. While the logic of the argument is close to ours, we have a different predicted order of the treatment effects in our setting. Indeed, our treatment does not change aspirations for given opportunities but rather changes opportunities by giving access to new investment resources. That is, while SC and tribal women (living in relatively pro-women households) are working more often at baseline, they are also expected to seize more often the opportunity to borrow in order to invest in a welfare-improving occupational change.

where women come together to share risks and support each other, there is a concern that participation in these groups could potentially result in a shift in gender norms for the women involved. Therefore, it's possible that our analysis may underestimate the true impact of SHGs.

Table 2 compares baseline characteristics of pro- and non pro-women households. We see important differences, confirming that pro-women face on average less restrictions to work and freedom. They are also poorer, which will be accounted for in the empirical analysis. 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 across social 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:

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

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

By contrast, Muslims (who are few in number in our sample) and upper castes lack the agency and the supportive norms to do so.

Table 2: Baseline characteristics across social groups

	Pro-women	Non pro-women
Wife has no education (%)	83.8	84.4
Household size	5.52	6.1***
Age of husband	42.0	43.9**
Age of wife	36.6	38.1**
Land owned (acres)	1.72	1.61
Income (INR)	13,001	16,408***
Small cattle owned (heads)	5.3	2.1***
Wife's casual labour supply (days)	35.0	20.2***
Wife has a micro business (%)	11.7	4.5***
Contraception use (%)	8.2	9.2
Wife goes often out of village (%)	44.8	28.2***
Observations	384	400

Stars denote significant difference in means between the groups.
(*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

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 $t-1$,[15] H_{it} is a vector of control variables at the household level, including household size in equivalent adults,[16] and dummies for household income quartile[17], 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.

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

We start by documenting important shifts in the occupation choices of wives. First, table 3 shows that wives who are members of SHGs and live in pro-women households strongly decrease their casual labour

[15] 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.

[16] 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.

[17] We use wave-region-specific quartiles in order to account for time and geographical differences.

supply in the 'post' period (-75%). Those are usually poorly-paid (0.7 USD per day on average in our sample), manual, and unpleasant jobs, which are done occasionally to complement the household income when required (less than 30 days per year on average). We do not observe the same pattern for husbands.

Table 3: 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
Mean at baseline	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 (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

Second, we find in table 5 that pro-women SHG households strongly increase (by more than 350%) their vegetable production (especially potatoes, tomatoes, chillies and eggplants). 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). Vegetable crops present a higher yield and income potential, but require higher input investments (seeds, fertilizers, insecticides, water management, etc.) than traditional grain crops. Moreover, they require almost uniform (light) labor throughout the production cycle, which is why vegetable production often take place on the land close to the house. Such activity fits well within the framework of domestic life and child-rearing and is therefore traditionally performed by women (Joshi et al., 2006; Gurung, 2006). Vegetables are relatively more directed to market sales, and sell at higher prices. Vegetable production thus offers the possibility to intensify land and (home-) labor use, and to get relatively quick and high returns. Yet, the production of vegetables is also riskier than grains': prices are more volatile, perishability is a major issue impeding large-scale production, and they are more sensitive to pest damage and adverse weather. Table 4 illustrates the trade-offs related to vegetable cultivation: it requires much higher expenditures, yet households who can afford it get a higher net value of production and income.

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 6, 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,

Table 4: Agricultural costs and benefits in households with and without vegetable production

	Some vegetable prod.	No vegetable prod.	p-value[3]
Total annual agricultural expenditures (INR)[1]	1753.2	1101.6	0.000 ***
Total value of annual production (INR)[1],2	9277.2	4467.1	0.000 ***
Probability to sell on market (%)	57.7	14.8	0.000 ***
Proportion of production sold (%)[1]	13.0	3.2	0.000 ***
Total income from selling crops (INR)[1]	1318.9	181.43	0.000 ***
Observations	215	1465	

We focus on households with positive agricultural production.

[1] We trim the top 1% observations. [2] We evaluate production at the village-year median market prices.

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

Table 5: 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
Mean at baseline	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.

buffaloes, goats, sheep, mules, horses), which are mostly bred outside of the house and managed by men.

Table 6: 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
Mean at baseline	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.

Hence, wives who have access to credit and live in relatively pro-women households appear to decrease their casual labor supply and invest more in female-managed agricultural activities, which are more enjoyable, healthy, and profitable on average.[18] Table 7 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 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 8, we go one step further and test the last theoretical prediction (prediction 3), and in particular that the wife's investment should be higher when the husband is richer. 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 9 and 10, 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, we find a large negative effect on declared contraception use, which is often considered as a key female empowerment indicator.[19] Interestingly, the *knowledge* of birth control methods is not affected (see table 20 in

[18] For instance, in the last wave, the median daily income 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 cattle products is 400 rupees (5 USD).

[19] Contraception is key to prevent unwanted pregnancies, avert maternal deaths and sexually transmitted diseases, reduce hunger, and promote female autonomy and freedom (Saleem and Bobak, 2005; Cleland et al., 2006; Upadhyay et al., 2014; Starbird et al., 2016; Ashraf et al., 2014; Anderson, 2018; Ram et al., 2022). This is especially true in the context of India, where issues of gender inequality and discrimination are extensive (Anderson, 2024), and where maternal mortality rates are higher than in many other

Table 7: 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
Mean at baseline	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 8: 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
Mean at baseline	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.

appendix). We are therefore confident that we capture a decision to reduce contraception, independently of knowledge.[20] The effects are in fact stronger after controlling for knowledge (see table 20). Moreover, treated women declare wanting (or expecting) more children in the future. Taken together, these facts might indicate wives' fertility preferences coming closer to husbands'. Indeed, research has shown that men usually want more children and that they often try to impose their preferences on wives, in particular through shorter birth spacing (Ashraf et al., 2014, 2020a).[21] Second, we 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 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 9: Contraception and desired fertility

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Contraception use	Children desired	Contraception use	Children desired
Post	-0.0188	-0.0750	0.00101	-0.0650
	(0.0227)	(0.0595)	(0.0214)	(0.0752)
SHG × Post	-0.0578*	-0.0891	-0.0551	-0.132
	(0.0342)	(0.0893)	(0.0379)	(0.107)
Post × Prowomen	0.0140	-0.118	0.0123	-0.128
	(0.0268)	(0.116)	(0.0265)	(0.128)
SHG × Post × Prowomen	-0.0876*	0.282*	-0.0899*	0.320*
	(0.0487)	(0.166)	(0.0521)	(0.181)
Observations	1948	1900	1654	1609
Mean at baseline	0.0875	0.403	0.0817	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 (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

To summarize, 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. Yet, in table 11, 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

countries with similar mean income levels. Around two-thirds of all maternal mortality in India is due to bleeding and infection after childbirth, high blood pressure during pregnancy, and complications from delivery and unsafe abortions. Further, unintended pregnancies are the primary cause of death amongst adolescent girls (Rajkhowa and Qaim, 2022).

[20] The very low average level of use of contraception might reflect high rates of sterilization and/or under-reporting. These should however not affect the estimated change for pro-women SHG household over time.

[21] 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 10: 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
Mean at baseline	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 (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

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 11: 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 (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

5 Country-wide evidence on well-being and occupation: a natural experiment in India

To test the predictions of the model that relate to the increase on 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.

5.1 Data and context

5.1.1 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 section, we suggest this policy shift contributed to an increase in the expected and potential returns of women specialising in garments in India, through two mechanisms. Firstly, the cessation of the MFA entailed an increase in returns for Indian cotton farmers. The Lopez-Acevedo and Robertson (2012) report shows that India's apparel and textile exports grew strongly post-MFA, with the support of a large pool of unskilled and skilled workers, local entrepreneurship, and relatively supportive government policies. Similarly, Suresh et al. (2014) document a notable increase in the ratio of output value to paid-out costs for Indian cotton farmers, between 2002 to 2009, 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 21 in the Appendix.

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 (International Trade Center, 2011). More globally, the textile and apparel industry is one of the largest sectors in India and women representing more than half of the workers.[22] It therefore employs a majority of Indian women. Consequently, the upswing in cotton revenue following the MFA's termination should have increased returns from women's specialisation in garments.

We thereby assume that this reform increased the potential returns of female specialization in garments, in particular in cotton-growing areas in India (as the effect of the reform should have been stronger in those geographical areas). It therefore corresponds to an increase in the parameter R in our theoretical model and, according to the Prediction 2, should entail an increase in the transfers when the gender norm is low (i.e. where women's investment is more easily accepted).

[22] Annual Report, Ministry of Textile, 2011-12.

5.1.2 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 individuals 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, health variables and the caste they belong to. We end up with a sample of 10,312 women present in both waves, so a total sample of 20,624 observations. We moreover can follow the occupation of a sample of 2,065 women present in both waves (a total of 4,130 observations). We use it to create a garment dummy variable that takes value 1 if the woman works in plantations, manufacturing in cotton, in textile, in wool, in silk or apparel, or if she is an employee in agricultural textile. Table 12 and 13 show the baseline summary statistics of the samples.

Table 12: Summary of outcome, treatment and control variables for the large sample

	Whole sample		Without forward castes		Cotton intensive		Not cotton intensive	
	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean
BMI	2.13	2.28	2.11	2.27	2.15	2.26	2.12	2.30
Cotton	.51	.51	.48	.48	1	1	0	0
Caste prowomen	.34	.34	.38	.38	.34	.34	.33	.335
Rice	.51	.51	.51	.51	.30	.30	.73	.73
Number of children	2.97	3.21	3.03	3.29	3.19	3.47	2.75	2.955
Age	34.37	41.71	34.23	41.55	34.47	41.91	34.27	41.51
GDP	16382.42	54697.82	15963.04	53106.38	17177.5	56938.96	15564.81	52393.21
Observations	10312	10312	9044	9044	5228	5228	5084	5084

t statistics in parentheses.
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:** Descriptive Sample drawn from the Indian Demographic and Health Survey.
See the section 5.1.2 for more details on the dataset and sample criteria.

Table 13: Summary of outcome, treatment and control variables for the restricted sample

	Whole sample		Without forward castes		Cotton intensive		Not cotton intensive	
	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean	1st wave mean	2nd wave mean
BMI	1.98	2.18	1.97	2.18	1.97	2.10	1.98	2.24
Garment	0.03	0.02	0.03	0.02	0.01	0.00	0.04	0.02
Cotton	0.40	0.40	0.39	0.39	1.00	1.00	0.00	0.00
Caste prowomen	0.55	0.55	0.57	0.57	0.55	0.55	0.55	0.55
Rice	0.72	0.72	0.72	0.72	0.56	0.56	0.83	0.83
Number of children	2.91	3.11	2.92	3.12	3.13	3.36	2.76	2.94
Age	33.74	41.22	33.67	41.14	33.69	41.23	33.76	41.21
GDP	15554.96	54399.71	15433.24	53978.04	16482.54	56892.59	14937.83	52741.14
Observations	2065	2065	1989	1989	825	825	1240	1240

t statistics in parentheses
This table shows the descriptive statistics of the 4,130 women present in the both waves of the Indian Human Development Survey for whom we have all the relevant information including occupation. **Source:** Descriptives Sample drawn from the Indian Demographic and Health Survey.
See the section 5.1.2 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 use 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 regarding shifts in local conditions and global demand, as it is not contingent on actual production. We define cotton-intensive districts as the ones with suitability above the median of the sample: 12.78%, as presented in Figure 4.

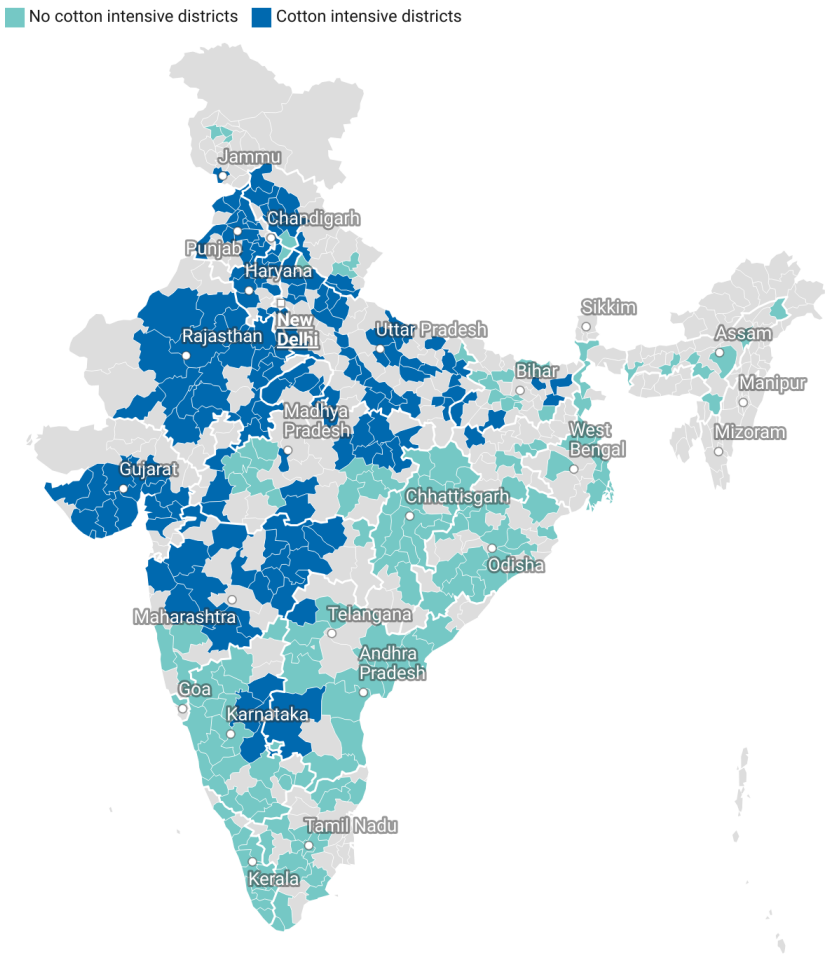

Figure 4: Map of cotton-intensive districts present in the Indian Human Development Survey

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%.

We use the same measure of societal norms on gender roles in investment as in Section 4. We use caste affiliation as a proxy for gender norms, following prior research that has demonstrated variations among castes in their support for women's participation in the workforce and investment (Luke and Munshi, 2011; Eswaran et al., 2013; Jayachandran, 2015; Agte and Bernhardt, 2023). Following this literature, as in Section 4, we classify as "pro-women" castes those in favour of women investing: the Adivasi (scheduled tribes),

the scheduled castes, the Sikh and the Jain. Castes where female labour force participation is less accepted include Forward Castes, Other Backward Castes, and Muslims. We analyze as above the robustness of our results by excluding forward castes.

We confirm that women belonging to castes not in favour of women investing indeed work less, using a self-declared variable taking value "1" if the woman states working more than 240 hours per year at baseline, in either a formal or informal job. Table 14 shows that women from pro-women castes declare working more on average than those from non-pro-women groups, the difference being statistically significant.

Table 14: Declared working - baseline

	Non Pro-women	Pro-women	Difference	P-value
Declared working	0.58	0.69	-0.11	0.00
Observations			10312	

This table shows the means across pro-women and non-pro-women groups of a dummy variable that takes 1 if the wife self-declared working more than 240 hours per year, in a formal or informal activity at the baseline wave.

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

Prediction 2 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, all associated with an improvement in health indicators. In our theoretical model, wives make transfers to their husbands and do not receive them. A lower wife's BMI would then indicate higher transfers directed towards her husband.

Table 15: 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 15 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 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 garments, 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 garments in this context.

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 12 and 13 show the descriptive statistics of outcome, treatment and control variables.

5.2 Empirical strategy

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 corresponds to the Body Mass Index (BMI), and a dummy variable indicating whether the wife is working in garments. $Cotton_d$ is a dummy taking value one for a cotton-suitable district above the median (12.78%, as presented in Figure 4), $Prowomen_d$ is a dummy taking value one if the wife belongs to a caste in favour of female investment and $Post_t$ is a dummy indicating whether the outcome is measeured during the 2nd wave, post-treatment. β_1, our coefficient of interest, then measures for women from pro-women groups the effect of an increase in female occupation prospects 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.

5.2.1 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 garments 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 15.

Subsequently, to discern whether our findings solely reflect a natural trend toward female specialization in garments 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 specialization in garments. Findings from this robustness check are presented in Section 5.4. The geographical rice-suitability is presented in Figure 5.

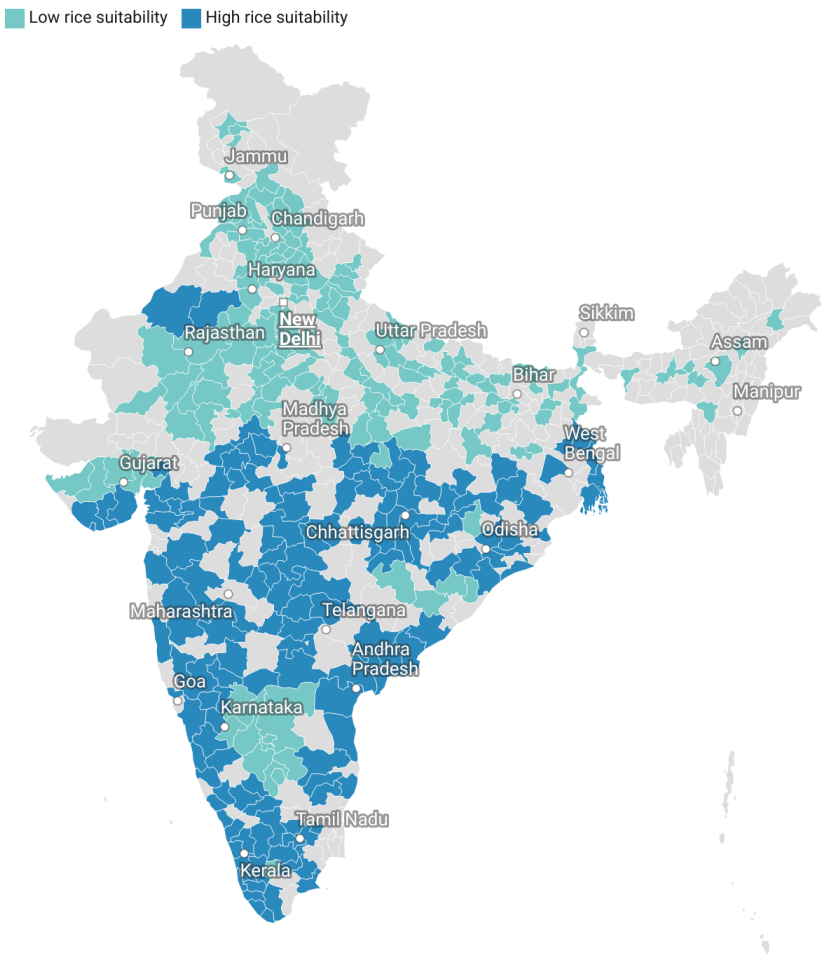

Figure 5: Map of rice-intensive districts present in the Indian Human Development Survey

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%.

5.3 Empirical results on occupation and well-being

Table 16 shows the estimation of equation (9). In the column (1), estimated on the whole sample, we highlight that women living in districts with higher suitability for cotton and belonging to castes in favour of female investment have a lower their body mass index, significant at 15.8%, hinting at a potential transfer towards her husband. In the column (2), we remove forward castes (FC) from the sample and see a significant decrease of 5% in the body mass index of women living in districts with cotton, belonging to castes in favour of women working.

In columns (3)-(6) of Table 16, we present the results for the sample containing only women for whom we have information on occupations. In columns (4) and (6), we observe that women residing in cotton-suitable regions and belonging to castes supportive of women's investment specialise twice as much in garments after the reform. This finding holds true regardless of whether forward castes are included. Furthermore, in Columns (3) and (5), we note that women living in cotton-growing regions and belonging to castes supportive of women's investment experience a 15% decrease in their body mass index in the sam-

ple including forward castes, and a 16% decrease when forward castes are excluded, potentially indicating transfers to their husbands.

In line with the theoretical prediction 2, 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 garments sector when the level of norms is low, meaning in castes in favour of women investing. 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 transfers occuring.

Table 16: Impact of the GATT reforms on BMI and occupation in garments

	Whole sample	Without FC	Whole sample		Without FC	
	(1)	(2)	(3)	(4)	(5)	(6)
	BMI	BMI	BMI	Garment	BMI	Garment
Cotton × Post	-0.0376	-0.0157	0.0169	-0.00112	0.0413	-0.00318
	(0.0314)	(0.0309)	(0.0573)	(0.0192)	(0.0649)	(0.0202)
Prowomen × Post	0.0657	0.0676	0.228	-0.0136	0.232	-0.0130
	(0.0736)	(0.0746)	(0.163)	(0.0112)	(0.163)	(0.0107)
Cotton × Prowomen × Post	-0.117	-0.143*	-0.308*	0.0259*	-0.334*	0.0281*
	(0.0818)	(0.0814)	(0.172)	(0.0137)	(0.179)	(0.0151)
Observations	20624	18088	4130	4130	3978	3978
Mean	2.21	2.19	2.08	0.02	2.08	0.02

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

All equations control for the number of children, the age of women (quadratic), and the GDP of the state of residence.

Columns 3-6 focus on women for whom we know the occupation.

* $p < 0.10$, ** $p < 0.05$, ***

Std errors clustered at the district level in parentheses.

5.4 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. The dummy variable *rice* then takes value one in districts with rice suitability higher than the median (19%, as presented in Figure 5).

Table 17: Impact of the GATT reforms on BMI and occupation in garments - Rice placebo test

	Whole sample	Without FC	Whole sample		Without FC	
	(1)	(2)	(3)	(4)	(5)	(6)
	BMI	BMI	BMI	Garment	BMI	Garment
Rice × Post	0.0323	0.0159	-0.0353	0.00979	-0.0349	0.00980
	(0.0352)	(0.0353)	(0.0701)	(0.0160)	(0.0772)	(0.0174)
Prowomen × Post	0.0283	0.00971	0.259	0.0243*	0.256	0.0255*
	(0.0646)	(0.0616)	(0.301)	(0.0131)	(0.303)	(0.0139)
Rice × Prowomen × Post	-0.0477	-0.0330	-0.213	-0.0382**	-0.215	-0.0380**
	(0.0709)	(0.0698)	(0.309)	(0.0153)	(0.315)	(0.0152)
Observations	20624	18088	4130	4130	3978	3978
Mean	2.21	2.19	2.08	0.02	2.08	0.02

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

All equations control for the number of children, the age of women (quadratic), and the GDP of the state of residence.

Columns 3-6 focus on women for whom we know the occupation.

* $p < 0.10$, ** $p < 0.05$, ***

Std errors clustered at the district level in parentheses.

Table 17 illustrates that estimating equation (9) using rice (rather than cotton) suitability at the district level has no impact on the Body Mass Index and decreases the probability of women working in garments, 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 garments.

6 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 on female investment 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 invest 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 investment, we

analyze 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 specialization in cotton more profitable. As cotton in India is found to be a more feminine specialization, we use the same proxy for conservative gender norms as the first empirical exercise (castes in favour of women investing), and explore the effect of this increase in investment profitability on their probability to work in the garments sector and on their health (proxy for transfers). We find that, after 2005 in areas with cotton, women in pro-women groups doubled their probability of working in garments, while experiencing a reduction in their BMI of 15%.

These findings highlight the necessity for policies aimed at fostering female entrepreneurship and workforce participation to consider not just the availability of opportunities but also the cultural context in which women operate. It suggests that interventions designed to empower women economically must explore the societal norms and cultural attitudes surrounding female roles in the economy. By recognizing and addressing these cultural factors, policymakers can tailor interventions more effectively to overcome barriers and create an environment conducive to greater female economic participation.

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7 Appendix

7.1 SHG field experiment

7.1.1 Descriptive statistics about sample

Table 18: 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 19: 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		

7.1.2 Additional tables

Table 20: Contraception

	Whole sample		Without forward castes	
	(1)	(2)	(3)	(4)
	Contraception know.	Contraception use	Contraception know.	Contraception use
Post	-0.114***	0.0295	-0.0923**	0.0357*
	(0.0337)	(0.0187)	(0.0378)	(0.0192)
SHG× Post	-0.113**	-0.00950	-0.175***	0.0163
	(0.0488)	(0.0274)	(0.0572)	(0.0322)
Post × Prowomen	0.0257	-0.00263	0.0102	0.00450
	(0.0398)	(0.0225)	(0.0433)	(0.0229)
SHG× Post × Prowomen	0.00300	-0.0789**	0.0665	-0.109**
	(0.0666)	(0.0388)	(0.0742)	(0.0435)
Contraception knowledge		0.400***		0.373***
		(0.0327)		(0.0354)
Observations	2035	1948	1728	1654
Mean at baseline	0.191	0.0875	0.189	0.0817

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 (*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$).

7.2 GATT natural experiment

Table 21: 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.