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MICROFINANCE AND GENDER EMPOWERMENT

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ABSTRACT. In the past 30 years, microfinance has carried many promises of social and economic transformation, with the shift towards targeting women being seen as a major strategic move through which the promise of social development could be most effectively delivered. However, ethnographic studies have shown that many women relinquish the use of their loans to male members of the household, belying the empowering promise of microfinance. We propose a simple model of household bargaining which examines how providing women with credit affects production and decision-making power in the household. Following Bergstrom (1996), we account for the roles of both divorce and non-cooperation in the household as relevant fall-back options in the bargaining strategy of each spouse. We show that the introduction of a microcredit programme is likely to have widely heterogeneous impacts, and can adversely affect the bargaining power of some women. We demonstrate that access to credit allows a woman to strengthen her bargaining position through an expansion of her autonomous activities (the causal mechanism hoped for) only in a limited number of cases: when she is able to invest her new capital profitably in an autonomous activity, and her husband has no alternative activity in which the same capital would generate comparable returns, or lacks the power to overrule her preferred investment choice. The two cases in which it is most likely that the availability of credit would enable the woman to strengthen her bargaining position within the household are (i) when capital can be invested in a cooperative activity to which both spouses contribute in an important way, and (ii) when a large share of the household budget is devoted to expenditures on household public goods.

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1. Microfinance and the Promise of Social Change

In the past 30 years, microfinance has carried many promises of social and economic trans-
formation, with the shift towards targeting women being seen as a major strategic move
through which the promise of social development could be most effectively delivered. It
is argued that enabling women to generate their own independent income would help tip
the balance of power within the household in their favour and allow them to negotiate a
larger share of household resources. Because women are more likely than men to invest in
household public goods, enlarging the scope for women's (as opposed to men's) employ-
ment through access to microcredit is believed to be the most effective channel to deliver
wider social benefits (Armendariz de Aghion and Morduch 2005, Khandker 2003, Pitt et
al. 2006).[1]

This virtuous sequence of events linking targeting women for the delivery of credit to
poverty alleviation is premised on women's enhanced ability to exert greater autonomous
control over resources and has been justified on both theoretical and empirical grounds.
Empirically, a substantial and growing body of evidence has shown that increasing re-
sources in the hands of women (rather than men's) has greater impacts on family welfare,
in particular children's health (child survival and nutrition rates) and education (Duflo
2005, World Bank 2001).[2] This social motive for targeting women has been a strong moti-
vation behind poverty-oriented microfinance programmes such as FINCA or the Grameen
Bank.[3]

Analytically, the foundations for such an approach can be found in bargaining models of
the household which posit that household members can obtain a greater share of household

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[1]In addition, because women are believed to be more risk-averse, easier to monitor, and more amenable
to the threat of social sanctions than men, targeting women would also contribute to the financial sus-
tainability of microfinance programmes as evidenced by women's higher repayment rates compared to
men's. See Cull, Demirguc-Kunt and Morduch (2008) for a recent overview of the financial sustainability
debate.

[2]Note Edmonds (2005)'s contrary finding that children aged 13 to 17 were more likely to attend school
when they lived with a eligible male recipient of a new pension transfer, than when they lived with an
eligible female recipient.

[3]Susan Davis, chair of US -based Grameen Foundation explained "There has been research that shows
that when women make financial decisions, greater disposable income goes into improved nutrition, health
status, and housing for their children and families. That's why the industry shifted. When Grameen
started, it was just trying to reach 50-50 parity between men and women, but then they noticed the
difference." http://knowledge.allianz.com/en/globalissues/microfinance/microcredit/

davis_microfinance_women_grameen.html. Accessed October 8, 2008. For FINCA, whose borrowers
are 70 percent women, see http://www.gdrc.org/icm/finca/finca-2.html. Accessed on October 8, 2008.

resources by improving their fall-back options. Threat or fall-back options capture the level of welfare available to each spouse in case of a breakdown in the bargaining process taking place in the household. The empowering effect of microfinance programmes is expected to materialise through their effects on two types of fall-back options: the utility levels attained by each spouse in case of divorce or exit from the marriage; and the utility levels attained when each spouse retreats to an autonomous sphere within the household. In keeping with this theoretical literature, proxies used in the empirical literature to measure relative bargaining power in the households include assets brought at marriage, unearned income, or inherited assets, over which each spouse retains separate control within marriage, or exogenous policies that affect men and women's outside options such as divorce or employment laws (Adam et al. 2003, Fafchamps et al. 2006, Thomas et al. 2002). All (explicitly or implicitly) take the view that greater family welfare can be attained by increasing women's autonomous control over resources.

However, transferring the above reasoning to microfinance is far from straightforward. While women may readily keep control over cash benefits transferred to them, by contrast, loans enter a complex decision-making process with perplexing impacts on the outcomes of the bargaining process.[4] In particular, there is congruent evidence that many women relinquish the use of their loans, in part or in whole, to their spouses (Goetz and Gupta 1996, Kabeer 2001, Rahman 1999). For instance, in an ethnographic study of the operations of Grameen Bank in a Bangladeshi village, Rahman (2001) showed that 78 percent of loans granted to women were used by male members of the household (i.e. their husbands or sons). Similarly, Goetz and Gupta (1996) report that 56 percent of loans borrowed by women were invested in male activities. In a study of a group lending programme conducted by one of us in Kyrgyzstan, almost all group loans (97.5 percent), irrespective of the gender of the borrower, were allocated to livestock breeding, an activity traditionally controlled by men with some inputs by women (Ngo 2008).

The fact that women pass on their loans to male members of the household has been interpreted by some as evidence of women losing control over their loans, casting doubt on the empowering potential of microfinance. The focus is on women as primary decision-makers and having autonomous control over loans use and/or loan management.

The observation that women often relinquish their loans to their husbands has led some theoreticians to argue that, in some instances, it may be in the strategic interest of women

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[4]See Rutherford (2002) for an ethnographic account of the complexity of the financial (loans and savings) portfolio handled by low-income households in Bangladesh.

borrowers to do so. Ligon (2002) observes that even if a woman is able to invest a loan profitably in an autonomous activity, her bargaining position in the household may be weakened if the initiative causes her autonomous income to become more uncertain. In this case, she would be better off handing over the loan money to her husband rather than investing it herself. Van Tassel (2004) offers the explanation that relinquishing control of the loan is a way of ensuring that the husband would help to repay the debt and thereby secure access to future credit in the event that the current loan project fails.[5]

Another interpretation has been proposed by Kabeer (1998, 2001), who argues that women placed in situations of unequal interdependence within the family, and with limited options outside of marriage, may prefer interventions that strengthen the household as a whole rather than seek to improve their individual situations. As Kabeer explained:

> "[Women had] a much stronger stake in strengthening cooperation, and minimizing conflict within the family. Unequal interdependence within the family, and women's greater vulnerability outside it, explain why the women loanees sought greater equality within the family as a result of their access to credit rather than greater independence from it. It explains, for instance, the significance they invested in their ability to bring a valued resource into the household and to contribute directly to household income."

The scope for women to invest capital in purely autonomous activities is clearly circumscribed by gender norms that delineate the division of labour and responsibilities between men and women in the household and the wider community.[6] For instance, social conventions and gender norms regarding the divisions of labour may oblige women to remain near the home to take care of children, or restrain their ability to travel to markets. These constraints explain why women are limited to fewer and less profitable business ventures than men (de Mel et al. 2008, 2009, Emran et al. 2006, Johnson 2004, Johnston and

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[5]More specifically, Van Tassel posits that the husband has a preference for more risky investments than the wife, and, in fact, would not find it worthwhile to renew the loan to invest in the wife's preferred safe project. Therefore, the husband has no incentive to repay the current loan to ensure the household's access to future credit if future investments will always be made in the safe project. By transferring control, the woman effectively provides a guarantee that future investments will be in the risky project, thereby giving the husband the incentive to assist in repaying the current debt. We should note that there is some inconsistency in Van Tassel's formulation of control rights within the household, because even when the woman gives up control of the loan, she is assumed to retain ownership of the profits from the investment.

[6]This perspective appears most clearly from ethnographic studies of microfinance, which are rich in contextual details. See Johnson (2004), Kabeer (1998), Kabeer (2001), Mayoux (1999), Rahman (1999).

Morduch 2007).[7] Unequal interdependence between spouses also explains why women are more dependent on the contribution of male household members for the conduct of their businesses than men are on women's inputs. Limitations on women's self-employment opportunities has been widely documented. For example, in Bangladesh, where the practice of purdah puts considerable limits on women's mobility in the public space, women who invest their loans in their own activities remain bound to home-based activities (e.g. poultry or milk cow rearing) in line with traditions stipulating that these activities are managed by women. Loans used by men and women in joint enterprises also retain the same gender structure, for example with women making puffed rice or sweet, which are then sold by their husbands (Anderson and Eswaran 2007, Hashemi et al. 1996, Kabeer 1998).

To disentangle how microcredit programmes targeted at women can be expected to shift the balance of power in the household, we develop a simple model of household bargaining where we (i) allow for cooperative endeavours in production between the husband and the wife, and the possibility of investing the loan in such endeavours; (ii) account for the roles of both non-cooperation and the threat of divorce in the bargaining process, and acknowledge that social norms may limit (in different ways) the range of entrepreneurial activity that may be undertaken in marriage and following divorce. Following Bergstrom (1996), we propose a model which accounts for the role of both divorce and non-cooperation in the household as relevant fall-back options in the bargaining strategy of each spouse. Our model contrasts with axiomatic models of intrahousehold bargaining, which solve the bargaining problem by assuming ex-ante what the relevant threat point will be (Lundberg and Pollak 1993, Manser and Brown 1980, McElroy and Horney 1981).

Our approach differs from those of Van Tassel (2004) and Ligon (2002) in that, rather than assuming a binary choice for the use of credit, we allow for its use in a cooperative sphere of production; and distinguish between the possible uses of credit within and outside of marriage. On the other hand, we abstract away from the issue of risky investments and their implications for household bargaining, which has received careful attention in these studies.

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[7]In a recent study on the profitability of micro-enterprises in Sri Lanka, De Mel, McKenzie and Woodruff (2008) find that mean returns to capital are zero among female-owned enterprises and that more than half of the enterprises owned by women have negative returns, compared to 20 percent for men.

Our modelling choice allows us to explore the possibility of heterogeneous impacts across households of microcredit programmes targeted at women borrowers. Thus, we are able to address one of the key issues within the current debate on women's empowerment and microfinance today: namely, under what conditions, if any, can a policy of targeting women in microcredit programmes, improve their decision-making power and control of resources within the household. We believe that this key policy-related question for research on microfinance and gender empowerment today has not received adequate attention in the existing theoretical literature. Van Tassel (2004) and Ligon (2002) focus, instead, on two specific puzzles from the early experience of microfinance institutions; namely, the substantially higher rates of repayment achieved by targeting women borrowers, and the relinquishment of loans by women borrowers to their spouses.

Our focus on cooperation in the household echoes recent concerns about the consequences of excluding men in microfinance (Armendariz de Aghion and Roome 2008) or health (Mullany et al. 2005) programmes, when their participation is important for programme success; and evidence that household enterprises that are managed with the cooperation of both spouses are more likely to make efficient use of capital injections (de Mel et al., 2009)

We find that access to credit allows a woman to strengthen her bargaining position through an expansion of her autonomous activities under a limited set of circumstances : when the woman is able to invest her new capital profitably in an autonomous activity and her husband has no alternative activity in which the same capital would generate comparable returns, or lacks the power to overrule her investment choice. The two cases in which it is most likely that the availability of credit would enable the woman to strengthen her bargaining position within the household are (i) when capital can be invested in a cooperative activity to which both spouses contribute in an important way, and (ii) when a large share of the household budget is devoted to expenditures on household public goods.[8]

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[8]There are two reasons for which we focus our attention on the woman's bargaining position within the household, and not only her level of welfare. The first is that women with greater decision-making authority with the household may be able to influence household outcomes, such as investments in children's health and education, in ways that are more in line with social objectives (See, for example, Duflo, 2003, and Thomas, Contreras and Frankenberg, 2002). The second is that we may be interested in women's empowerment intrinsically and not simply about her level of welfare: an individual making few decisions in a wealthy household is different from an individual who has greater say in a poorer household even if their levels of 'welfare' are comparable.

Section 2 introduces our model of household bargaining and interprets it in the context of an intervention that provides household members with productive skills or assets specific to a particular type of productive activity. The impact of a credit programme on the welfare and relative bargaining powers of individual household members are investigated in Section 3. We illustrate the model's predictions using numerical simulations and by drawing on ethnographic studies of the outcomes of microfinance programmes. Section 4 concludes with further discussions of our theoretical results.

2. Cooperative Gains and Bargaining Power within the Household

Empirical studies have shown that in many societies, divorce carries a particularly high cost and non-cooperation within the household constitutes a more credible threat-point than divorce for most women. This insight was prominently put forward by Lundberg and Pollack (1994), who define the non-cooperative threat point as a "division of labour based on socially recognized and sanctioned gender roles". Short of marriage dissolution, spouses retreat to 'separate spheres' within the marriage where they each fulfill their gender roles and where the non-cooperative equilibrium is determined by each spouse's voluntary contributions to household public goods (Lundberg and Pollak 1993).[9]

Choosing the relevant threat point has important implications regarding the prediction of household bargaining models. Predictions from divorce-threat bargaining models differ considerably from models that posit non-cooperation as the fall-back option (Adam et al. 2003, Anderson and Eswaran 2007, Pollack 1994). For example, Anderson and Eswaran (2007) are able to reject the prediction from divorce-threat bargaining models that un-earned income has a greater impact than earned income on women's bargaining power in Bangladesh, where divorce is highly uncommon. Instead, in line with predictions from bargaining models using non-cooperation as the relevant threat point, they argue that it is the control that women exert over their own earnings in the non-cooperative outcome that can shift the balance of power within the household. Relatedly, they show that there is no difference between pure housewives (who do not contribute to household income) and women working on their husbands' farms because the latter do not exert control over the income generated from their labour.

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[9]In traditional patriarchal societies, this involves women meeting their traditional obligations as mothers, wives, and daughters-in-law such as child-bearing and performing household chores. For men, this includes fulfilling their roles as primary breadwinners and meeting their obligations towards their parents, community and kinship group.

Nevertheless, in our theoretical analysis of decision-making within the household, we allow for both non-cooperation and exit as strategic options in the bargaining process. There are a number of reasons for taking this approach. First, empirical tests of the divorce-threat model versus the separate spheres model are conducted at the mean; this does not preclude the possibility that, in specific instances, the woman's exit option does impact upon negotiated decisions within the household. Given our concern with heterogeneous outcomes within households from the introduction of a microcredit programme, our theoretical analysis must take this possibility seriously. Second, the terms of non-cooperation may differ substantially between households in developed countries and in developing countries with strongly patriarchal norms. In the latter case, a certain level of violence against women by their husbands may be deemed socially permissible and, therefore, the threat of violence or actual violence may be used in the bargaining process . The possibility of violence under non-cooperation can imply that, in certain instances, leaving the marriage is a realistic option (even if it is not actually undertaken).[10] Third, while the incidence of divorce in these societies may be low, the incidence of separation initiated by the wife, precisely in situations where she has been subject to or threatened with violence, may be substantially higher.[11]

We differentiate between the scope for autonomous activities within marriage, and income opportunities following exit. If an individual, especially a woman, relies on the support and resources available to her as a consequence of her status or position within the community for her autonomous household activity, then she may not have the same opportunities upon exiting the marriage. It is also possible that a woman is constrained in terms of the type of economic activities she can undertake within a marriage because of social conventions, and has more options available to her if she leaves the marriage and is no longer obliged to follow these conventions.

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[10]In the context of Bangladesh, the social acceptability of violence against women by their husbands has been documented in various ethnographic studies; e.g. Hartmann and Boyce (1983) and White (1992). The use of the domestic violence as a bargaining tool has been documented by Rahman (1999). Bloch and Rao (2001) provide econometric and qualitative evidence, using data from three South Indian villages, that domestic violence against women is being used strategically by their husbands to extract transfers from the wives' parents.

[11]While it is difficult to obtain systematic evidence on this issue, qualitative studies suggest that, in Bangladesh, the incidence of women leaving their marriages to escape domestic violence is not insignificant. See, for example, Naila Kabeer's study on female employees in the garments industry in Bangladesh; the majority of married women in her sample took up work in garments factories after leaving violent marriages (Kabeer, 2000).

This distinction between opportunities within and outside of marriage also has important implications for credit. A loan taken by the household may be invested in a female activity, but it does not necessarily follow that the woman would be able to retain control of the new asset or enterprise if she leaves the marriage.[12] On the other hand, a woman may have little scope of investing a loan profitably while she remains married – in which case, the loan may be invested in a male or cooperative activity or the household may not participate in the loan programme at all – but the existence of the programme may nevertheless improve her exit option. The exact nature of the impact would depend on the economic opportunites within the community and the socially defined gender norms regarding these opportunities; as well as on the specific skills of the household members.

For these reasons, participation in a credit programme need not affect the income opportunities of the spouses following exit; while the availability of a credit programme may improve the spouses' exit options even if it is not used to make investments in autonomous activities within the marriage.

We model bargaining within the household as a game of alternating offers with both divorce (also referred herein as the exit or outside option) and non-cooperation within the household (in the definition proposed by Lundberg and Pollak recalled above) as relevant fall-back options.[13] In the following section, we develop the model and discuss its main insights in the context of development interventions that seek to shift the balance of power within the household with the aim of achieving broader societal transformations.

2.1. **A Bargaining Model of the Household.** Imagine a household consisting of a husband, h and a wife w. They can engage in production in a number of different activities, represented by the set $\mathcal{S}$. Each productive activity requires assets that are specific to that activity – for example, a husking machine for husking paddy – and so we represent household assets by a vector $\mathbf{k} = (k_1, .., k_S)$, where k_s is the value of assets specific to activity s. Each activity also involves performing various tasks that, because of the

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[12]Bina Agarwal argues that, traditionally, women in South Asia have had very weak property rights, both in the written law and in practice, and that divorced women, even those from very prosperous households, many find themselves in a state of destitution because of their lack of independent rights in property (Agarwal, 1994). Whether women may have stronger de facto rights to property acquired with loans given to them by MFIs remains an open question.

[13]Kanbur and Haddad (1994) propose a similar model of household bargaining and touch upon some of the results discussed here. However, given our focus on microfinance interventions and gender empowerment, our interpretation of the model and the results are considerably different from those of Kanbur and Haddad (who consider the question whether households grow more or less equal as they grow richer). Moreover, our analysis is carried out in a more general setting.

prevailing gender-related norms, can only be performed by a man, while others can only be performed by a woman. Therefore, a unit of effective labour by the husband in an activity is not equivalent to a unit of effective labour by the wife, and output depends on the specific levels of each. Each spouse is endowed with one unit of labour per period. Formally, output in activity s is given by

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\begin{aligned}
y_s &= g_s\left(k_s, l_s\right) \\
l_s &= \gamma_s \left(l_s^h\right)^{\theta_s} \left(l_s^w\right)^{1-\theta_s}
\end{aligned}
$$

where l_s^h, l_s^w measure the labour input by the husband and the wife, respectively, in activity s. The parameter θ_s captures the relative importance of male and female labour, and γ_s the combined skill level of the couple, in the activity concerned. We assume $g_s\left(.\right)$ is weakly increasing and concave in both inputs.

Since we wish to examine the effects of credit on bargaining and cooperation within the household, we consider the case where the household has three productive activities: $\mathcal{S} = \{m, f, c\}, \theta_m = 1, \theta_f = 0, \theta_c \in (0, 1)$ (the letters stand for 'male', 'female' and 'cooperative'). Thus, the husband and wife can undertake production independently in activities m and f respectively, but some labour input from both is required for positive output in activity c.

At the end of production, total household income is given by $y = \sum_{s \in S} y_s$ (we assume, for ease of notation, that each output has a price of 1). In this section, we assume that the income is spent on a single consumer good, which can be consumed privately by either h or w. Both spouses derive utility from own consumption only. Furthermore, utility from consumption of the private good exhibits constant absolute risk aversion: $U^i\left(x\right) = -\exp\left(-r^i x\right)$, a functional form that allows for the Nash bargaining solution to be computed with ease. Furthermore, for ease of exposition, we let $r^h = r^w$.[14]. These simplifying assumptions are made primarily to illustrate the basic properties of the bargaining game. In section 2.3, and for the subsequent analysis relating to credit, we consider a more general setting for household consumption, allowing for n different consumption goods, which may include both private and household public goods.

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[14]We feel there is no loss of understanding from these simplifying assumptions as the effect of risk-aversion on bargaining is well-understood from previous work: Roth (1979) and Kihlstrom, Roth and Schmeidler (1981) have shown that increasing an agent's aversion to risk lowers his share in the outcome of bargaining. Therefore, if one spouse is more risk-averse, then he or she would do worse in the bargaining game. If utility exhibited decreasing absolute risk aversion, then providing additional income to one spouse would strengthen his bargaining position because of a decrease in risk-aversion, independently of any effect on his threat point.

The husband and the wife have control rights over the output from activities m and f respectively. Either spouse may have full control rights over output in activity c, without affecting our analysis: under non-cooperation, the spouse without control rights would refuse to provide labour for this activity, and thus output would equal zero. Therefore, in the absence of an agreement about the allocation of labour and expenditures, each spouse devotes all her labour to her own activity, and uses the resulting income for private consumption. The autarkic incomes and expenditures are given by $y_a^h = g_m\left(k_m, \gamma_m\right), y_a^w = g_f\left(k_f, \gamma_f\right)$. This corresponds to the outcome described as 'separate spheres' by Lundberg and Pollak (1993).

Although h and w would also engage in autonomous production in the event of divorce, their incomes in this case need not correspond to their 'separate spheres' incomes. This is because social norms may impose (or relax) constraints on the types of assets that they can control and the types of activities they can undertake within a marriage. Therefore, we represent income levels following divorce by a different set of variables, $\mathbf{y}_e = \left(y_e^h, y_e^w\right)$.

To model the process whereby the couple reach an agreement, we make use of the household bargaining game proposed by Bergstrom (1996) and Kanbur and Haddad (1994). The husband and wife can propose an allocation of labour and consumption expenditures in alternate periods, which the spouse can then accept or refuse. If an offer is accepted, then it becomes the standing agreement according to which resources are allocated within the household thereafter, unless it is rejected by the spouse in a subsequent period. When there is no standing agreement, the spouses allocate labour and spend their incomes independently. In addition, either spouse i may choose to walk away from the marriage in any period (before production takes place), in which case he or she would receive the income y_e^i in each period thereafter (once the marriage has broken down, there is no scope of renegotiation possible).

Formally, suppose h makes offers in periods $2t - 1$ and w makes offers in periods $2t$, for $t = 1, 2, ...\infty$. There are three stages of decision-making within each period as follows:

Stage 1: If there was no agreement in place in the previous period, then the current offerer can propose an allocation of labour $\left(l_s^h, l_s^w\right)_{s \in \mathcal{S}}$ and shares in total expenditure for each spouse $(\alpha, 1 - \alpha)$. This then becomes the 'standing offer'. Alternatively, the current offerer can choose to exit the marriage at this stage.

Stage 2: If there was an agreement in place in the previous period or a standing offer, then the spouse of the offerer must choose whether to (continue to) accept or reject it. If the offer or agreement is rejected, there is no agreement for the remainder of the period. If it is accepted, then there is an agreement in place corresponding to the 'standing offer' or previous agreement. Alternatively, the spouse can choose to exit the marriage at this stage.

Stage 3: If there is an agreement in place, then resources are allocated according to the agreement. If not, then the spouses individually choose to allocate labour across productive activities, and spend the incomes over which they have control rights.

In the description above, we have assumed, implicitly, that when a couple come to an agreement, they are able to commit to divide the income generated from the cooperative activity at the end of production process in accordance with the income shares agreed upon[15]. Under this assumption, any rational proposal will involve an efficient allocation of labour resources within the household; because an offer that involves an efficient allocation of labour can always be made more attractive to both spouses than another which does not. Thus, the total household income in any cooperative agreement will be given by the following maximisation problem:

$$(1) \qquad y\left(\mathbf{k}, \boldsymbol{\gamma}\right) = \max_{\left(l_s^h, l_s^w\right)_{s \in \mathcal{S}}} \sum_{s \in \mathcal{S}} g_s\left(k_s, \gamma_s \left(l_s^h\right)^{\theta_s} \left(l_s^w\right)^{1-\theta_s}\right)$$

subject to

$$\sum_{s \in \mathcal{S}} l_s^i \leq 1 \text{ for } i = h, w$$

where $\mathbf{k} = \left(k_m, k_f, k_c\right), \boldsymbol{\gamma} = \left(\gamma_m, \gamma_f, \gamma_c\right)$.

Thus, the only substantive issue to be decided upon in the bargaining process is how the income $y(\mathbf{k}, \boldsymbol{\gamma})$ will be divided between the spouses. In effect, we have here the bargaining game analysed by Rubinstein (1982) with the modification introduced by Binmore (1985)[16]. Binmore showed that the two parties reach an agreement immediately and, if

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[15]This assumption is essential for the spouses to be able to participate in the cooperative activity. However, they need not be able to commit to make transfers from the income generated by their independent activities because any agreement that requires them to do so cannot arise in equilibrium: the spouse who is required to make such a transfer would be better off under non-cooperation.

[16]Note that, unlike Rubinstein's bargaining game, spouses may choose to reject an offer that was accepted in a preceding period. However, as noted by Bergstorm (1996), it is never optimal for either spouse to do so. Given the stationary environment, if it is optimal for a spouse to accept an offer in some period t, it is also optimal to accept the standing agreement corresponding to this offer in subsequent periods.

the time lapse between proposals is infinitesimally small, then the total income shares of the two parties are given by the solution to the following problem:

(2) $$\alpha\left(\mathbf{k}, \boldsymbol{\gamma}, \mathbf{y}_e\right) = \arg \max_{\alpha \in [0,1]} \left[U\left(\alpha y\right) - U\left(y_a^h\right)\right] \left[U\left(\beta y\right) - U\left(y_a^w\right)\right]$$

subject to

$$U\left(\alpha y\right) \geq U\left(y_e^h\right)$$
$$U\left(\beta y\right) \geq U\left(y_e^w\right)$$

where $\beta = 1 - \alpha$. Here, α and β are the income shares of the husband and wife respectively. It is evident from the maximisation problem described in (2) that the utility levels achieved under non-cooperation and from divorce both influence the outcome of bargaining. For constant absolute risk aversion utility (and the same degree of risk aversion for both spouses), the solution to the bargaining problem in (2) takes a simple form:

(3) $$\alpha\left(\mathbf{k}, \boldsymbol{\gamma}, \mathbf{y}_e\right) = \begin{cases} y_e^h/y \text{ if } \frac{1}{2}\left(1 + \frac{y_a^h - y_a^w}{y}\right) < y_e^h/y \\ 1 - y_e^w/y \text{ if } \frac{1}{2}\left(1 + \frac{y_a^w - y_a^h}{y}\right) < y_e^w/y \\ \frac{1}{2}\left(1 + \frac{y_a^h - y_a^w}{y}\right) \text{ otherwise} \end{cases}$$

It is evident from (3) that a spouse's share of total income in the outcome of bargaining depends on the relative values of incomes under non-cooperation, unless this value falls below the income attained from leaving the marriage. In the latter case, one receives, in the bargaining game, exactly the income obtained from exit, while the spouse takes the rest of total household income. Intuitively, a spouse who can fend for herself in a non-cooperative household will not be pressured by her partner into accepting an agreement that is biased against her in exchange of a return to cooperation. By contrast, if she has little autonomy within the household, she may acquiesce to an unfavourable agreement to end a conflict. In the second case, a strong exit option protects her from having to suffer an arrangement that is very biased against her, for when faced with the prospect of such an arrangement, her divorce option becomes a credible threat.

2.2. An Interpretation of the Model in the Context of Household Bargaining.

Before considering how this framework may be used to investigate the impact of a microcredit programme on bargaining power within the household, we discuss briefly how the 'male', 'female' and 'cooperative activities' and the corresponding parameters γ_m, γ_f, and γ_c should be interpreted. Note that the 'female' activity is one that the woman is able carry out within the limits of the socially recognised division of labour for her gender, without the cooperation of her spouse. In the absence of a cooperative agreement,

the gender norms also recognise her right to retain control over this income. In a patriarchal setting, women may be dependent on men in carrying out their entrepreneurial activities at least at some stage of production or marketing. In this case, the productive activity should be classified as 'cooperative' within this framework rather than 'female'.[17] Likewise, a productive activity that is carried out primarily by men but relies on some input from the female spouse, and from which she can credibly threaten to withdraw her cooperation, should be classified as a 'cooperative' rather than a 'male' activity.

The parameters γ_m and γ_f can serve to capture heterogeneity across households in individual skill levels in autonomous activities, and γ_c, the ability of the spouses to work together in an activity that requires coordination and cooperation. For example, a low value of γ_c can represent an extremely conflictual relationship where there is little scope of cooperation between the spouses. In this case, the spouses are likely to engage in largely autonomous activities.[18] A household where the female spouse has strong entrepreneurial skills, and can operate an entreprise independently of her husband would be characterised by a high value of γ_f.[19] If a woman who has no opportunity for work other than on her husband's farm, the household would be characterised by low γ_f. Moreover, if her input in farm work is easily substitutable by the man, then θ_c is close to 1 and γ_m is close to γ_c.

The Impact of a Development Programme on Intra-Household Bargaining: The model of household bargaining developed in the previous section can be used to examine the effects of a development intervention that provides households productive assets or improves the productivity of household members in specific activities. In the case of a single private consumption good and CARA utility, the impacts are readily apparent from equation (3). Here, we provide a brief discussion of the comparative statics results under these assumptions. A more general (and weaker) version of these results will be presented in the next section.

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[17]For example, in the context of Bangladeshi rural households, Goetz and Gupta (1996) note that "the household is a joint venture, and the gender division of labor is such that full, individual control of the productive process is virtually impossible for women given the gendered nature of access to markets." (p.53)

[18]This equilibrium is equivalent to the situation described by Kabeer (2001) as "divorce within marriage" (p.74). The spouses remain married because of the social stigma associated with divorce.

[19]Kabeer (1998) provides a number of examples of women who can be placed in this category. In some cases, they had overcome traditional gender restrictions: one earned as income as an itinerant trader, another owned a grocery shop in the main bazaar. Others had found an effective solution within these restriction such as the woman who reared a cow and sold its milk 'in the neighbourhood', thus not having to rely on a male household member for marketing.

Consider, first, the case where the initial parameters are such that the divorce threat is not a binding constraint for either spouse. Then an intervention that provides the household additional assets in the cooperative activity, or develops the couple's skills in this activity (i.e. an increase in k_c or γ_c) would cause α to shift towards $\frac{1}{2}$. Thus, the allocation of resources within the household would become more egalitarian: the intuition is that as the gains from cooperation improves, the outcome of bargaining becomes less sensitive to differences in the non-cooperative welfare levels between the two spouses. Moreover, the level of consumption, and therefore welfare, would improve for both spouses.[20]

By contrast, an intervention targeted at the autonomous activity of either spouse (i.e. an increase in k_s or γ_s for $s = m$ or f) would shift bargaining power within the household in favour of that spouse. The welfare of the other spouse may actually decline but, as will be apparent in the following section, this is much less likely when household public goods are present.

Next, consider the case where the initial parameters are such that the divorce threat constraint is binding for the husband (perhaps because he has a strong exit option) or the wife (perhaps because her level of welfare in a non-cooperative marriage is very low). Then a limited intervention in any of the household activities (i.e. an increase in k_s or γ_s for $s = c, m$ or f) such that the constraint continues to bind for the spouse in question, would leave her welfare unchanged, but actually *worsen* her bargaining power, as measured by α.

This last result has a simple intuitive explanation. When exit from the marriage becomes a credible threat point for one spouse, there is, in effect, no more bargaining taking place within the household. The other spouse need only ensure that his partner is receiving just enough utility within the marriage so as not to opt for her exit option. As the household becomes richer, it becomes cheaper for him to do so: his partner will be content with staying in the marriage for an even smaller share of the gains from cooperation.[21]

A broader intervention targeted at the cooperative activity, or at the autonomous activity of the spouse whose divorce threat constraint binds, would cause this constraint to become slack. The impact on her bargaining power is ambiguous but her level of welfare within the marriage would improve.

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[20]To see this, note that the level of consumption for the male spouse equals $\alpha y = \frac{1}{2}\left(y + y_a^h - y_a^w\right)$; while the level of consumption for the female spouse equals $(1 - \alpha)\,y = \frac{1}{2}\left(y + y_a^w - y_a^h\right)$.

[21]See Kanbur and Haddad (1994), who find similar results.

The extent to which these results can be generalised will be evident from the analysis in the next section.

2.3. **Multiple Consumption Goods.** In this section, we extend the analysis to a setting where there are $L > 2$ consumption goods, including both private and household public goods. Let $\mathbf{p} = (p_1, p_2, .., p_L)$ be the prices of the L goods, and denote by $\mathbf{x} = (x_1, x_2, ..., x_L)$ a consumption bundle which provide utility levels $U^h(\mathbf{x})$ and $U^w(\mathbf{x})$ to the husband and wife respectively. In this setting, the husband and wife would bargain, not over income shares but over the level of expenditure on each commodity. However, the nature of the bargaining game is such that any cooperative agreement agreed upon will involve an efficient level of expenditures; i.e. given the household budget, the utility levels attained in the agreement will be on the utility possibility frontier. Therefore, given total household income y, any consumption bundle agreed upon will belong to the set $\{\mathbf{x}(y, \lambda) : \lambda \in (0, \infty)\}$ where

(4)
$$\mathbf{x}(y, \lambda) = \arg\max_{\mathbf{p}.\mathbf{x} \leq y} U^h(\mathbf{x}) + \lambda U^w(\mathbf{x})$$

Thus, any bargaining solution can be fully summarised by the parameter λ. Here, λ is the wife's relative pareto weight, with the husband's pareto weight being fixed at 1. Note that $\mathbf{x}(y, 0)$ represents the household expenditures that would result if they were decided upon entirely by the husband, while $\mathbf{x}(y, \infty)$ represents the expenditures that the wife would choose on her own. We can say that the husband (wife) has *a stronger preference for good l at income level y* if $x_l(y, 0) > x_l(y, \infty)$ $(x_l(y, 0) < x_l(y, \infty))$. If utility is separable across different goods, it is straightforward to show that, as λ increases, the household spends more on goods for which the wife has a stronger preference and less on goods for which the husband has a stronger preference at the given income level. In this sense, λ can be said to capture decision-making authority or 'say' within the household.

To facilitate the analysis of the bargaining game, we define an indirect utility function:

$$V^i(y, \lambda) = U^i(\mathbf{x}(y, \lambda)) \text{ for } i = h, w$$

Thus $V^i(y, \lambda)$ is the utility obtained by spouse i in an efficient agreement when total household income equals y and the wife's relative pareto weight is λ.

Expenditure levels under non-cooperation would depend on the precise nature of the subgame played when expenditure decisions are made non-cooperatively. In particular, Lundberg and Pollak (1993) has shown that the equilibrium attained under non-cooperation is

sensitive to the presence or absence of separate spheres in household expenditures and on whether the spouses can make intra-household transfers. For our purpose, the relevant issue is how utility levels under non-cooperation respond to changes in autarkic income levels. Therefore, rather than making explicit the subgame played in non-cooperation, we denote the utility levels attained by indirect utility functions $\tilde{V}^i\left(y_a^h, y_a^w\right)$, for $i = h, w$, and consider each possible case highlighted by Lundberg and Pollak (1993).

Case (i): if there are separate spheres of household expenditures and no possibility of intra-household transfers under non-cooperation, then $\tilde{V}_i^i > \tilde{V}_j^i$ for $j \neq i$[22];

Case (ii): if there are separate spheres of household expenditures, but intra-household transfers are possible, and spouse i makes positive transfers to j in equilibrium, then $\tilde{V}_i^i = \tilde{V}_j^i$ for $j \neq i$;

Case (iii): if there are household public goods, and each spouse spends a positive amount on each household public good, then $\tilde{V}_i^i = \tilde{V}_j^i$ for $j \neq i$ (Lundberg and Pollak, 1993);

We can contrast these three cases with the case where there are no household public goods:

Case (iv): if there are no household public goods, then $\tilde{V}_j^i = 0$ for $j \neq i$.

Note that, in each of these cases, $\tilde{V}_i^i > 0$. As we have argued that the outcome of bargaining will involve an efficient level of consumption expenditures, the bargaining solution for the general case is given by the following maximisation problem:

$$(5) \qquad \lambda\left(\mathbf{k}, \boldsymbol{\gamma}, \mathbf{y}_e\right) = \arg \max_{\lambda \in (0,\infty)} \left[V^h\left(y, \lambda\right) - \tilde{V}^h\left(y_a^h, y_a^w\right)\right] \left[V^w\left(y, \lambda\right) - \tilde{V}^w\left(y_a^h, y_a^w\right)\right]$$

subject to

$$V^i\left(y, \lambda\right) \geq \hat{V}^i\left(y_e^i\right) \text{ for } i = h, w$$

where $\hat{V}^i\left(.\right)$ is the indirect utility function for welfare from exiting the marriage.[23]

We consider, first, the situation where the constraints imposed by the exit option do not bind. Then $\lambda\left(\mathbf{k}, \boldsymbol{\gamma}, \mathbf{y}_e\right)$ is given implicitly by the following equation:

$$(6) \qquad\qquad\qquad \lambda = \frac{V^h\left(y, \lambda\right) - \tilde{V}^h\left(y_a^h, y_a^w\right)}{V^w\left(y, \lambda\right) - \tilde{V}^w\left(y_a^h, y_a^w\right)}$$

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[22]We use $\tilde{V}_j^i$ to denote $\frac{\partial \tilde{V}^i}{\partial y_a^j}$.

[23]Formally, $\hat{V}^i\left(y_e^i\right) = \max_{\mathbf{p}.\mathbf{x} \leq y_e^i} U^i\left(\mathbf{x}\right)$.

To determine how λ responds to a development intervention that affects household productivity in the different activities, or to changes in the level of household assets, we differentiate throughout (6) with respect to the relevant parameter. Thus, we obtain

$$(7) \qquad \frac{d\lambda}{d\upsilon} \equiv \frac{y_\upsilon \left(V_y^h - \lambda V_y^w\right) - \tilde{y}_\upsilon^h \left(\tilde{V}_h^h - \lambda \tilde{V}_h^w\right) + \tilde{y}_\upsilon^w \left(\lambda \tilde{V}_w^w - \tilde{V}_w^h\right)}{V^w - \tilde{V}^w + \lambda V_\lambda^w - V_\lambda^h}$$

where $\upsilon = k_m, \gamma_m, k_c, \gamma_c, k_f$, or γ_f.[24] From equation (7), it is possible to distinguish between two distinct effects of any intervention on decision-making authority within the household, as measured by λ. The first is an 'income effect' which (ignoring the denominator which, it can be shown, is always positive) is equal to $y_\upsilon \left(V_y^h - \lambda V_y^w\right)$. If preferences can be represented by a CES utility function (of the form $U^i\left(\mathbf{x}\right) = \sum_l \alpha_l^i \left(x_l\right)^\rho$), then it can be shown that $V_y^h - \lambda V_y^w \gtreqless 0$ for $\lambda \lesseqgtr \lambda_e\left(y\right)$, where $\lambda_e\left(y\right)$ is defined implicitly by the equation $\lambda V_y^w\left(y, \lambda\right) = V_y^h\left(y, \lambda\right)$ (see proof of Propostion 2.1). In other words, the income effect causes λ to move towards $\lambda_e\left(y\right)$. In the case of a symmetric utility possibility set, $\lambda_e\left(y\right) = 1$, and, in this sense, the income effect can be said to make decision-making authority within the household more egalitarian.

When the intervention is in the cooperative sphere, there is only an income effect on λ as described above. However, if the intervention is in the male or female sphere of autonomous activity, there is an additional effect on λ caused by a shift in the non-cooperative threat point. This 'threat-point effect' equals $-\tilde{y}_\upsilon^h \left(\tilde{V}_h^h - \lambda \tilde{V}_h^w\right)$ for an intervention targeted at the male activity, and $\tilde{y}_\upsilon^w \left(\lambda \tilde{V}_w^w - \tilde{V}_w^h\right)$ when it targets the female activity (again ignoring the denominator which is the same as in the income effect). The following proposition summarises the results discussed here.

Proposition 2.1. *Suppose preferences can be represented by a CES utility function. If the divorce option is not a binding constraint for either spouse in the initial equilibrium, then*

(i) *an intervention which leads to an increase in any of the variables $k_m, \gamma_m, k_c, \gamma_c, k_f$, or γ_f, has two distinct effects on decision-making authority within the household as measured by λ:*

    (a) *an 'income effect' which is smaller than, equal to, or greater than zero depending on whether the initial value of λ is greater than, equal to, or smaller*

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[24]We use the following abbreviated notation: $y_\upsilon = \frac{\partial y}{\partial \upsilon}, \tilde{y}_\upsilon^i = \frac{\partial \tilde{y}_\upsilon^i}{\partial \upsilon}, V_y^i = \frac{\partial V^i}{\partial y}$, and $V_\lambda^i = \frac{\partial V^i}{\partial \lambda}$.

than $\lambda_e\left(y\right)$; the 'income effect' leads to an improvement in welfare of both spouses;

(b) a 'threat-point effect' which, in the case of an intervention in the male (female) sphere of activity, is greater than zero if and only if $\tilde{y}_v^h\left(\tilde{V}_h^h - \lambda\tilde{V}_h^w\right) < 0$ $\left(\tilde{y}_v^w\left(\lambda\tilde{V}_w^w - \tilde{V}_w^h\right) > 0\right)$; the effect is absent in the case of a cooperative activity.

(ii) a small increase in y_e^h or y_e^w, such that the constraints imposed by the divorce options continue to be slack, will have no impact on λ or on welfare levels; for a sufficiently large increase in y_e^i, $i \in \{h, w\}$, the constraint for spouse i will begin to bind, and λ will shift in favour of this spouse. Correspondingly, the welfare level of this spouse will improve at the expense of the other spouse.

Proposition 2.1, which provides a generalisation of the first set of results in the previous section, highlights the difference between a development intervention targeted at the cooperative sphere within the household and one that improves skills or enables capital buildup within the autonomous sphere of either spouse. In the former case, the intervention produces only an 'income effect': as the household grows richer, the outcome of bargaining becomes less sensitive to differences in non-cooperative welfare levels. Therefore, decision-making within the household grows more egalitarian.[25]

In addition to an 'income effect', raising the autonomous income potential of a spouse under non-cooperation has a separate effect on decision-making authority if it disproportionately affects the threat-points of the two spouses. In the absence of household public goods, (case (iv) above) $\tilde{V}_h^w = \tilde{V}_w^h = 0$; i.e. an increase in the non-cooperative income of one spouse does not affect the welfare of the other spouse. Thus, the 'threat-point effect' favours the spouse whose autonomous activity is targeted in the intervention.

In the presence of household public goods, it is possible that $\tilde{V}_j^i > 0$ for $i \neq j$ and therefore the 'threat-point effect' is ambiguous. For cases (ii) and (iii) above, and as noted by Lundberg and Pollak (1993) within a similar model, the 'threat-point effect' is 'neutral': interventions in the male and female spheres have the same effect on decision-making authority, and tends to favour the spouse who has greater decision-making authority in the initial situation (as measured by λ). Intuitively, raising the autonomous income of one spouse, would cause this spouse to spend more on household public goods under non-cooperation and thus create 'spill-overs' on the welfare of the other spouse; thus, the

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[25]This is also a generalisation of a result earlier noted by Kanbur and Haddad (1994).

'threat-point effect' is more muted when the household spends a larger share of its budget on household public goods, as opposed to private goods.

The welfare effects of an expansion of the cooperative sphere are unambiguous: although there may be a shift in bargaining power within the household, both spouses will experience an improvement in welfare. However, there is considerable ambiguity in the case of an intervention targeted at an activity carried out independently by one spouse. This is because, whenever the 'threat-point effect' is non-zero, it leads to an improvement in the level of welfare of one spouse at the expense of the other. Therefore, if the threat-point is sufficiently large to offset the income effect, one of the spouses may experience a decline in welfare. The example with CARA utility in the previous section provided such a case.

The existing theoretical literature on household bargaining with non-cooperation as the threat point has focused on the case in which raising the non-cooperative income level of one spouse also strengthens his or her bargaining position.[26] In the subsequent analysis, we emphasize this case as well, to provide additional structure to the model. Moreover this emphasis seems justified given that the case is consistent with a large number of results from the empirical literature.[27]

If the divorce threat-point is a binding constraint for either spouse in the initial situation, the effect of any intervention on bargaining within the household, and the underlying intuition, correspond exactly to the special case with CARA utility discussed in the previous section. The results are summarised below.

Proposition 2.2. *Suppose the bargaining problem has a corner solution with spouse i receiving the same utility in the agreement as she would from her exit option. Then,*

(i) an increase in assets or skill level in the autonomous activity of spouse j would cause λ to shift in favour of spouse j and has no impact on the welfare of i;

(ii) a small increase in assets or skill level in the autonomous activity of spouse i, or in the cooperative activity, such that i's constraint continues to bind following the intervention, will similarly cause λ to shift in favour of i, and have no impact on the welfare of j; for

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[26]See, for example, Lundberg and Pollak (1993), Chen and Woolley (2001), and Anderson and Eswaran (2007).

[27]For example, the household bargaining model with non-cooperation as the threat point is able to provide consistent explanations for empirical results obtained by Lundberg, Pollak and Wales (1997), Duflo (2003), Thomas, Contreras and Frankenberg (2002).

sufficiently large increases in these variables, j's constraint becomes slack and j experiences an improvement in welfare; the impact on λ is ambiguous.

(iii) an increase in i's income from exiting the marriage will cause λ to shift in favour of i, and lead to improved welfare for i; a small increase in j's income from exiting the marriage will have no impact on λ but a sufficiently large increase will lead to the dissolution of marriage.

3. Access to Credit

In section 2.1, it is assumed that the household has no means of acquiring or disposing off assets. In particular, the household had no means to save, or access to credit, in order to buy new assets. We now introduce a microcredit programme into this environment, and examine its effects on household production and decision-making. A loan product is described by a 4-tuple $\mathcal{L} = (L, z, n, \sigma)$ where L is the size of the loan, which must be repaid, including interest, in equal installments of z over n periods; and $\sigma \in [0, 1]$ is the fraction of each loan installment that the husband is obliged to pay in the event that cooperation between the spouses breaks down. This last parameter may be determined by the terms of the loan, informal understanding with the bank officer, or by the relevant social norms.

If the size of the loan is small, and investments are lumpy, say the purchase of a cow or a plot of land, then it may well be that the loan will be invested exclusively in one sphere of production within the household. In the subsequent analysis, this is our working assumption.

The presence of a microcredit programme implies that the household has to decide not only on the allocation of labour across productive activities and household expenditures, but also, when a new loan is available, on whether or not to take out a loan and, if they do, on how to invest the loan. Therefore, we add two additional stages to those introduced in section 2.1 to model decision-making within each period:

Stage P: If the household has access to a credit programme, each spouse states a preference, $P^i \in \{Y, N\}$ about whether or not to participate. The household's decision is determined by the function $P\left(P^h, P^w\right) : \{Y, N\} \times \{Y, N\} \longrightarrow \{Y, N\}$.

Stage I: If $P = Y$, then the household receives a loan of size L; and each spouse states a preference, $I^i \in \{m, f, c\}$ about the activity in which the loan money should be invested. The household's decision is determined by the function $I\left(I^h, I^w\right) : \{m, f, c\} \times \{m, f, c\} \longrightarrow \{m, f, c\}$. The new level of capital in the activity, s, chosen for investment, becomes $k_s + L$.

The functions $P\left(.\right)$ and $I\left(.\right)$, which define how the household members' preferences for borrowing and investment translate into a collective household decision, will be defined in the next section.

We assume that there is full enforcement in loan repayment. Therefore, the presence of an outstanding loan lowers the disposable income of household member i under non-cooperation to $y_a^i - \sigma^i z$ in each period (where $\sigma^h = \sigma$, and $\sigma^w = 1 - \sigma$). Also, while there is an outstanding debt, a cooperative agreement specifies how to allocate the total disposable income $y - z$. Stages P and I are followed by stages 1-3 as defined above, except for the adjustments to disposable income indicated here.

During the time interval that the household is obliged to repay the loan, non-cooperation involves having to pay some part of the installment out of one's own autonomous income. The cost of non-cooperation during the time interval that the loan is being repaid depends on the installment shares σ and $1 - \sigma$, and differs from that after the loan has been fully repaid. Therefore, full repayment of the loan will potentially lead to a shift in bargaining powers within the household and cause any previous agreement in the allocation of resources to be renegotiated[28]. Following the reasoning used in the previous section, the equilibrium allocation of resources after full repayment can be represented by $\lambda\left(\mathbf{k} + e_s L, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)$ where s is the activity sphere in which the loan of size L has been invested and the vector $\hat{\mathbf{y}}_e = \left(\hat{y}_e^h, \hat{y}_e^w\right)$ represents (potentially stochastic) income levels from exiting the marriage following the introduction of the credit programme.

The allocation of resources during loan repayment is a more difficult problem because, in this case, bargaining is taking place in a non-stationary environment. Each period brings closer the date when the last installment will be repaid and therefore, in theory, the strategic incentives of the spouses will change over time such that an offer that is acceptable in some period t may no longer be acceptable in period $t+1$. In our modelling, we abstract away from the problem of non-stationarity by arguing that when the date

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[28]Indeed, since we have assumed that the time interval between offers is close to zero, any previous agreement will always be renegotiated after the last installment is paid.

of the final installment is weeks or months distant, the spouses should bargain <u>as if</u> they are negotiating in a stationary environment. In reality, a counter-offer may require no more than a few hours (if not minutes) while experiments with bargaining games, and more generally repeated games, have shown that subjects do not engage in backward induction reasoning for more than a few periods (Selten and Stoecker, 1986; Johnson et al., 2002). Therefore it seems reasonable to assume that when bargaining over an allocation of resources, spouses do not take into account that each new round of a offer and counter-offer brings closer the event of full repayment of the loan. On the other hand, they should consider the implications of full repayment on the decision whether or not to exit the marriage because no backward induction reasoning is necessary here. Hence, we write the solution to the bargaining problem while a loan $\mathcal{L}$ is being repaid, as follows:

$$(8) \qquad \hat{\lambda}\left(\mathbf{k}_1, \boldsymbol{\gamma}, \mathbf{y}_e, \mathcal{L}\right) = \arg \max_{\lambda \in [0,1]} \prod_{i=h,w} \left[V^i\left(y^i - z, \lambda\right) - \tilde{V}^i\left(y_a^h - \sigma^h z, y_a^w - \sigma^w z\right) \right]$$

subject to

$$(9)$$
$$\sum_{t=1}^{n} (\delta_i)^{t-1} V^i\left(y - z, \lambda\right) + \sum_{t=n+1}^{\infty} (\delta_i)^{t-1} V^i\left(y, \lambda\left(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) \geq \sum_{t=1}^{\infty} (\delta_i)^{t-1} E\hat{V}^i\left(\hat{y}_e^i\right) \text{ for } i = h, w$$

where $\hat{\lambda}\left(\mathbf{k}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)$ is the husband's share in total income, $\mathcal{L} = (L, z, n, \sigma)$, $\mathbf{k}_1 = \mathbf{k} + e_s L$, δ_i is the discount factor for household member i, and y, y_a^h, and y_a^w are as defined in the preceding section for household assets $\mathbf{k}_1$.

It is evident from (8) that the bargaining outcome during the period of repayment is influenced by σ and $1 - \sigma$, the shares of the installment for which the husband and the wife bear responsibility under non-cooperation. We can argue that these shares should be related to the relative decision-making authorities of the spouses when they opt for the programme, since whoever is perceived to be the primary decision-maker within the household at the time the loan is given is likely to be held accountable (by the enforcement authority, which may be the bank or a peer group) for repayment if an installment is overdue. This argument does not in itself suggest a value for σ as it is fraction of a sum of money while λ is a weight on utility, but it does indicate that the obligation to repay installments should not significantly shift the balance of power within the household.

3.1. **Participation and Investment Decisions.** Any household decision regarding the take-up and use of credit can potentially affect the fall-back options of the household members. Therefore, both the husband and the wife may have reason to think about these

decisions strategically, considering not only the profitability of a particular investment but also its impact on relative bargaining powers within the household in future periods.

The household's decision regarding participation and loan use should also depend on the 'say' of each spouse in these matters which, in our framework, is represented by the functions $P\left(.\right)$ and $I\left(.\right)$ introduced in the previous section. The decision-making authority of each spouse regarding financial matters may depend on the cultural context, the precise mechanism through which credit is delivered (e.g. whether or not it is given exclusively to women), and the initial levels of bargaining powers within the household.

For example, in highly patriarchal societies, and in households where the woman is initially in a weak bargaining position, an appropriate assumption may be that the husband has 'final say' regarding both the investment and participation decisions: $P\left(P^h, P^w\right) = P^h$ and $I\left(I^h, I^w\right) = I^h$. In households where the wife is initially in a relatively strong bargaining position, it is plausible that the household cannot obtain microcredit loans (that is given exclusively to women) unless both spouses give their consent and, in particular, the woman is willing to take part in the necessary loan-related meetings. In this case, we would stipulate that $P\left(P^h, P^w\right) = Y$ if $P^h = P^w = Y$ and $P\left(P^h, P^w\right) = N$ otherwise.

It is also important to note that if the household has access to repeated loans, then financial decisions in the current period can impact upon the decision-making authority of the spouses regarding future loans. This would provide them added reason to be strategic regarding such decisions. In the following discussion, we assume for simplicity that the household has access to only one loan, and explore the effect of repeated loans on the strategic choices of household members at the end of Section 3.

Ordering of Investment Choices: To analyse the household's invesment and participation decisions, we first consider the preference ordering of the husband and the wife regarding these decisions for different parameter values. The following proposition provides a ranking of investment choices for each spouse, once a loan has been taken up.

Proposition 3.1. *(i) If the divorce threat constraint binds for spouse j for some investment choices, both in periods during and following full repayment of the loan, then spouse i prefers the most efficient investment among them;*

(ii) if the divorce threat constraint binds for spouse i for some investment choices, then spouse i is indifferent among them;

(iii) among investment choices for which the divorce threat constraint does not bind for spouse i, he (she) prefers the efficient investment unless there is another choice for which the loss in income is compensated, in welfare terms, by a strengthening of decision-making authority;

(iv) spouse i always prefers (weakly) an investment for which his or her divorce threat constraint is slack to another for which the constraint binds.

There are two key implications of Proposition 3.1. The first is that if the divorce threat constraint binds for spouse i for each of the three possible investment choices, then she (he) is indifferent among them. This is because, by construction, the allocation of resources within the household provides her exactly the level of welfare she would obtain from leaving the marriage for all these choices. Moreover, assuming that the constraint will continue to bind following full repayment for these investment choices, the other spouse, spouse j, would prefer the most productive of the investments as, by Proposition 2.2(ii), all income gains from the investment will accrue to him (her).[29] This is a special case, but it is one worthy of consideration because, if the size of the loan is small, and the divorce threat constraint is initially binding for either spouse, then it is plausible that the constraint would continue to bind, regardless of the choice of investment.

The second implication is that if there is more than one investment choice for which the divorce threat constraint does not bind for either spouse, then she (he) ranks them by comparing the loss in household income from an inefficient investment, and the gain in bargaining power from doing so. She may not choose the most efficient investment if the efficiency loss from diverting the loan is relatively small, and one or more choices lead to a significant shift in relative bargaining powers.

Preferences regarding the participation decision: The participation decision becomes salient when the terms of the loan are not very attractive and the household has limited scope for absorbing additional capital for productive purposes, such that any improvement in welfare from using the loan is marginal. Since taking out and investing a

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[29]The case that is not analysed in Proposition 3.1 is where there is some investment choice such that the divorce threat constraint binds for spouse i while the loan is being repaid, but the threat no longer plays a role in bargaining once full repayment has been achieved. In this case, the other spouse, spouse j, may prefer an inefficient investment that promises higher utility to spouse i once repayment is complete, such that i would require a smaller compensation prior to full repayment of the loan to be persuaded not to exit. Since this case requires a complex range of conditions to be satisfied and is also intuitively subtle, we do not explore it formally in this paper.

loan can potentially lead to a shift in decision-making authority within the household, this may give rise to situations in which one spouse finds it attractive to participate in the credit programme while the other does not.

In particular, if the 'threat point effect' defined in Proposition 2.1 favours the spouse whose autonomous activity benefits from an intervention, then a household member would be most 'willing' to participate in the loan programme if he or she anticipates that the loan would ultimately be in invested in his or her own autonomous activity, and least 'willing', if the investment takes place in the activity of the other spouse. And this can potentially lead to a conflict betwen the spouses.

To formalise this notion, we introduce the following variables: let $\underline{y}^i_s (y_0, \lambda_0)$ be the smallest value of household income, following an investment, for which spouse i would be willing to participate in a credit programme, if it is anticipated that the loan will be invested in activity s (i.e. $I(I^h, I^w) = s$; y_0 is the household income, and λ_0 is the wife's pareto weight prior to the investment); let $\underline{y}^i_0 (y_0, \lambda_0)$ be the corresponding threshold value if the initial balance of bargaining power were maintained in all periods[30]. Then, we have the following result:

Proposition 3.2. *Suppose the 'threat point effect' always favours the spouse whose autonomous activity is targeted in an intervention. Then, (i) If the divorce option is not a binding constraint for either spouse following the use of a loan, then $\underline{y}^h_f > \underline{y}^h_c > \underline{y}^h_m$ and $\underline{y}^w_f < \underline{y}^w_c < \underline{y}^w_m$. Furthermore, if the wife (husband) is initially in a weaker bargaining position, then $\underline{y}^w_c > \underline{y}^w_0$ and $\underline{y}^h_c < \underline{y}^h_0$ ($\underline{y}^w_c < \underline{y}^w_0$ and $\underline{y}^h_c > \underline{y}^h_0$)*

(ii) If the divorce option is binding for spouse i both before and after a loan has been invested, then $\underline{y}^j_f = \underline{y}^j_c = \underline{y}^j_m$ for $j \neq i$. Spouse i will be indifferent between participation and non-participation.

According to Proposition 3.2, if the divorce option constraints do not bind, then the minimum increase in total household income for which one would be willing to participate in the credit programme is smallest in the case that the loan will be invested in his or

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[30]Formally, $\underline{y}^i (y_0, \lambda_0)$ is given, implicitly, by the equation

$$\sum_{t=1}^{n} (\delta_i)^{t-1} V^i (\underline{y}^i - z, \lambda_0) + \sum_{t=n+1}^{\infty} (\delta_i)^{t-1} V^i (\underline{y}^i, \lambda_0) = \sum_{t=1}^{\infty} (\delta_i)^{t-1} V^i (y_0, \lambda_0)$$

her own autonomous activity, followed by an investment in the cooperative activity, and largest in the case of an investment in the autonomous activity of the other spouse.

To abstract away from differences in the participation choice that arise from different intertemporal preferences, we can assume that $\underline{y}_0^h \approx \underline{y}_0^w$ (i.e. if taking up the loan had no impact on bargaining power within the household, the gain in income above which one would be willing to take the loan is the same for both spouses). Then, it follows from Proposition 3.2 that if, say, the wife is initially in a weaker bargaining position, then

$$\underline{y}_f^w < \underline{y}_c^w < \underline{y}_0^w \approx \underline{y}_0^h < \underline{y}_c^h < \underline{y}_f^h$$

Thus, we obtain $\left[\underline{y}_c^w, \underline{y}_c^h\right] \subset \left[\underline{y}_f^w, \underline{y}_f^h\right]$; which means that the range of income values over which the spouses disagree on the participation decision is smaller in the case of an investment in a cooperative activity compared to that of an investment in the female activity. Of course the same sort of reasoning would apply if the husband is initially in a weaker bargaining position.

If the divorce option is a binding constraint for one spouse both before and after the use of a loan, then she is indifferent between participating and not participating in the loan programme as she receives exactly the level of welfare she will obtain from exiting the marriage in both cases. Her partner, on the other hand, effectively enjoys all the income gains from the investment, and therefore he would wish to participate in the credit programme as long as there is scope for making a profitable investment within the household: he is indifferent about whether the loan would be used in joint production, or in the autonomous activity of either spouse.

3.2. Impact of a Credit Programme on Decision-Making Authority and Welfare within the Household. Given a household's decision whether or not to participate in a loan programme when they are given access to it, and its choice of investment, Propositions 2.1 and 2.2 can be applied directly to determine the impact of the programme on decision-making authority and welfare levels within the household *after* the loan has been fully repaid.

Strictly speaking, a credit programme will affect income opportunities both within the marriage and from exit while Propositions 2.1 and 2.2 only consider changes in one or the other. However, note that the nature of the solution to the bargaining problem in (5) is such that only one type of outside option – exit or non-cooperaton – will impact

upon the bargaining outcome at any one time, never both. This means, in particular, that if non-cooperation provides the relevant threat points following the introduction of the programme, then whether the exit options have changed at all do not matter for determining the relative bargaining powers and welfare levels within the household. If exit provides the relevant threat points, then whether or not the non-cooperative threat points have shifted do not matter for determining welfare levels. However, in this case the impact on relative bargaining powers within the household is ambiguous as it also depends on how the programme affects aggregate household income. Therefore we are unable to make clear predictions in this regard.

With this caveat in mind, we can observe that if the divorce option is not a credible threat for either spouse in the bargaining process both ex-ante and ex-post, then, using Proposition 2.1, (i) a loan which is taken and invested in a cooperative activity will lead to more egalitarian decision-making within the household, and shared gains in welfare; (ii) a loan which is invested in an autonomous activity can lead to a shift in decision-making authority within the household, and potentially improved welfare for one spouse at the expense of the other.

Using Proposition 2.2, we observe that if the divorce option is a credible threat for one of the spouses ex-ante and the credit programme does not significantly affect exit options, then he or she would experience no gain in welfare and a *weakening* of decision-making authority, from participating in a programme that provides relatively small loans. Access to credit may affect intra-household allocation even for households that do not participate in the programme but only if the introduction of the programme substantially improves exit options, or the divorce option is initially a credible threat for one of the spouses.

Having determined how particular participation and investment decisions would affect welfare levels and relative bargaining powers within the household, we now turn our attention to decisions made by the household in the presence of a credit programme under different initial conditions. Although Propositions 3.1 and 3.2 do not cover all situations that are theoretically possible, they do allow us to make clear predictions regarding participation and investment choice in a number of cases that are potentially important in the context of microcredit and gender empowerment. We discuss two broad cases below:

Case A: If the divorce threat is a binding constraint for one of the spouses and the size of the loan is small, then it is plausible that the constraint would continue to bind after the loan is taken. In this case, the spouse in question is indifferent between participating and

not participating in the credit programme (Proposition 3.2(ii)), and indifferent between the investment alternatives once the loan has been taken (Proposition 3.1(ii)). Her partner reaps all the gains (or losses) from any financial decision, and therefore prefers the efficient participation and investment choices (Proposition 3.2(i) and 3.1(i)). Then, assuming that when one spouse is indifferent, the preference of the other spouse determines the collective choice, the household makes the efficient participation and investment decisions. As per the discussion at the beginning of this section, once the loan has been fully repaid, only one of the spouses experiences a gain in welfare from access to credit, and bargaining power within the household shifts in favour of this spouse.

Case B: If there is at least one investment choice for which the divorce option is not a binding constraint for either spouse, the preferences of the household members regarding participation in the credit programme, and investment of the loan, are potentially in conflict. Then it is possible that the household would make an inefficient choice (i.e. there is another participation or investment choice, and an allocation of resources, for which both spouses would have been better off), and/or the household's choices would actually lead to a decline in welfare for one of its members.

In particular, if the participation decision is made unilaterally by one spouse (i.e. $P(P^h, P^w) = P^h$ or $P(P^h, P^w) = P^w$), then it is possible that the household would take up the loan even if it leads to a decline in welfare for the other spouse. Proposition 3.2(i), and the subsequent discussion, illustrates how such an outcome is more likely if the household's optimal investment choice lies in the autonomous sphere of either spouse, rather than the cooperative sphere.

Furthermore, if the investment decision is made unilaterally by one spouse (i.e. $I(I^h, I^w) = I^h$ or $P(I^h, I^w) = I^w$), then he or she may opt for an inefficient investment for the sake of retaining or improving his or her bargaining power (Proposition 3.1(iii)). Using Proposition 2.1, we can argue that an investment in a joint activity leads to a smaller shift in bargaining powers within the household than an investment in the autonomous sphere of either spouse that has the same impact on aggregate household income.[31] Therefore, the spouse who makes the investment choice unilaterally is less likely to appropriate the loan for an ineffcient use if the efficient investment lies in the cooperative sphere, rather than the autonomous sphere of the other spouse.

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[31] As noted in the discussion following Proposition 2.1, the necessary condition is that the 'threat-point effect' of an investment favours the spouse whose activity benefits from the investment.

Morever, as per the discussion at the beginning of this section, an eventual investment in the cooperative sphere would improve the welfare level for both spouses and cause decision-making authority within the houshold to become more egalitarian (Proposition 2.1(i)); while an investment in the autonomous sphere of either spouse *can* cause relative bargaining positions within the household to become more unequal, and lead to a decline in welfare for one of the spouses.

In the context of microcredit targeted at women, the preceding discussion suggests that a husband who has final say in financial matters is less likely to refuse a microloan (which would have enabled the wife to improve her welfare or bargaining position within the household), or put the loan to an inefficient use, if the efficient investment choice lies in the cooperative sphere.

Recall also from the discussion in Section 2.3 that as the share of public goods in the household budget increases, the 'threat-point' effect becomes more muted, and each spouse has less to fear, in terms of a loss of bargaining.power, from an investment in the autonomous activity of the other spouse. Therefore, the risk of an inefficient investment or an inefficient choice relating to programme participation is less likely when a large share of the household budget is spent on household public goods.

We briefly touch upon a number of other possibilities not covered in Case A or B above. If the participation decision is consensus-based (i.e. $P\left(P^h, P^w\right) = Y$ if $P^h = P^w = Y$ and $P\left(P^h, P^w\right)$, then the loan is taken up only if the subsequent investment leads to a Pareto-improvement. If the investment decision allows for compromise when the spouses have conflicting preferences (i.e. $I\left(I^h, I^w\right) = s$ if $I^h \neq I^w$, and s is second choice for both spouses), then it is possible that they would collectively choose to invest in the cooperative activity when each prefers an investment in his or her own activity.

3.3. **Repeated Loans.** If a household has access to repeated loans, then any decision made regarding a loan today can potentially affect the fall-back options of household members, and therefore have consequences for loan take-up and loan use decisions in the future. In order words, when making choices regarding a loan today, household members may also take into account the impact of these choices for their decision-making authority regarding future loans. We do not provide a formal analysis of this issue in this paper because, in the model, there is no formal relation between the variable λ, which measures decision-making authority with regard to household expenditures, and

the functions $P(.)$ and $I(.)$ which represent various possibilities for how participation and investment decisions are made.[32]

However, we provide an insight based on intuition about how the possibility of future loans would impact upon the strategic choices of the husband and the wife today: The availability of future loans provides an additional reason for a household member to be concerned about his or her future bargaining power; this is irrespective of whether or not one would wish to take up a loan in the future, but depends on the condition that the spouses are potentially in conflict about these future loan-related choices. Consequently, a household member would be more willing to waste resources today – e.g. by making an inefficient investment – to be able to protect his decision-making authority for the future. In this sense, the possibility of future loans – to the extent that spouses may be in conflict regarding the take-up and use of these loans – would make them more protective of their existing bargaining power when making any strategic choices.

3.4. **Heterogenous Impact of Credit Programmes across Households.** The stylised framework of the household economy we have developed can account for a variety of outcomes described in ethnographic studies regarding household responses to credit programmes. In particular, the theoretical results developed in the preceding sections allow us to distinguish between different types of intra-household relations and predict, in each case, what would be the impact of a microcredit programme that targets women. We shall use the wide array of intra-household relations documented in Naila Kabeer's (1998, 2001) study of women participating in the SEDP credit programme in the Bangladesh to illustrate the model's predictions.

The parameters of the model provide a large set of possible initial conditions for the household. Before considering the ethnographic study, we compute numerical solutions for a range of values of the productivity parameters γ_m, γ_f and γ_c to illustrate the scope of heterogeneous impacts within the model.

Numerical Solutions: Specifically, we fix $\gamma_m = 4$ and allow γ_f to vary between 1 and 8, and γ_c between 2 and 16. We assume that, initially, the household owns 4 units of capital specific to the male activity, and 2 units of capital in each of the other two (female and joint) activities. We consider a loan size equivalent to 2 units of capital, which

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[32]Basu (2006) proposes an innovative approach to determine the equilibrium decision in such a situation. We do not adopt the same approach here as Basu abstracts away from modelling the bargaining process, which is a key element in the analytical framework presented above.

requires repayment in 12 equal installments, each worth 0.2 units of capital. The loan must be invested in a single activity. The time discount rate for the period between each installment is assumed to be 0.9 for both spouses.

We model non-cooperation according to the 'separate spheres model', developed by Lundberg and Pollak (1993): there are two household public goods, one in the 'sphere' of each spouse, and, under non-cooperation, one is able to provide only for the public good that lies in one's own sphere. Utility is assumed to take the same logarithmic form for both spouses, with a coefficient of 0.3 for the private good, and a coefficient of 0.35 for each of the household public goods (therefore, each spouse would prefer to spend 60% of the total budget on his or her private good, and 35% of the budget on each of the household public goods). We allow for spouses to make transfers to each other under non-cooperation.

If the marriage breaks down, it is assumed that the male spouse would have access to 6 units of capital, and the female spouse access to 4 units of capital (including any assets they may obtain using credit). Both will be able to carry on their autonomous activities, with their level of skill given by $\gamma = 4$.

Figure 1 indicates, for each spouse, the preferred investment choice, or the preference not to participate in the loan programme, for different $\boldsymbol{\gamma}$ values. The striking feature about the figure is that, when their joint productivity in the cooperative activity is low, the spouses are rarely in agreement about how to invest the loan. Unless one spouse is much more skilled than the other, each prefers to make use of the loan herself. In particular, it is evident that if the husband has final say over the choice of investment, then the loan would rarely be employed in the female activity, even if the wife has strong skills in this activity. This is in spite of the fact that the spouses are able to make transfers to each other under non-cooperation and a significant share of the household budget is spent on public goods (which means that any income gains by one spouse leads to spillovers on the welfare of the other).

If the household's productivity in the joint activity is high, the husband opts to invest in this activity; as previously discussed, this leads to a more egalitarian allocation of resources (since the wife is initially in a weaker bargaining position), and an improvement in welfare for both spouses. Indeed, if the husband has final say in how the loan is to be used, the wife's bargaining position improves only if the couple is sufficiently productive in the joint activity compared to the male activity (except in the sole case where the wife is twice as productive as the husband, and γ_c takes an intermediate value).

It is also evident from Figure 1 that the loan may be invested in the female activity when γ_f is relatively high, and the wife has final say in the investment choice. But we would argue that, in terms of the empowering potential of microfinance, this case is less interesting: if the wife can opt to invest the loan in her own activity even though the husband would prefer otherwise, it must be that she is, in some sense, already empowered in terms of decision-making authority within the household.

For all the parameter values considered above, both spouses are better off, or at least no worse off, from participating in the loan programme. To explore further issues around participation, we consider a different case where the household has a larger asset base (and therefore lower returns to capital) and is offered a smaller loan at a higher interest rate. The preferences of the two spouses regarding participation and investment choice for different γ values are represented in Figure 2 (the exact parameter values are provided in the figure). A significant feature in the diagram is that for a large range of γ-values, the wife would wish to participate in the credit programme and invest the loan in her own activity; however the husband would prefer not to participate in the programme at all for fear of weakening his bargaining positon. Interestingly, as γ_f increases, i.e. the wife becomes more productive in her activity, the husband's preference switches from 'no participation' to investing the loan in his *own* activity. It is evident that the rationale for his preference is to protect/strengthen his bargaining position, since making use of the loan himself is even more inefficient when γ_f is high. If the wife is twice as productive in her autonomous activity as the husband is in his own, he finally agrees to have the loan used by her.

Figure 3 represents a household where both spouses have a much stronger preference for household public goods compared to private goods. The remaining parameter values are the same as for the household depicted in figure 1. The greater emphasis placed on household public goods by household members means that an expansion of the autonomous sphere of one spouse also improves the non-cooperative welfare level of the other spouse. Therefore, such interventions lead to a much smaller shift in decision-making authority than in the case of the household depicted in figure 1. As a result, both spouses are more willing to have the loan invested in the autonomous activity of their partner when the latter is highly skilled in this activity. In particular, the husband is more likely to accept an investment in the female autonomous sphere.

We also note that if the husband has a weaker preference for household public goods, compared to the parameter values used in Figure 1, and γ_f and γ_c are relatively low, then the wife is indifferent between any of the three investment alternatives and not taking out a loan (results not shown). The reason is that the husband makes zero transfers under non-cooperation, and thus her non-cooperative threat point is relatively weak. Therefore, her divorce threat is a binding constraint before participation and continues to bind for any choice of investment since the size of the loan is relatively small. As previously discussed, the husband would opt for the efficient participation and investment decisions in such a situation.

Illustration with an ethnographic study: The different combinations of productivity levels in the three types of household activities can be mapped to the various cases of intra-household relations documented by Kabeer (2001).

First, consider a household for which γ_c is very small relative to γ_m and γ_f. Then, in equilibrium, each spouse allocates all of his or her labour to her autonomous sphere, and consumes the income generated in this sphere. No bargaining takes place within the household as there is no surplus to bargain over. These parameter values can represent an extremely conflictual relation within the household, where there is no scope for the spouses to cooperate in a joint activity. Kabeer (2001), in providing a characterisation of women borrowers in a microcredit programme in Bangladesh, refers to such a situation as one of "divorce within marriage", wherein women were able to use their loans "to create a parallel economy for themselves which gave them considerable financial independence from their husbands" (Kabeer 2001, p.74). In terms of the model, if the availability of credit enables the woman to obtain a loan and invest it in her own autonomous activity, then the gains will necessarily accrue to her. As her husband receives only the income from his own activity, his welfare will be unaffected. Thus, we have an example where the woman's access to credit has a direct, unambiguously positive impact on her welfare.

Second, consider a household where γ_f is small relative to γ_c and γ_m. In this case, the woman has few options to provide for herself if cooperation breaks down in the household. As her non-cooperative threat-point is weak, the man may be able to extract all the surplus above her utility from exit. In this situation, the availability of credit will not improve the woman's welfare, in whichever activity the loan may be used. As previously discussd, all income gains from a (small) increase in the household's productive assets will accrue to the man and, indeed, there will be a strengthening in his bargaining position. Kabeer

(1998) provides a number of examples of women borrowers whose situation corresponded well with this outcome. Although the household relied on them for access to credit and, in some instances, they made substantial labour contributions to the loan-related activity, they had no control over - and sometimes little knowledge of - the income generated using their loans.

Third, consider a household where γ_c is high relative to both γ_m and γ_f. This means that both spouses provide valuable inputs in a cooperative activity. This may be a female enterprise in which the man provides essential inputs like marketing or a male enterprise where the woman's input is highly valued. Kabeer (1998, 2001), provides a number of accounts of marriages that can be placed in one or the other of these categories. If the household has a high level of skill in the cooperative activity, compared to the autonomous activities, then, the numerical simulations presented above suggest that both spouses would prefer to invest the loan in joint productivity. In Kabeer's interviews, the women involved in such joint activities (in some cases, 'joint' simply because the woman was the conduit for an essential input, namely credit) indicated that they played an important role in deciding how the profits generated using the loan activity would be used. In this sense, they had experienced an increase in welfare as a result of their access to credit. In terms of the model, if the most productive use of new capital is in the cooperative sphere, then the availability of a credit programme will lead to an increase in income generated in the cooperative sphere. Then, as previously discussed, the allocation of household income between the spouses will shift in favour of the more disempowered spouse.

Lastly, consider a household where a microcredit loan would enable a woman to expand her autonomous sphere, and her activity provides the most efficient means for using the loan within the household. However, as previously discussed, if her husband has an alternative means of using capital that retains his bargaining position without sacrificing too much income, he has an incentive to appropriate the loan. In this case, the likely end result of the credit programme would be to weaken the woman's bargaining position within the household (though her welfare may still improve). It would be difficult to identify instances of such appropriation in empirical studies since it requires being able to distinguish between efficient use of a loan in a male activity and strategic appropriation of the loan by a man to retain his bargaining position. Nevertheless, the man's strategic incentive to appropriate the loan identified in the model may account partly for the large fraction of loans given to women through microfinance programmes being invested in male-dominated activities, as noted earlier.

The numerical solutions and the four scenarios discussed above indicates that the scope of strengthening a woman's bargaining position within the household by providing her access to credit is limited; since her husband has the incentive to appropriate the loan for his own use or veto participation in the loan programme precisely in situations where permitting her to use the loan would lead to a significant shift in bargaining power within the household. For the desired outcome to materialise, it must be that not only is the woman able to invest new capital profitably in an autonomous activity, but also that her husband has no alternative activity in which the same capital would generate comparable returns (since, according to Proposition 3.1(iii), if the loss in household income from appropriating a loan is small, then the husband has strong incentives to do so). While it is true that in a highly conflictual relationship the availability of credit can improve her welfare, it does not, strictly speaking, enable her to strengthen her bargaining position since there is no marriage surplus to bargain over.

We note also that for highly disempowered women, credit interventions will not have any impact on her welfare as all income gains will accrue to the husband. The two cases in which it is most likely that the availability of credit would enable the woman to strengthen her bargaining position within the household are (i) when capital can be invested in a cooperative activity to which both spouses contribute in an important way, and (ii) when a large share of the household budget is devoted to expenditures on household public goods.

4. Conclusion

Our aim in this paper was to provide a critical perspective on the theory underlying gender targeting in microcredit programmes and its possible effect on intra-household relations. In the literature, this issue is often regarded as being closely related to the question of whether women with greater autonomous control over assets and income within the household have greater say in household decisions, while, in policy discussions, empirical findings on the latter question often serve to motivate or justify targeting women for microcredit.

To investigate how providing a household access to credit affects the allocation of resources and intra-household decision-making, we developed a simple theoretical framework distinguishing between three alternatives facing individuals within the household - exit, autonomy and cooperation - and the type of production possible under each alternative.

Unlike most of the literature on the theory of intra-household allocation, we explicitly model the process of bargaining within the household to examine how the possibility of exit or autonomy affects the decision-making process.

Even this simple framework reveals a wide range of possible outcomes for households provided with access to new credit. For example, depending on the initial balance of power in the household and the potential of each household member to undertake or participate in an entrepreneurial activity, the introduction of a credit programme may lead to (i) greater cooperation in household production, and a more egalitarian intra-household allocation of resources; (ii) greater autonomy of the woman in productive activities; (iii) appropriation of all additional income generated with the loan by the husband with no change in welfare for the woman; and (iv) strategic appropriation of the loan – or strategic veto of programme participation – by the husband to preserve his bargaining power. The theory can account for the heterogeneity of outcomes across households revealed through careful micro-level studies of micocredit programmes, such as Naila Kabeer's (1998, 2001) work on the impact of the SEDP credit programme in Bangladesh.

Our model demonstrates that the introduction of a microcredit programme is likely to have heterogeneous impacts and also adverse effects on the bargaining power of some women. Important sources of the heterogeneity in programme impact include attitudes of husbands and wives regarding gender norms, the scope for women's autonomy in the community, as well as pre-intervention levels of relative bargaining power in the household. Our theoretical results point to the importance of paying closer attention to the distribution of the gains and losses from the intervention.[33] To our knowledge, only one impact study has attempted to consider the initial bargaining power of female participants prior to the introduction of a microfinance programme. Ashraf et al. (2008) analyse the impact on access to a savings product on women's decision-making power and find that the positive mean impact was largely driven by initially less-empowered women, while more empowered women did not experience any significant effect.[34]-[35]

Most importantly, the theory underlines the fact that gender targeting in microcredit is not equivalent to providing women with greater autonomous control over new resources.

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[33]This is a point made more broadly by Heckman (2005) regarding the evaluation of economic policies in general and is particularly important to inform policy-making in developing countries. See Ravallion (2008) for the latter point.

[34]More or less empowered women refer to women above or below the baseline median of their measure of bargaining power respectively.

[35]Note that Karlan (2007) find no impact from access to credit on household decision-making.

This is because women are placed in situations of unequal interdependence within the family and have thus little scope to develop purely autonomous activities. Moreover, strategic preemptive behaviour by male spouses further restricts women's ability to allocate new loans to their autonomous activities. We show that women may be able to invest in their own independent activities only under a limited set of circumstances: for instance, in very conflictual households, in households where the woman is already empowered or highly skilled in her own activity, or when the husband and wife both care sufficiently about household public goods.

Depending on the socio-cultural context, greater individual control over resources may not be feasible without changes in the underlying structure of gender relations. In the impoverished settings in which microfinance projects operate, kinship ties and marriage play an important role in providing individuals with legitimate claims over household and community resources, together with vital access to an insurance network in times of crisis. Hence, cooperation and jointness of decision-making may be more desirable for women than autonomous control over resources. In the words of Kabeer (1998, p.83)

> As long as the family, and male guardianship remains women's greatest source of economic and social security, women's interests are likely to be better served by equalising the terms of interdependence within the family rather than seeking to establish their autonomy. The mitigation of their dependent status within the family so that the perceived 'jointness' of family welfare and interests is more equally shared by other members is one means by which this is achieved. In this context, [...] the notion of 'centrality' [...] does seem to better capture the processes described by the women loanees of moving from marginalisation within household decision-making and exclusion within the community to positions of greater centrality, inclusion and 'voice'.

Holding this perspective has important implications regarding our understanding of the empowering potential of microfinance programmes. If the new economic opportunities lie outside the traditional realm of the female spouse and exit options for women are severely limited, then she may be better off ignoring it to preserve her social ties within the community. Thus, the empowering potential of microfinance is necessarily circumscribed by prevailing gender norms, unless alternatives are offered to women that strengthen their outside options in a credible manner. The magnitude of this latter effort should not be

underestimated. Changing women's outside options requires special efforts and strong political will, as evidenced by the history of women's emancipation in Europe and in developing countries alike.[36]

In addition, because of the possibility of strategic preemptive behaviour on the part of the male spouse, an intervention that requires the cooperation of both spouses or ensures that male spouses also benefit (or do not lose) from it, may be more successful at achieving wider social impacts than interventions that focus on women's autonomous spheres only. However, the difficulty in designing policies that engender cooperation within the household should not be underestimated. Providing incentives for cooperation between spouses[37] can also be fraught with problems and may have unintended consequences, as evidenced by a study on pastoral women in Northern Kenya (Doss and McPeak 2005).[38]

A final point worth emphasizing is that, although women may not retain control over their loans during the productive process, loss of control should not necessarily be equated with loss of bargaining power. Instead, as evident from the formal theory on bargaining, the relative bargaining strengths within a couple depend on how much each spouse brings to the productive process in a cooperative agreement; the impact of a microcredit programme

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[36]In their study of women's participation in economic activities outside of the household in developing countries, Morrisson and Jutting (2005) conclude: "In sum, if social institutions in developing countries discriminate against women, policy measures aiming to improve their situation via improved access to education and health will have only a limited impact. [...] If custom forbids outside work for women, the enrollment rate of girls in primary schools can double without entailing an increase in female participation in the labor market. If custom goes against accepting that women can be in a position to exercise authority, the enrollment rate in universities can double without increasing the number of women managers. These examples show that to increase the effectiveness of country and donor policies, measures to address the institutional framework have to be undertaken" (pp. 1066, 1078). At the same time, overcoming these social institutional constraints is not easy, as highlighted by Pezzini (2005)'s study of twelve European countries, which shows that abortion rights and the pill did have significant effects on women's welfare, but that other women's rights (e.g. mutual consent divorce laws and high maternity protection on the job) were less effective or even counter-productive.

[37]Armendariz de Aghion and Roome (2008) recently conducted an experiment in Mexico, which consisted in allowing women to invite their husbands to join a Self-Help Group under different scenarios. Results from this experiment are still pending.

[38]The women in question required the cooperation of their husbands to market dairy milk in response to new market opportunities. However, Doss and McPeak (2005) find that instead of cooperating with their wives, men made migration decisions that limited their wives' ability to market milk. Note that Doss and McPeak (2005) are careful not to argue that non-cooperation between spouses over milk marketing and migration decisions will automatically have a negative impact of household welfare. Similarly, it is not obvious that women's milk marketing plans will have positive welfare effects. The welfare impacts of non-cooperation (or contestation to use Doss and McPeak's expression) within the household need to be made explicit and further explored empirically. See also Lundberg and Pollak (2003), who provide a theoretical discussion of such strategic decisions within the household.

depends on how the introduction of new capital reshapes household production, and draws upon the skills and inputs of the two spouses. This result casts a new light on complementary interventions such as entrepreneurship or business training programmes, to the extent that they succeed in increasing the value of a woman's contribution to a cooperative activity in her household.

5. Appendix

Proof. of Proposition 2.1: (i)(a) By definition, the 'income effect' equals

$$
(10) \qquad \frac{y_v \left(V_y^h - \lambda V_y^w \right)}{V^w - \tilde{V}^w + \lambda V_\lambda^w - V_\lambda^h}
$$

By construction, each spouse receives more than the level of utility from non-cooperation in the solution to the bargaining problem if there are potential gains from cooperation. Therefore, $V^w > \tilde{V}^w$. Furthermore, we have

$$
\begin{aligned}
\lambda V_\lambda^w - V_\lambda^h &= \lambda \sum_l U_l^w \frac{\partial x_l}{\partial \lambda} - \sum_l U_l^h \frac{\partial x_l}{\partial \lambda} \\
&= \sum_l \left(\lambda U_l^w - U_l^h \right) \frac{\partial x_l}{\partial \lambda}
\end{aligned}
$$

From the first-order conditions to the solution to (4), $\lambda U_l^w - U_l^h = 0$ for $l = 1, .., L$. Therefore $\lambda V_\lambda^w - V_\lambda^h = 0$. Therefore, the denominator in (10) is positive. Moreover, $y_v > 0$ for $v = k_m, \gamma_m, k_c, \gamma_c, k_f$, or γ_f (where $y_v = \frac{\partial y}{\partial v}$). Therefore, it remains for us to sign the term $V_y^h - \lambda V_y^w$. For a CES utility function of the form

$$
U^i \left(\mathbf{x} \right) = \sum_l \alpha_l^i \left(x_l \right)^\rho
$$

we can rewrite (4) as

$$
(11) \qquad \mathbf{x} \left(y, \lambda \right) = \arg \max_{\mathbf{p} \cdot \mathbf{x} \le y} \sum_l \left(\alpha_l^h + \lambda \alpha_l^w \right) \left(x_l \right)^\rho
$$

From the first-order condition to (11), we obtain

$$
\rho \left(\alpha_l^h + \lambda \alpha_l^w \right) \left(x_l \right)^{\rho - 1} = p_l \tau
$$

for each l.

Hence,

$$
\frac{\alpha_k^h + \lambda \alpha_k^w}{\alpha_m^h + \lambda \alpha_m^w} \left(\frac{x_k}{x_m} \right)^{\rho - 1} = \frac{p_k}{p_m}
$$

for $k, m \in \{1, .., L\}$

$$\text{or } \left(\frac{x_k}{x_m}\right)^{\rho-1} = \frac{p_k}{p_l} \frac{\alpha_m^h + \lambda \alpha_m^w}{\alpha_k^h + \lambda \alpha_k^w}$$

$$\implies x_k = x_m \left(\frac{p_k}{p_m} \frac{\alpha_m^h + \lambda \alpha_m^w}{\alpha_k^h + \lambda \alpha_k^w}\right)^{\frac{1}{\rho-1}}$$

Using the budget condition,

$$\sum p_l x_l = y$$

Therefore,

$$x_m \sum p_l \left(\frac{p_k}{p_m} \frac{\alpha_m^h + \lambda \alpha_m^w}{\alpha_l^h + \lambda \alpha_l^w}\right)^{\frac{1}{\rho-1}} = y$$

$$\implies x_m = y / \sum p_l \left(\frac{p_k}{p_m} \frac{\alpha_m^h + \lambda \alpha_m^w}{\alpha_l^h + \lambda \alpha_l^w}\right)^{\frac{1}{\rho-1}}$$

$$\implies x_m = y \left(\frac{p_m}{\alpha_m^h + \lambda \alpha_m^w}\right)^{\frac{1}{\rho-1}} / \sum p_l \left(\frac{p_l}{\alpha_l^h + \lambda \alpha_l^w}\right)^{\frac{1}{\rho-1}}$$

Moreover, $\frac{\partial x_m}{\partial y} = \left(\frac{p_m}{\alpha_m^h + \lambda \alpha_m^w}\right)^{\frac{1}{\rho-1}} / \sum p_l \left(\frac{p_l}{\alpha_l^h + \lambda \alpha_l^w}\right)^{\frac{1}{\rho-1}} = \frac{x_m}{y}$. We wish to compute $V_y^i = \sum_l U_l^i \frac{\partial x_l}{\partial y}$. First, note that $U_l^i = \rho \alpha_l^i (x_l)^{\rho-1}$. Therefore, $U_l^i \frac{\partial x_l}{\partial y} = \rho \alpha_l^i \frac{(x_l)^\rho}{y}$

Therefore,

$$\sum_l U_l^i \frac{\partial x_l}{\partial y} = \frac{\rho}{y} \sum_l \alpha_l^i (x_l)^\rho = \frac{\rho}{y} U^i (\mathbf{x})$$

Therefore,

(12) $$V_y^h - \lambda V_y^w = \frac{\rho}{y} \left[U^h (\mathbf{x}) - \lambda U^w (\mathbf{x})\right]$$

At $\lambda = \lambda_e$, we have, by definition, $V_y^h - \lambda V_y^w = 0$. Therefore $U^h (\mathbf{x}) - \lambda U^w (\mathbf{x}) = 0$. Therefore, for $\lambda > \lambda_e$, we have $U^h (\mathbf{x}) - \lambda U^w (\mathbf{x}) < 0$. Therefore $V_y^h - \lambda V_y^w < 0$. For $\lambda < \lambda_e$, we have $V_y^h - \lambda V_y^w > 0$. Hence, from (12), $\lambda \lesseqgtr \lambda_e \implies V_y^h - \lambda V_y^w \gtreqless 0$.

Therefore, the 'income effect' is smaller than, equal to, or greater than zero depending on whether the initial value of λ is greater than, equal to, or smaller than λ_e.

We prove by contradiction that the 'income effect' improves welfare for both spouses: suppose an intervention leads to an increase in household income from y_0 to y_1, and has no effect on the non-cooperative threat points of either spouse. Suppose that the utility level of the husband declines or remains unchanged as a result of this intervention. Let λ_0 and λ_1 be the values of the wife's Pareto weight in the solution to the bargaining problem

before and after the intervention. By assumption, $V^h(y_1, \lambda_1) < V^h(y_0, \lambda_0)$. Therefore, $\lambda_1 > \lambda_0$. Hence, $V^w(y_1, \lambda_1) > V^w(y_0, \lambda_0)$. Then, using equation (6), we obtain

$$
\begin{aligned}
\lambda_0 &= \frac{V^h(y_0, \lambda_0) - \tilde{V}^h(y_a^h, y_a^w)}{V^w(y_0, \lambda_0) - \tilde{V}^w(y_a^h, y_a^w)} \\
&> \frac{V^h(y_1, \lambda_1) - \tilde{V}^h(y_a^h, y_a^w)}{V^w(y_1, \lambda_1) - \tilde{V}^w(y_a^h, y_a^w)} \\
&= \lambda_1
\end{aligned}
$$

which contradicts the previous deduction. Therefore, the utility level of the husband must improve following an increase in household income. Using the same reasoning, we can show that the utility level of the wife must improve following an increase in household income.

(i)(b) By definition, the 'threat-point effect' equals

(13)
$$
\frac{-\tilde{y}_v^h\left(\tilde{V}_h^h - \lambda \tilde{V}_h^w\right) + \tilde{y}_v^w\left(\lambda \hat{V}_w^w - \tilde{V}_w^h\right)}{V^w - \tilde{V}^w + \lambda V_\lambda^w - V_\lambda^h}
$$

We have shown, in part (i)(a), that the denominator in (13) is positive. In the case of an intervention in the male sphere of activity, $\tilde{y}_v^h > 0$ and $\tilde{y}_v^w = 0$. Therefore, the threat-point effect is positive, i.e. causes λ to increase, if and only if $\tilde{y}_v^h\left(\tilde{V}_h^h - \lambda \tilde{V}_h^w\right) < 0$.

In the case of an intervention in the female sphere of activity, $\tilde{y}_v^h = 0$ and $\tilde{y}_v^w > 0$. Therefore, the threat-point effect is positive, i.e. causes λ to increase, if and only if $\tilde{y}_v^w\left(\lambda \tilde{V}_w^w - \tilde{V}_w^h\right) > 0$.

In the case of an intervention in the cooperative activity, $\tilde{y}_v^h = 0$ and $\tilde{y}_v^w = 0$. Therefore, the threat-point effect equals zero.

(ii) If the constraints imposed by the divorce threat points do not bind, the value of λ is determined by (6). Therefore, a small enough increase in y_e^h or y_e^w would have no impact on λ or on $V^h(y, \lambda)$ and $V^w(y, \lambda)$. If the increase in y_e^i is sufficiently large, we have $V^i(y, \lambda') < \hat{V}^i(y_e^i)$ where λ' is defined implicitly by (6). Therefore, the constraint for person i will begin to bind, and the solution will be given, implicitly, by $V^i(y, \lambda^*) = \hat{V}^i(y_e^i)$. Therefore, $\lambda^* > \lambda'$ for $i = w$ and $\lambda^* < \lambda'$ for $i = h$. Therefore, $V^i(y, \lambda^*) > V^i(y, \lambda')$ and $V^j(y, \lambda^*) < V^j(y, \lambda')$ for $j \neq i$.   □

Proof. of Proposition 2.2: (i) & (ii) Suppose the divorce threat constraint is binding for the female spouse. Then we have

$$(14) \qquad\qquad V^w(y, \lambda) = \hat{V}^w(y_e^w)$$

An increase in $k_m, \gamma_m, k_f, \gamma_f, k_c$ or γ_c would lead to an increase in y according to (1). If the constraint continues to bind following such an increase, then λ must decrease in order to satisfy (14). On the other hand, the wife's level of utility will remain at $\hat{V}^w(y_e^w)$. If the wife's constraint becomes slack then her level of welfare must improve (weakly): $V^w(y, \lambda) \geq \hat{V}^w(y_e^w)$. According to Proposition 2.1, if the divorce threat constraint is slack for both spouses, then changes in any of the parameters $k_m, \gamma_m, k_f, \gamma_f, k_c$ or γ_c can lead to an *increase* in λ. Therefore, if the wife's constraint is initially binding but slack following the intervention, the net impact on λ is ambiguous. The same reasoning would apply if the husband's divorce threat constraint is initially binding.

(iii) An increase in y_e^w affects only the right-hand side of the divorce threat constraint. Therefore, the constraint will continue to bind following such an increase. Since y is unchanged, λ must increase in order to satisfy (14). Since the constraint was initially binding for the wife and her utility from exit has improved, so must her level of utility from the cooperative agreement. Since the husband's divorce threat constraint is initially slack, the solution to (5) for the initial parameter values will continue to satisfy both constraints for a small enough increase in y_e^h. For a sufficiently large increase in y_e^h, the initial solution will violate the husband's constraint. As the wife's constraint binds in this solution, and the allocation of resources within the household is, by construction, efficient, there is no other possible allocation that would satisfy the constraints for both spouses. Therefore, both spouses are better off from leaving the marriage. $\qquad\square$

Proof. of Proposition 3.1: (i) If the divorce threat constraint binds for spouse i for investment choice s, we have

$$\sum_{t=1}^{n}(\delta_i)^{t-1}V^i\left(y(\mathbf{k}_1, \boldsymbol{\gamma}) - z, \hat{\lambda}(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L})\right) + \sum_{t=n+1}^{\infty}(\delta_i)^{t-1}V^i\left(y(\mathbf{k}_1, \boldsymbol{\gamma}), \lambda(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e)\right)$$

$$= \sum_{t=1}^{\infty}(\delta_i)^{t-1}E\hat{V}^i(\hat{y}_e^i) \quad \text{where } \mathbf{k}_1 = \mathbf{k} + e_s L$$

$$(15)$$
$$\implies (1 - (\delta_i)^n)V^i\left(y(\mathbf{k}_1, \boldsymbol{\gamma}) - z, \hat{\lambda}(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L})\right) = E\hat{V}^i(\hat{y}_e^i) - (\delta_i)^n V^i\left(y(\mathbf{k}_1, \boldsymbol{\gamma}), \lambda(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e)\right)$$

Since it is assumed that the divorce threat constraint also binds for spouse i in periods after repayment of the loan is complete, we have $V^i\left(y\left(\mathbf{k}_1, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) = E\hat{V}^i\left(\hat{y}_e^i\right)$. Therefore, the condition in (15) can be written as

$$V^i\left(y\left(\mathbf{k}_1, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right) = E\hat{V}^i\left(\hat{y}_e^i\right)$$

Therefore, the bargaining outcome in periods prior to full repayment, $\hat{\lambda}\left(\mathbf{k}_1, \boldsymbol{\gamma}, \mathbf{y}_e, \mathcal{L}\right)$ and following full repayment, $\lambda\left(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)$, are given by

$$(16) \qquad V^i\left(y\left(\mathbf{k}_1, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_1, \boldsymbol{\gamma}, \mathbf{y}_e, \mathcal{L}\right)\right) = E\hat{V}^i\left(\hat{y}_e^i\right)$$

$$(17) \qquad V^i\left(y\left(\mathbf{k}_1, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) = E\hat{V}^i\left(\hat{y}_e^i\right)$$

The solutions in (16) and (17) do not depend on the activity that is chosen for the investment, once household income is taken into account. Therefore, since $V^j\left(y, \lambda\right)$ is increasing in y, person j's utility is maximised for the investment choice which maximises household income.

(ii) If the divorce threat constraint binds for spouse i for investment choices s', s'', we have

$$\sum_{t=1}^{n}(\delta_i)^{t-1}V^i\left(y\left(\mathbf{k}_1, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_1, \boldsymbol{\gamma}, \mathbf{y}_e, \mathcal{L}\right)\right) + \sum_{t=n+1}^{\infty}(\delta_i)^{t-1}V^i\left(y\left(\mathbf{k}_1, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right)$$
$$= \sum_{t=1}^{\infty}(\delta_i)^{t-1}E\hat{V}^i\left(\hat{y}_e^i\right) \text{ where } \mathbf{k}_1 = \mathbf{k} + e_s L$$

for $s = s', s''$. Since the right-hand side of the equation is the same in the case of s', s'', welfare of spouse i in the two cases are also equal.

(iii) Denote by s^* the efficient investment choice; i.e.,

$$s^* = \arg\max_s y\left(\mathbf{k} + e_s L, \boldsymbol{\gamma}\right)$$

where the function $y\left(.\right)$ is given by (1).

After full repayment of the loan, the difference in per-period utility to agent i from investment s^* and some choice $s' \neq s^*$ equals

$$(18) \qquad V^i\left(y\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) - V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right)$$

where $\mathbf{k}_s = \mathbf{k} + e_s L$.

Define $W_{11}^i(s^*, s')$ and $W_{12}^i(s^*, s')$ as follows:

$$\begin{aligned}
W_{11}^i(s^*, s') &= \left[V^i\left(y\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) - V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) \right] \\
W_{12}^i(s^*, s') &= \left[V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) - V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right), \lambda\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e\right)\right) \right]
\end{aligned}$$

Then, the expression in (18) can be written as

$$(19) \qquad W_{11}^i(s^*, s') + W_{12}^i(s^*, s')$$

Note that $W_{11}^i(s^*, s')$ is equal to the difference in per-period utility due to the income difference between the efficient investment choice s^* and some other investment choice s'; and $W_{12}^i(s^*, s')$ is equal to the difference in per-period utility due to the difference in decision-making authority resulting from the two different investment choices.

Similarly, we can obtain an expression for the difference in per-period utility to agent i from investment choice s^* and some choice $s' \neq s^*$ during periods that the loan is being repaid:

$$(20) \qquad V^i\left(y\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right) - V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right)$$

Define $W_{21}^i(s^*, s')$ and $W_{22}^i(s^*, s')$ as follows:

$$\begin{aligned}
W_{21}^i(s^*, s') &= \left[V^i\left(y\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right) - V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right) \right] \\
W_{22}^i(s^*, s') &= \left[V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_{s^*}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right) - V^i\left(y\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}\right) - z, \hat{\lambda}\left(\mathbf{k}_{s'}, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L}\right)\right) \right]
\end{aligned}$$

Corresponding to $W_{11}^i(s^*, s')$ and $W_{12}^i(s^*, s')$, $W_{21}^i(s^*, s')$ represents the difference in per-period utility resulting from the difference in income from the two investment choices, and $W_{22}^i(s^*, s')$ represents the difference in per-period utility resulting from the difference in decision-making authority from the two investment choices.

The expression in (20) can be written as

$$(21) \qquad W_{21}^i(s^*, s') + W_{22}^i(s^*, s')$$

Therefore, the difference in the discounted sum of utilities from the two investment choices can be written as

$$(22) \qquad \sum_{t=1}^n (\delta_i)^{t-1} \left[W_{11}^i(s^*, s') + W_{12}^i(s^*, s') \right] + \sum_{t=n+1}^{\infty} (\delta_i)^{t-1} \left[W_{21}^i(s^*, s') + W_{22}^i(s^*, s') \right]$$

Agent i prefers investment choice s' to the efficient choice s^* if and only if the expression in (22) is smaller than zero; i.e.

(23)
$$\sum_{t=1}^{n}(\delta_i)^{t-1}W_{11}^i\left(s^*,s'\right)+\sum_{t=n+1}^{\infty}(\delta_i)^{t-1}W_{21}^i\left(s^*,s'\right)<-\sum_{t=1}^{n}(\delta_i)^{t-1}W_{12}^i\left(s^*,s'\right)-\sum_{t=n+1}^{\infty}(\delta_i)^{t-1}W_{22}^i\left(s^*,s'\right)$$

In words, the condition in (23) says that the gain in utility as a result of higher income from the efficent choice s^* is smaller than the gain in utility from the (possibly higher) level of decision-making authority resulting from an inefficient choice s'.

(iv) If the divorce threat constraint is binding for agent i for investment choice s', then he/she receives a discounted sum of utilities equal to $\sum_{t=1}^{\infty}(\delta_i)^{t-1}E\hat{V}^i\left(\hat{y}_e^i\right)$ from this choice. If the constraint is slack for investment choice s'', then the discounted sum of utilities for choice s'' is greater than or equal to $\sum_{t=1}^{\infty}(\delta_i)^{t-1}E\hat{V}^i\left(\hat{y}_e^i\right)$. Therefore, agent i (weakly) prefers investment choice s'' to investment choice s'. $\qquad\square$

Proof. of Proposition 3.2: We begin by assigning a name to the following, endogenous, condition that is assumed to hold true in the statement of the proposition:

Condition A.1: *The 'threat point effect' favours the spouse whose autonomous activity is targeted in an intervention.*

(i) Let λ_s represent the outcome from bargaining following an investment in activity s, after full repayment has been made (defined in (5)); and let $\hat{\lambda}_s$ represent the corresponding value during periods in which installments are still being paid (defined in (8)). Let $\underline{y}_s^i$ be the minimum value of household income, following an investment, at which spouse i would be willing to participate in a credit programme knowing that the loan will be invested in activity s. Therefore, we have

(24) $$\sum_{t=1}^{n}(\delta_i)^{t-1}V^i\left(\underline{y}_s^i-z,\hat{\lambda}_s\right)+\sum_{t=n+1}^{\infty}(\delta_i)^{t-1}V^i\left(\underline{y}_s^i,\lambda_s\right)=\sum_{t=1}^{\infty}(\delta_i)^{t-1}V^i\left(y_0,\lambda_0\right)$$

where y_0 and λ_0 denote the level of household income and the Pareto weight on the wife's utility before the investment.

Suppose $y_m=y_c=\underline{y}^w$, where y_s denotes aggregate household income following an investment in activity s. By construction, the wife will be just willing to participate in the credit programme knowing that the loan will be invested in the cooperative activity. However,

by Condition A.1 and Proposition 2.1, $\lambda_m < \lambda_c$ and $\hat{\lambda}_m < \hat{\lambda}_c$ (using the assumption that $y_m = y_c$). Since $V^w(y, \lambda)$ is increasing in λ, we have

$$\sum_{t=1}^{n} (\delta_w)^{t-1} V^w \left(y_m - z, \hat{\lambda}_m \right) + \sum_{t=n+1}^{\infty} (\delta_w)^{t-1} V^w (y_m, \lambda_m) < \sum_{t=1}^{\infty} (\delta_w)^{t-1} V^w (y_0, \lambda_0)$$

Therefore, $\underline{y}_m^w > y_m \implies \underline{y}_m^w > \underline{y}_c^w$.

Suppose $y_f = y_c = \underline{y}_c^w$. By Condition A.1 and Proposition 2.1, $\lambda_f > \lambda_c$ and $\hat{\lambda}_f > \hat{\lambda}_c$. Since $V^w(y, \lambda)$ is increasing in λ, we have

$$\sum_{t=1}^{n} (\delta_w)^{t-1} V^w \left(y_m - z, \hat{\lambda}_m \right) + \sum_{t=n+1}^{\infty} (\delta_w)^{t-1} V^w (y_m, \lambda_m) > \sum_{t=1}^{\infty} (\delta_w)^{t-1} V^w (y_0, \lambda_0)$$

Therefore, $\underline{y}_f^w < y_f \implies \underline{y}_f^w < \underline{y}_c^w$. Similarly, we can show that $\underline{y}_f^h > \underline{y}_c^h > \underline{y}_m^h$.

If $\lambda_0 < \lambda_e(y_0)$ – i.e. the wife is initially in a weaker bargaining position – then, by Proposition 2.1, $\lambda_c > \lambda_0$ and $\hat{\lambda}_c > \lambda_0$. It follows from (24) that $\underline{y}_c^w < \underline{y}_0^w$ and $\underline{y}_c^h > \underline{y}_0^h$. In the same manner, we can show that if $\lambda_0 > \lambda_e(y_0)$, then $\underline{y}_c^h < \underline{y}_0^h$ and $\underline{y}_c^w > \underline{y}_0^w$.

(ii) Since the divorce option is a binding constraint for spouse i both before and after taking up the loan, she receives exactly the utility $\sum_{t=1}^{\infty} (\delta_i)^{t-1} E\hat{V}^i (\hat{y}_e^j)$ in both cases. Therefore, she is indifferent between participating and not participating in the loan programme.

Moreover, $\hat{\lambda} (\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L})$ and $\lambda (\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e)$ are given by (16) and (17) respectively. Therefore, $\hat{\lambda} (\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e, \mathcal{L})$ and $\lambda (\mathbf{k}_1, \boldsymbol{\gamma}, \hat{\mathbf{y}}_e)$ are determined by total household income, $y (\mathbf{k}_1, \boldsymbol{\gamma})$, following the investment, but are independent of the activity in which the loan is invested. It follows from the reasoning provided in the proof for part (i) of the proposition that the minimum increase in total household income for which spouse j would be willing to participate in the credit programme is the same for all three types of investment. $\qquad \square$

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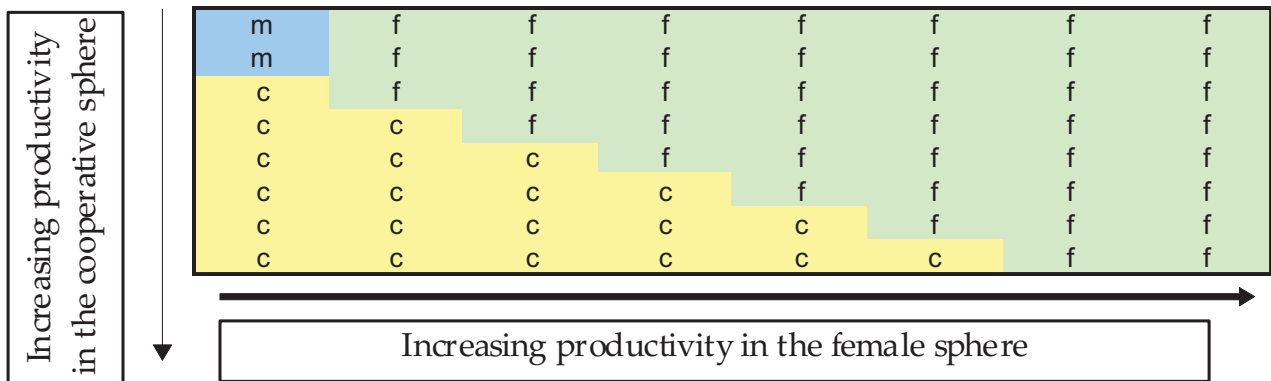
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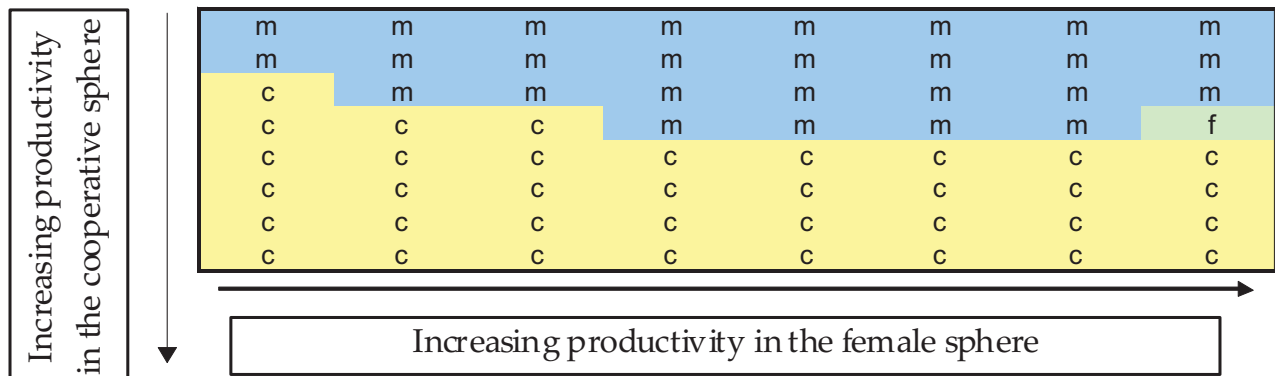
SOAS, University of Oxford

Parameter Values

	Cooperative Activity	Male Activity	Female Activity	
Initial Capital	**2**	**4**	**2**	$\alpha^h = 0.3,\ \alpha^w = 0.3$
Gamma	2-16	4	1-8	$\beta_1^h = 0.35,\ \beta_1^w = 0.35$
				$\beta_2^h = 0.35,\ \beta_2^w = 0.35$
<u>In case of exit</u>				Loan Size 2
Initial Capital	-	6	4	Installment Size 0.2
Gamma	-	4	4	# of Installments 12

Preferred Investment Choice of the Wife

Increasing productivity in the cooperative sphere

Increasing productivity in the female sphere

Preferred Investment Choice of the Man

Increasing productivity in the cooperative sphere
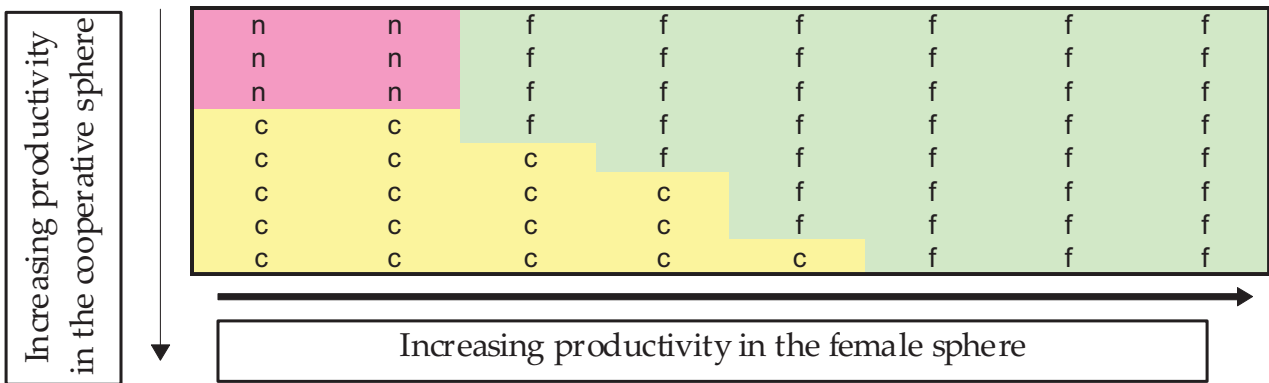
Increasing productivity in the female sphere

Legend

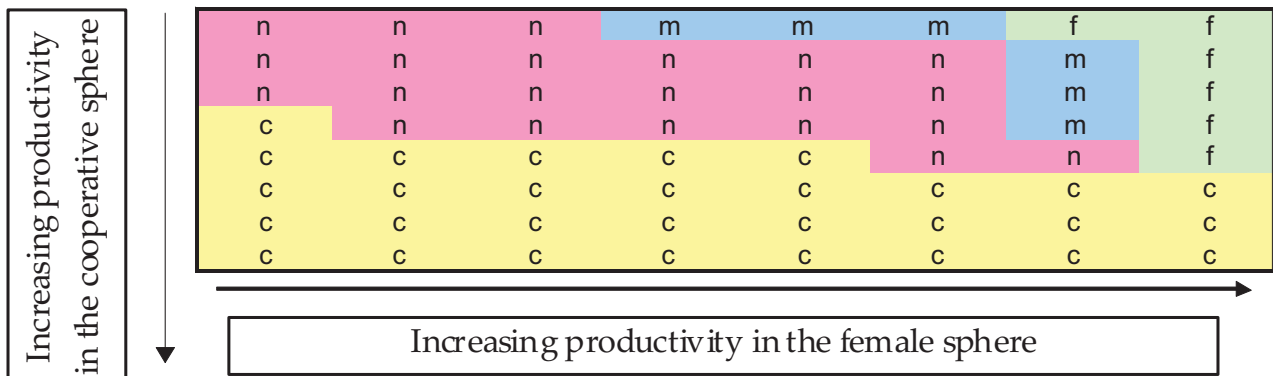|	Investment in … preferred
c	cooperative activity
m	male activity
f	female activity
indiff	indifferent between investing in all types of activities and not participating in the loan programme
n	no participation in loan programme preferred

Figure 1

Parameter Values

	Cooperative Activity	Male Activity	Female Activity	
Initial Capital	4	8	4	$\alpha^h = 0.3,\ \alpha^w = 0.3$
Gamma	2-16	4	1-8	$\beta_1^h = 0.35,\ \beta_1^w = 0.35$
				$\beta_2^h = 0.35,\ \beta_2^w = 0.35$
In case of exit				Loan Size 1
Initial Capital	-	6	4	Installment Size 0.6
Gamma	-	4	4	# of Installments 12

Preferred Investment Choice of the Wife

Increasing productivity in the cooperative sphere

Increasing productivity in the female sphere

Preferred Investment Choice of the Man

Increasing productivity in the cooperative sphere
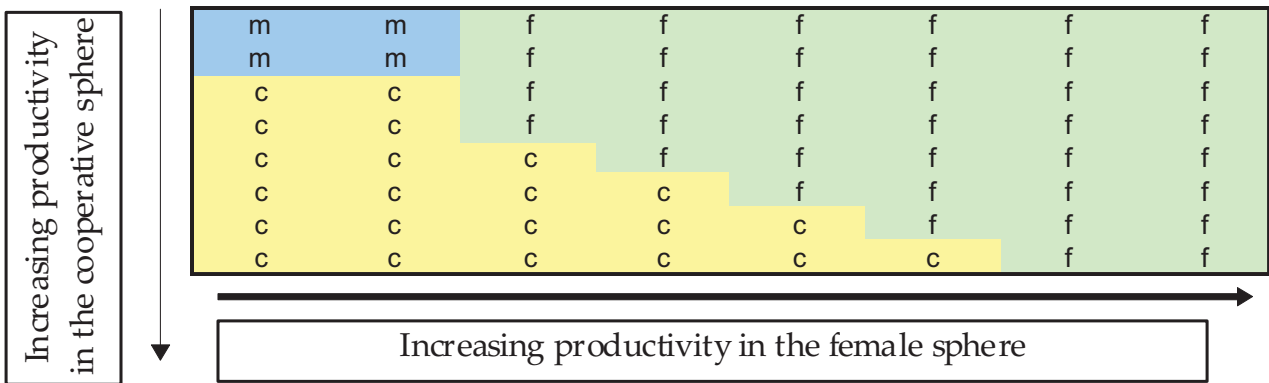
Increasing productivity in the female sphere

Legend

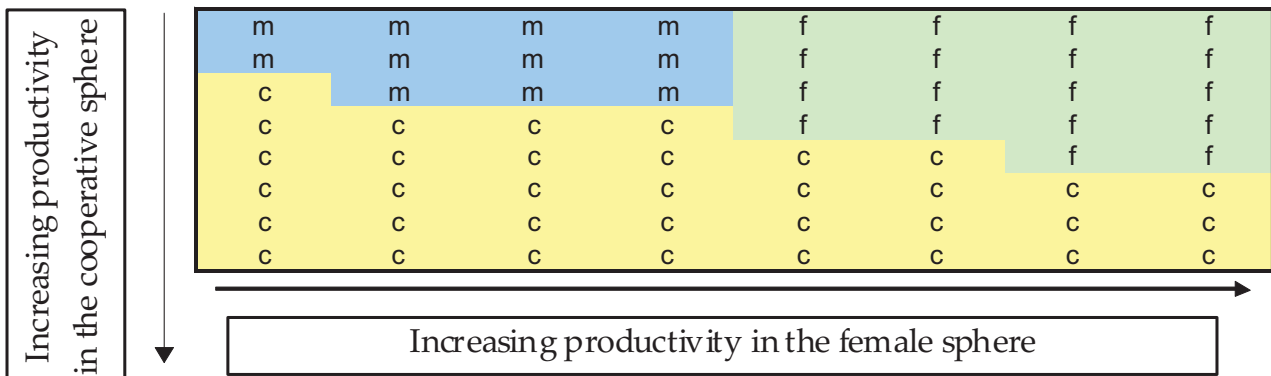|	Investment in … preferred
c	cooperative activity
m	male activity
f	female activity
indiff	indifferent between investing in all types of activities and not participating in the loan programme
n	no participation in loan programme preferred

Figure 2

Parameter Values

	Cooperative Activity	Male Activity	Female Activity	
Initial Capital	4	8	4	$\alpha^h = 0.2$, $\alpha^w = 0.2$
Gamma	2-16	4	1-8	$\beta_1^h = 0.4$, $\beta_1^w = 0.4$
				$\beta_2^h = 0.4$, $\beta_2^w = 0.4$
In case of exit				Loan Size — 2
Initial Capital	-	6	4	Installment Size — 0.2
Gamma	-	4	4	# of Installments — 12

Preferred Investment Choice of the Wife

Increasing productivity in the cooperative sphere

Increasing productivity in the female sphere

Preferred Investment Choice of the Man

Increasing productivity in the cooperative sphere

Increasing productivity in the female sphere

Legend

	Investment in … preferred
c	cooperative activity
m	male activity
f	female activity
indiff	indifferent between investing in all types of activities and not participating in the loan programme
n	no participation in loan programme preferred

Figure 3