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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 under very specific circumstances: 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. The case in which the availability of credit is most likely to strengthen women's bargaining position in the household is when capital can be invested in a cooperative activity in which both spouses contribute in an important way.

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1 Introduction : Microfinance and the Promise of Social Change

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. 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) employment 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 resources 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 motivation 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

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 sustainability 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.

of household 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. Another interpretation has been proposed by Kabeer (1998, 2001), who argues that

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.

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.[5] For instance, social conventions and gender norms regarding the divisions of labour may obligate 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. 2007, 2008, Emran et al. 2006, Johnson 2004, Johnston and Morduch 2007).[6] 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

5 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).

6 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.

bargaining that allows us to distinguish between three types of interventions that affect (i) the return to a cooperative endeavour involving both spouses; (ii) the return to each spouse's autonomous activities within the household; and (iii) each spouse's exit option. 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).

Given the limits on women's ability to earn an independent income, we pay particular attention to how access to a new resource that enlarges the scope for cooperation in the household affect the relative bargaining power of 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. Since production decisions regarding loan use affect the fall-back options of the spouses, we also explore the situation when the male spouse may have an incentive to appropriate the loan to maintain his own bargaining power within the household.

We find that access to credit allows a woman to strengthen her bargaining position through an expansion of her autonomous activities only under very specific 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. The case in which the availability of credit is most likely to strengthen women's bargaining position in the household is when capital can be invested in a cooperative activity in which both spouses contribute in an important way. We also show that the impact of any type of intervention depends critically on whether or not divorce is a credible threat point.

The next section sets up our model of household bargaining and interprets it in the context of an intervention providing women with access to new capital. We then represent and distinguish between four types of intrahousehold relations and predict how access to credit affects production and bargaining power in the household in each case. We illustrate the model's predictions by drawing on ethnographic studies of the outcomes of microfinance programmes. Section 3 concludes with further discussions of our theoretical results.

2 Cooperative Gains and Bargaining Power within the Household

In many societies, divorce carries a particularly high cost and non-cooperation within the household may constitute 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).[7]

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 unearned 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.

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.[8] We briefly 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.

7 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.

8 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 (utility functions are weakly concave rather than linear as in the model of Kanbur and Haddad).

2.1 A Bargaining Model of the Household

Consider the husband m and the wife f of a household. Each spouse has one unit of labour available that has to be allocated between an autonomous activity and a cooperative activity. The former has a return of w^i per unit of labour, $i \in \{m,f\}$, while the total output from cooperation equals $f(l^m,l^f)$, l^i being the amount of time spent on the cooperative activity by spouse i. We assume f(.) is increasing in both inputs. Moreover, $f(0,l^f)=f(l^m,0)=0$; i.e. some input from both spouses is essential for the activity to generate any output. The output from the cooperative activity can be sold on the market at price p. We define a potentially different set of autonomous activities in the event of divorce with income streams e^m and e^f, which represent the exit options of the household members.

There is a single consumption good with unit price and each household member derives utility from own consumption only. For ease of analysis, we consider the case where husband and wife have identical preferences over private consumption, described by the utility function U(.). We make the standard assumption that U is increasing and concave.

In the absence of any agreement about how to share the gains from revenues from cooperation, each spouse devotes all her labour time to the autonomous activity for a total income of w^i (over which he or she has full control thereafter). Such an outcome may not be Pareto efficient[9], so that there is scope for gains from cooperation within the household. Following Bergstrom (1996), we assume that in each period, either spouse may propose an allocation of household resources -- i.e. an allocation of household labour across the three activities as well as a division of total household income between the two spouses. More precisely, each spouse will have the opportunity to make such a proposal in alternative periods that her partner may, then, accept or refuse. If the partner accepts, then resources are allocated according to the proposal during that period and in all subsequent periods until either spouse chooses to break the agreement. In addition, either spouse may choose to walk away from the marriage in any period, in which case he or she would receive the income e^f in each period thereafter (once the marriage has broken down, there is no scope of renegotiation possible).

Note that we have assumed, implicitly, that when a couple come to an agreement, they are able to commit to making any necessary transfers at the end of production process in line with the division of household resources they have agreed upon. Under

9 In the sense that cooperation within the household could make at least one household member better-off without making any other member worse-off.

this assumption, any rational proposal will involve an efficient allocation of labour resources within the household; for consumption decisions can be made independently of production choices. (In section 2.3, we discuss how relaxing this assumption would affect our results). Thus, the total household income in any cooperative agreement will be given by the following maximisation problem:

$$T\left(p,w^m,w^f\right)=\max_{l^m,l^f} pf\left(l^m,l^f\right)+w^m\left(1-l^m\right)+w^f\left(1-l^f\right) \qquad [1]$$

$$\max_{\alpha\in[0,1]}\left[U\left(\alpha T\right)-U\left(w^m\right)\right]\left[U\left(\beta T\right)-U\left(w^f\right)\right]$$

Thus, the only substantive issue to be decided upon in the bargaining process is how the income T(p,w^m,w^f) 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). Binmore showed that the two parties reach an agreement immediately and, if 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]

$$\max_{\alpha\in[0,1]}\left[U\left(\alpha T\right)-U\left(w^m\right)\right]\left[U\left(\beta T\right)-U\left(w^f\right)\right]$$

subject to

$$\begin{aligned} U^m\left(\alpha T\right) &\geq U^m\left(e^m\right) \\ U^f\left(\beta T\right) &\geq U^f\left(e^f\right) \end{aligned}$$

where β=1-α . 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. 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. The axiomatic approach adopted by Lundberg and Pollak (1993) overlooks the role played by the exit options in the bargaining process when one spouse has little scope of autonomy within the household. Manser and Brown

(1980) and McElroy and Horney (1981), also using an axiomatic approach, allow the exit options to affect the outcome of bargaining, but, as pointed out by Bergstrom (1996), not in the manner that is predicted by non-cooperative bargaining theory. By explicitly modeling the bargaining process, we are able to show precisely how both the possibility of non-cooperation and divorce affect decision-making within the household.

2.2 An Interpretation of the Model in the Context of the Household Economy

Before considering how this framework may be used to investigate the impact of a development programme on bargaining power within the household, we discuss briefly how the parameters p, w^m, w^f should be interpreted. Note that w^i is the return on labour that spouse i can achieve 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.[10] In this case, the return from her labour would be captured by the parameter p rather than w^f ; i.e. it should be considered a cooperative activity. Likewise, a productive activity that is carried out primarily by the man but relies on some input from the female spouse, and from which she can credibly threaten to withdraw cooperation, would be captured by the parameter p rather than w^m.[11]

It should be evident that there will be considerable heterogeneity in the parameters p, w^m, w^f across households according to the skill levels of the spouses, the availability of complementary inputs provided by each, and their ability to work together in an activity that requires coordination and cooperation. For example, a low value of p can serve to represent an extremely conflictual relationship where there is little scope of cooperation within the household. In this case, the spouses are likely to engage in largely autonomous activities.[12] A household where the female spouse has strong entrepreneurial skills, has the necessary capital for her enterprise, and can operate it independently of her husband

10 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)

11 For example, in a number of cases women borrowers of the SEDP programme studied by Kabeer (1998) supplied their spouses with credit to set up their own business, purchased land for them to farm, or a rickshaw for the husband's use.

12 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.

would be characterised by a high value of w^f.[13] If a woman who has no opportunity for work other than on her husband's farm, the household would be characterised by low w^f. Moreover, if her input in farm work is easily substitutable, then the return from the man's labour in joint production (on the farm) will be close to w^m.[14]

Financial capital is a complementary input that can potentially raise the labour returns of household members and, therefore, providing access to credit can be expected to raise some or all of the parameters p, w^m, w^f . However, the same credit programme may affect these parameters differently across households. Intuitively, if the husband has much greater entrepreneurial competence than the woman, than the availability of credit will strongly affect w^m but not w^f . If the credit programme makes it possible for the household to undertake an enterprise where the spouses provide complementary inputs, we would observe an increase in p but, potentially, not in w^m or w^f .

We shall assume for that any new financial capital that is brought into the household will be allocated efficiently across the different household activities. However, given that capital investments made today will affect the fall-back options of household members in the future, they have an incentive to appropriate, if possible, any new resources brought into the household to strengthen their future bargaining position. We explore this possibility in section 2.3.

2.3 The Impact of a Development Programme on Intra-Household Bargaining

We now consider how the decision-making process within a household is affected by a development programme that affects (a) the return p on cooperation within the household; (b) the returns w^m and w^f per unit of labour devoted to the autonomous activity; and (c) the spouses' exit options (e^m and e^f). We show that the impact of any type of intervention depends critically on whether or not divorce is a credible threat point. The threat of divorce may not be used for two reasons: first, because exiting the marriage is not a realistic option and, thus, the threat is not credible; or because non-cooperation serves as a much more effective bargaining tool. The first proposition addresses the

13 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.

14 Anderson and Eswaran (2007) found, also in the context of rural women in Bangladesh, that women who work on their husband's farm and those who do not engage in any income-generating activities had similarly low levels of decision-making authority within the household. This suggests that women who worked on their husband's farms had no more scope to engage in autonomous activities than did housewives.

situation where the threat of divorce does not factor into the bargaining process for either spouse.

Proposition 1: *Suppose that the participation constraint is not binding for either individual in the bargaining solution.*

(i) Then for some α_1, α_2, *satisfying* $\alpha_1 < \frac{1}{2} < \alpha_2$ *the man's share in the division of household resources,* α^* *is increasing in* w^m *for* $\alpha \leq \alpha_2$ *and decreasing in* w^f *for* $\alpha \leq \alpha_1$*;*

(ii) If $\alpha^* > \frac{1}{2}$, *then* α^* *is decreasing in p and vice versa if* $\alpha^* < \frac{1}{2}$*;*

(iii) For $\alpha \leq \alpha_2$, α^* *is more sensitive to a change in* w^f *than to a change in p that has the same impact on aggregate household income; correspondingly, for* $\alpha \geq \alpha_1$, α^* *is more sensitive to a change in* w^m *than to a change in p that has the same impact on aggregate household income;*

(iv) changes in e^m *and* e^f *have no impact on* α^*.

The first result contained in Proposition 1 is well-known in the literature on intra-household bargaining: increasing the scope of autonomy of one spouse yields her a greater share of household resources. More significantly, as we point out in part 2 of the proposition, an increase in the gains from *cooperation* also shifts relative bargaining powers within the household in favour of the more disempowered spouse.

According to the third part of the proposition, gains in the cooperative sphere will have a smaller impact on relative bargaining powers than an equivalent gain in the autonomous sphere of the more disempowered spouse. This does not mean that policies that target the cooperative sphere within the household are necessarily less effective at changing intra-household relations than those that target the autonomous spheres. Precisely because programmes that target the cooperative sphere have a smaller impact on relative bargaining powers within the household, they are likely to have a net positive impact on the *welfare* of the more empowered spouse, who would consequently be more supportive of the initiative than if it had focused exclusively on the autonomous sphere of his partner. Therefore, to the extent that the more empowered spouse has the authority to determine a household's participation in a development programme, targeting the cooperative sphere may ultimately have a greater impact on intra-household relations. In the following section, we shall explicitly allow household members to make strategic choices regarding programme participation and production to illustrate this point.

Next, we analyse the case for households where bargaining relations within the household are extremely asymmetric, such that exit from the marriage is a credible threat-

point for one of the spouses.[15] We ask how, in this case, interventions that affect the gains from cooperation and the independent incomes from non-cooperation and divorce influence the solution to the bargaining game. We have the following proposition:

Proposition 2: *Suppose, for a particular household, the bargaining problem has a corner solution with f receiving the same utility in the agreement as she would from her exit option. Then,*

(i) an increase in p, w^f, w^m will increase α^*; i.e. it raises the man's share of the surplus;

(ii) an increase in e^f will lower α^*, while an increase in e^m will have no impact on the bargaining solution.

Proof of Proposition 2: *Since the participation constraint of f is binding, we have*

$$U\left((1-\alpha^*)T\right) = U\left(e^f\right)$$

If this equation is to hold following an increase in p, w^f, and w^m, it must be accompanied by an increase in α^*. Following the same logic, an increase in e^f would lead to a decrease in α^*. On the other hand, since e^m does not appear in the equation, changes in this variable would not affect α^*.

Thus we observe considerable heterogeneity in the impact of different types of interventions across households. Where the exit option serves as a credible threat, increasing the gains of cooperation (through an increase in the price of the jointly produced good) actually decreases the share of the spouse *f* who is against her participation constraint. In addition, increasing her range of economic opportunities within marriage w^f would similarly decrease her share of the surplus from cooperation. By contrast, strengthening her exit option e^f will lead to an increase in her share.

The first two parts of Proposition 2 have a simple intuitive explanation. When exit from the marriage becomes a credible threat point, there is, in effect, no more bargaining taking place within the household. The better-off 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.[16]

15 For example, the threat of divorce may serve as a bargaining tool for the husband if he has an attractive exit option relative to non-cooperation within the household; or for the wife if non-cooperation within the household is a unattractive outcome compared with the option of divorce.

16 See Kanbur and Haddad (1994), who find similar results

Thus far, we have assumed that production and consumption decisions within the household are separable and that the allocation of capital and labour across different activities will be efficient. However, production decisions can, in themselves, affect the fall-back options of the spouses, and thus the outcome of subsequent bargaining. Therefore, unless members of the household can *ex-ante* commit to a plan for the allocation of productive resources and division of the profits, they have incentives to behave strategically when making production decisions. Since this possibility has implications about the extent to which a microcredit programme can affect relative bargaining positions within the household, we explore it in greater detail in the following section.

2.4 Strategic Choices in Programme Participation and Loan Use

Imagine that access to credit will enable one spouse, say the woman, to substantially expand her autonomous activities. Then her husband may have an incentive to subvert the process of loan take-up and loan use to maintain his own bargaining power within the household. At an intuitive level, the husband is most likely to make such strategic choices if the woman is initially "disempowered" in the decision-making process. What would be the impact of a credit programme on the household in such situations?

In effect, we are presented here with a dynamic problem: the household is faced with a decision that will itself influence the decision-making process within the household. 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 modeling the bargaining process, which is a key element in the analytical framework presented above. Instead, we consider a special case of the problem which is especially pertinent in the context of microcredit interventions in societies with strongly patriarchal norms: we assume that the institutional setup (i.e. the societal norms and/or the bank policy), or the initial bargaining situation, is such that the husband can overrule his wife's decision to join a credit programme, or appropriate the loans for his own use once the loan is received.[17]

Note that the issue of appropriation does not arise if the most productive use of new

17 Given that participation in a microfinance programme is a public and formal activity, it is doubtful that a woman would be able to join such a programme without her husband's knowledge. It is also doubtful that microfinance providers would lend money to a woman not knowing whether the husband agrees or not since they rely on the resource base of the whole household to ultimately repay the loan (Rahman 1999 provides a number of narratives involving borrowers of Grameen Bank which illustrates this mechanism).

capital lies in the man's autonomous sphere. Nor does it arise if the woman has little autonomy within the household and her divorce option is a credible threat. In the first case, efficiency alone would justify allocation of the loan to the male activity and its impact on the allocation of household income would be as described in Propositions 1 and 2. In the second case, the man would have no incentive to divert the asset from its most efficient use because his strong bargaining position ensures that any additional income generated by the household will accrue to him, as stated in Proposition 2. Rather, we are concerned with the case where the most productive use of new capital lies in the woman's autonomous sphere and her non-cooperative threat point is sufficiently strong to ensure that she can retain a share of any additional income she generates. If the final say with regard to financial decisions rests with the man, would he permit her to use the loan to expand her autonomous activity and thereby strengthen her bargaining position? In deciding whether to allow his wife to use the loan in her own activity, the man faces a trade-off between efficiency and bargaining power. He can prevent his wife from strengthening her bargaining position by diverting the loan to his own activity, but the household as a whole would be poorer in consequence. We present the condition under which the man has the incentive to appropriate a productive asset from his wife in Proposition 3:

Proposition 3: *Suppose the husband m has the ability to appropriate an asset and use it in his own production process. Then, he would appropriate an asset whose most efficient use lies in the woman's autonomous sphere if and only if her participation constraint is not binding, and*

$$\int_{w_1^m}^{w_2^m} \frac{\partial \alpha^*}{\partial w^m} T + \alpha^* \left(1 - l^{m*}\right) dw^m \geq \int_{w_1^f}^{w_2^f} \frac{\partial \alpha^*}{\partial w^f} T + \alpha^* \left(1 - l^{f*}\right) dw^f \qquad [3]$$

where w_2^i, w_1^i, are, respectively, the returns to labour in the autonomous sphere of $i \in \{m,f\}$ with and without the asset in question

The condition in [3] represents the strategic choice facing the man when his appropriation of a loan (or any other productive asset) would raise his labour returns from w_1^m to w_2^m while allowing his wife to invest the loan in her own activity would raise her labour returns from w_1^f to w_2^f. (If the wife's participation constraint binds, i.e. her divorce threat is credible, then the husband has no incentive to appropriate the asset as he is able to appropriate any additional income she generates, as stated in Proposition 2). It is clear

from the condition that it is more likely to be satisfied when ($w_2^m - w_1^m$) is comparable to ($w_2^f - w_1^f$). Intuitively, the man has the strongest incentive to appropriate the loan when he can use it nearly as productively as the woman, such that the efficiency loss from appropriation is small relative to the gain in bargaining power. In other words, the risk of loan appropriation is strong when men have a alternative venture in which the capital can yield comparable returns. Even if no such venture exists, the husband would choose to veto participation in the loan programme if the right-hand side of [3] were negative.

Given that gains in the cooperative sphere within the household also affects bargaining relations in a household with an unequal distribution of power (Proposition 1(ii)), a man may also have a strategic incentive to appropriate a loan that can be used most productively in a joint activity with his wife.[18] However, his incentive for doing so is necessarily weaker than in the case discussed above because an expansion in the cooperative sphere has a smaller impact on his bargaining position than an equivalent expansion in the woman's autonomous sphere (Proposition 1(iii)). Therefore, the possibility of strategic appropriation by the man is lower when the loan can be used in a cooperative activity than when its best use lies in the woman's autonomous sphere.

2.5 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 Bangladesh to illustrate the model's predictions.

First, consider a household for which p is very small relative to w^m and w^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

18 We do not formally provide the conditions under which appropriation of this kind would occur as the logic of the argument and the insights are essentially the same.

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 become more productive in her 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 w^f is small relative to p and w^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 stated in Proposition 2, all income gains will accrue to the man and, indeed, there will be a strengthening in his bargaining position (as measured by his share of total household income in the outcome of bargaining). Kabeer (1998) provides a number of examples of women borrowers whose situation corresponded well with the outcome predicted in Proposition 2. 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 p is high relative to both w^m and w^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 most productive use of additional capital is in the cooperative sphere, then the introduction of a credit programme will further increase p. 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 introduction of a credit programme will lead to an increase in p. Then, as stated in Proposition 1, 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 implied by Proposition 3, if her husband has an alternative means of using capital that is reasonably profitable, he has an incentive to appropriate the loan. In this case, the 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 four scenarios discussed above show that the availability of credit allows a woman to strengthen her bargaining position within the household through an expansion of her autonomous activities only in very specific cases. For this process to occur, 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. 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 case in which it is most likely that the availability of credit would enable the woman to strengthen her bargaining position within the household is when capital can be invested in a cooperative activity to which both spouses contribute in an important way.

3 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. 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 (1998, 2001) 's 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 (Proposition 1) and also adverse effects on the bargaining power of some women (Proposition 2). 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.[19] 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

19 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.

experience any significant effect.[20]-[21]

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. 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 (Proposition 3). We show that women may be able to invest in their own independent activities only under special circumstances, for instance in very conflictual households, or when women are already empowered in the household.

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

20 More or less empowered women refer to women above or below the baseline *median* of their measure of bargaining power respectively.

21 Note that Karlan (2007) find no impact from access to *credit* on household decision-making.

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.[22]

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[23] 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).[24]

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

22 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.

23 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.

24 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.

microcredit programme 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.

4 Appendix

Proof. of Proposition 1: Denote by $l^{m*}\left(p, w^m, w^f\right), l^{f*}\left(p, w^m, w^f\right)$, the levels of male and female labour devoted to the cooperative activity in the solution to the problem in (1). Denote by $\alpha^*\left(p, w^m, w^f\right)$ the husband's share in total resources in the solution to the problem in (2). Define

$$V\left(\alpha, p, w^m, w^f\right) = \left[U\left(\alpha T\right) - U\left(w^m\right)\right]\left[U\left(\beta T\right) - U\left(w^f\right)\right] \tag{4}$$

where $\beta = 1 - \alpha$. Differentiating the expression on the right-hand side w.r.t. α, we obtain

$$\frac{\partial V}{\partial \alpha} = U'\left(\alpha T\right)\left[U\left(\beta T\right) - U\left(w^f\right)\right] - U'\left(\beta T\right)\left[U\left(\alpha T\right) - U\left(w^m\right)\right] \tag{5}$$

Differentiating again w.r.t α, we obtain

$$\begin{aligned}\frac{\partial^2 V}{\partial \alpha^2} &= \alpha U''\left(\alpha T\right)\left[U\left(\beta T\right) - U\left(w^f\right)\right] + \alpha U''\left(\beta T\right)\left[U\left(\alpha T\right) - U\left(w^m\right)\right] \\ &\quad -2\alpha U'\left(\beta T\right)U'\left(\alpha T\right)\end{aligned} \tag{6}$$

Since the utility function is concave, we have $\frac{\partial^2 V}{\partial \alpha^2} < 0$.

Applying the Envelope theorem to the maximisation problem in (1), we obtain

$$\frac{\partial T}{\partial w^m} = 1 - l^{m*}, \frac{\partial T}{\partial w^f} = 1 - l^{f*}, \frac{\partial T}{\partial p} = f\left(l^{m*}, l^{f*}\right) \tag{7}$$

.Differentiating throughout (5) w.r.t. w^f, w^m and p, and substituting for $\frac{\partial T}{\partial w^m}, \frac{\partial T}{\partial w^f}$ and $\frac{\partial T}{\partial p}$, using (7), we obtain

$$\begin{aligned}&\frac{\partial^2 V}{\partial \alpha \partial w^f} = \alpha\left(1 - l^{f*}\right)U''\left(\alpha T\right)\left[U\left(\beta T\right) - U\left(w^f\right)\right] - \beta\left(1 - l^{f*}\right)U''\left(\beta T\right)\left[U\left(\alpha T\right) - U\left(w^m\right)\right] \\ &+U'\left(\alpha T\right)\left[\beta\left(1 - l^{f*}\right)U'\left(\beta T\right) - U'\left(w^f\right)\right] - \left(1 - l^{f*}\right)U'\left(\beta T\right)\alpha U'\left(\alpha T\right)\end{aligned} \tag{8}$$

$$\begin{aligned}&\frac{\partial^2 V}{\partial \alpha \partial w^m} = \alpha\left(1 - l^{m*}\right)U''\left(\alpha T\right)\left[U\left(\beta T\right) - U\left(w^f\right)\right] - \beta\left(1 - l^{m*}\right)U''\left(\beta T\right)\left[U\left(\alpha T\right) - U\left(w^m\right)\right] \\ &+\left(1 - l^{m*}\right)U'\left(\alpha T\right)\beta U'\left(\beta T\right) - U'\left(\beta T\right)\left[\alpha\left(1 - l^{m*}\right)U'\left(\alpha T\right) - U'\left(w^m\right)\right]\end{aligned} \tag{9}$$

$$\begin{aligned}&\frac{\partial^2 V}{\partial \alpha \partial p} = \alpha f\left(l^{m*}, l^{f*}\right)U''\left(\alpha T\right)\left[U\left(\beta T\right) - U\left(w^f\right)\right] - \beta f\left(l^{m*}, l^{f*}\right)U''\left(\beta T\right)\left[U\left(\alpha T\right) - U\left(w^m\right)\right] \\ &+\left(\beta - \alpha\right)f\left(l^{m*}, l^{f*}\right)U'\left(\alpha T\right)U'\left(\beta T\right)\end{aligned} \tag{10}$$

If neither participation constraint binds for prices p, w^m, w^f, we have, using the Implicit Function Theorem,

$$\frac{\partial V}{\partial \alpha}\left(\alpha^*\left(p, w^m, w^f\right), p, w^m, w^f\right) \equiv 0 \tag{11}$$

(i) Assuming that the participation constraints will remain slack for small changes in prices, we obtain, by differentiating throughout (11) w.r.t. w^m:

$$\frac{\partial^2 V}{\partial \alpha^2}\frac{\partial \alpha^*}{\partial w^m} + \frac{\partial^2 V}{\partial \alpha \partial w^m} \equiv 0 \tag{12}$$

We can show that, for $\alpha \leq \frac{1}{2}$ and $\frac{\partial V}{\partial \alpha} = 0$, $\frac{\partial^2 V}{\partial \alpha \partial w^m} > 0$.[2] Therefore, by continuity, $\exists \alpha_2 > \frac{1}{2}$, such that for $\alpha \leq \alpha_2$, we have $\frac{\partial^2 V}{\partial \alpha \partial w^m} > 0$. Then, from the identity in (12), $\frac{\partial \alpha^*}{\partial w^m} > 0$ for $\alpha^* \leq \alpha_2$. Similarly, we can show that $\exists \alpha_1 < \frac{1}{2}$ such that for $\alpha^* \geq \alpha_1$, we have α^* is decreasing in w^f.

[2] To see this, note that, for $\alpha \leq \frac{1}{2}$,

$$U'\left(\alpha T\right) \geq U'\left(\beta T\right)$$

(ii) Differentiating throughout (11) w.r.t. p, we obtain

$$\frac{\partial^2 V}{\partial \alpha^2}\frac{\partial \alpha^*}{\partial p}+\frac{\partial^2 V}{\partial \alpha \partial p}\equiv 0 \tag{16}$$

If $\alpha^*=\frac{1}{2}$, then, using (5) and (11), we must have $w^m=w^f$. Then, it is clear from (10) that $\frac{\partial^2 V}{\partial \alpha \partial p}=0$. Then, from the identity in (16), we have $\frac{\partial \alpha^*}{\partial p}=0$. Following the same reasoning as in the proof of part (i), we can show that for $\alpha^* \lesseqgtr \frac{1}{2}$, we have $\frac{\partial^2 V}{\partial \alpha \partial p} \gtreqless 0$.[3] Then, from the identity in (16), we have $\frac{\partial \alpha^*}{\partial p} \gtreqless 0$ for $\alpha \lesseqgtr \frac{1}{2}$.

(iii) From (7), a unit change in w^m has the same effect on total household income as an increase in p by $\frac{1-l^{m*}}{f(l^{m*},l^{f*})}$. From (16), we obtain

$$\begin{aligned}
\frac{1-l^{m*}}{f\left(l^{m*},l^{f*}\right)}\frac{\partial \alpha^*}{\partial p} &= -\frac{1-l^{m*}}{f\left(l^{m*},l^{f*}\right)}\frac{\partial^2 V}{\partial \alpha \partial p}\Big/\frac{\partial^2 V}{\partial \alpha^2} \\
&= \left\{\frac{\partial^2 V}{\partial \alpha \partial w^m}-U'\left(\beta T\right)U'\left(w^m\right)\right\}\Big/\frac{\partial^2 V}{\partial \alpha^2} \\
&< \frac{\partial^2 V}{\partial \alpha \partial w^m}\Big/\frac{\partial^2 V}{\partial \alpha^2} \\
&< \frac{\partial \alpha^*}{\partial w^m}
\end{aligned}$$

We know from the first part of the proposition that $\frac{\partial \alpha^*}{\partial w^m}>0$ for $\alpha^* \leq \alpha_2$, for some $\alpha_2 > \frac{1}{2}$. Thus, for $\alpha^* \leq \alpha_2$, α^* is more sensitive (i.e. responds more positively) to a unit change in w^m than to a change in p that has the same impact on total household income. Similarly, using (10) and (8), we obtain

$$\begin{aligned}
\frac{1-l^{f*}}{f\left(l^{m*},l^{f*}\right)}\frac{\partial \alpha^*}{\partial p} &= \left\{\frac{\partial^2 V}{\partial \alpha \partial w^f}+U'\left(\beta T\right)U'\left(w^f\right)\right\}\Big/\frac{\partial^2 V}{\partial \alpha^2} \\
&> \frac{\partial \alpha^*}{\partial w^f}
\end{aligned}$$

Thus, if $\frac{\partial V}{\partial \alpha}=0$, we must have

$$U\left(\beta T\right)-U\left(w^f\right) \leq U\left(\alpha T\right)-U\left(w^m\right) \tag{13}$$

(if not, the condition $\frac{\partial V}{\partial \alpha}=0$ cannot be satisfied).

If the third derivative of the utility function is small, then $U''\left(\alpha T\right) \approx U''\left(\beta T\right)$. Multiplying by $-U''\left(\alpha T\right)$ throughout (13) and using the approximation $U''\left(\alpha T\right) \approx U''\left(\beta T\right)$, we obtain

$$\begin{aligned}
&U''\left(\alpha T\right)\left[U\left(\beta T\right)-U\left(w^f\right)\right] \geq U''\left(\beta T\right)\left[U\left(\alpha T\right)-U\left(w^m\right)\right] \\
\Longrightarrow\ &\alpha U''\left(\alpha T\right)\left[U\left(\beta T\right)-U\left(w^f\right)\right]-\alpha U''\left(\beta T\right)\left[U\left(\alpha T\right)-U\left(w^m\right)\right] \geq 0
\end{aligned} \tag{14}$$

Note also that, for $\alpha \leq \beta$, we have

$$\left(\alpha-\beta\right)U''\left(\beta T\right)\left[U\left(\alpha T\right)-U\left(w^m\right)\right] \geq 0 \tag{15}$$

Adding (14) and (15), we obtain

$$\alpha U''\left(\alpha T\right)\left[U\left(\beta T\right)-U\left(w^f\right)\right]-\beta U''\left(\beta T\right)\left[U\left(\alpha T\right)-U\left(w^m\right)\right] \geq 0$$

In addition, the last two terms on the right-hand side of (9) are strictly positive (for the last term, note that in the solution to the bargaining problem, we must have $\alpha T \geq w^m$ and $\alpha \leq 1$). Therefore, $\frac{\partial^2 V}{\partial \alpha \partial w^m}>0$.

[3] In part (i),we established that for $\alpha < \frac{1}{2}$, we have

$$\alpha U''\left(\alpha T\right)\left[U\left(\beta T\right)-U\left(w^f\right)\right]-\beta U''\left(\beta T\right)\left[U\left(\alpha T\right)-U\left(w^m\right)\right]>0 \tag{17}$$

Moreover, since $\beta > \alpha$ and $U'>0$, we have

$$\left(\beta-\alpha\right)U'\left(\alpha T\right)U'\left(\beta T\right)>0$$

Furthermore, since $f\left(l^{m*},l^{f*}\right)>0$, we have $\frac{\partial^2 V}{\partial \alpha \partial p}>0$. Using the same reasoning, we can show that for $\alpha > \frac{1}{2}$, $\frac{\partial^2 V}{\partial \alpha \partial p}<0$.

We know from the first part of the proposition that $\frac{\partial \alpha^*}{\partial w^f} < 0$ for $\alpha^* \geq \alpha_1$, for some $\alpha_1 < \frac{1}{2}$. Thus, for $\alpha^* \geq \alpha_1$, α^* is more sensitive (i.e. responds more negatively) to a unit change in w^f than to a change in p that has the same impact on total household income.

(iv) It is evident that if the participation constraints are not binding, then changes in e^m and e^f have no impact on the first-order condition w.r.t. α and therefore no impact on the solution to the bargaining problem. ■

Proof. of Proposition 4: The husband's share of total income in the outcome from bargaining equals $\alpha^* T\left(p, w^m, w^f\right)$ where α^* is given by the solution to the maximisation problem in [2], and T is given by [4]. The change in his income following a marginal increase w^f is given by

$$\frac{\partial \alpha^*}{\partial w^f} T + \alpha^* \frac{\partial T}{\partial w^f}$$

Using the Envelope theorem, if neither participation constraint is binding in [2], then $\frac{\partial T}{\partial w^f} = 1 - l^{f*}$ where l^{f*} is obtained from the solution to [4]. Therefore, if providing the wife with an asset raises the labour returns in her autonomous sphere from w_1^f to w_2^f, its total impact on the man's income is given by

$$\int_{w_1^f}^{w_2^f} \frac{\partial \alpha^*}{\partial w^f} T + \alpha^* \left(1 - l^{f*}\right) dw^f \tag{18}$$

Similarly, we can show that if providing the man with the same asset raises the labour returns in his autonomous sphere from w_1^m to w_2^m, its total income on the man's income is given by

$$\int_{w_1^m}^{w_2^m} \frac{\partial \alpha^*}{\partial w^m} T + \alpha^* \left(1 - l^{m*}\right) dw^m \tag{19}$$

Therefore, if the man has the option of appropriating the asset, he would do so if the expression in (19) is larger than that in (18). ■

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