DOES FEMALE EMPOWERMENT PROMOTE ECONOMIC DEVELOPMENT?

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BREAD WORKING PAPER No. 281
JUNE, 2010

BREAD

Working Paper

Bureau for Research and Economic Analysis of Development

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June 2010

Abstract

Empirical evidence suggests that money in the hands of mothers (as opposed to their husbands) benefits children. Does this observation imply that targeting transfers on women is good development policy? We develop a series of non-cooperative family bargaining models to understand what kind of frictions can give rise to the observed empirical relationships, and we assess the policy implications of these models. We find that targeting transfers to women can have unintended consequences. Moreover, alternative forms of empowering women may lead to opposite results. More empirical research is needed to distinguish between alternative theoretical models.

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1 Introduction

Empirical evidence suggests that money in the hands of women benefits children. A number of studies show that when transfer payments are given to married women rather than to their husbands, expenditures on children (such as child nutrition, clothing, and schooling) go up disproportionately. Similarly, mothers' education has been shown to have a disproportionate effect on child health and education. Based on evidence of this kind, it is often argued that focusing development programs on women will foster development. The implicit argument is that if empowering women benefits children, it should ultimately lead to more human-capital accumulation and, therefore, growth. Already, much practical development policy is based on this premise; the large extent to which micro-credit programs are targeted exclusively to women is perhaps the most prominent example.

Despite the widespread deployment of gender-specific development programs, there is little work on the issue from the perspective of economic theory. One key question is *why* women invest more in children, rather than buying alcohol or tobacco as men seem prone to do. Finding the right answer to this question matters: without knowledge of the sources of behavioral differences, it is impossible to assess the effects of policy interventions. In particular, to assess the effects of policies that promote female empowerment it is essential to understand whether the observed gender-specific spending patterns are due to hard-wired biological differences or due to societal or economic constraints that differ by gender. If the underlying differences are biological in nature, giving more power to women should always benefit children. If, on the other hand, at least some of the behavioral differences are themselves due to gender discrimination, promoting gender equality would result in women becoming more like men, potentially lowering the benefits for children. Hence, understanding *why* women devote more resources to children is extremely important. In this paper, we advance the theoretical understanding of why women devote more resources to children than men. In particular, we develop a theoretical framework to explore what kind of mechanisms will lead to an asymmetry in child investment by gender, and we explore the implications of these mechanisms for the effects of gender-based development policy.

We start by surveying the empirical literature on gender and development. We then give a brief overview of the existing literature on decision making in the household to assess to what extent previous models are able to capture the idea that preference differences imply that whether income is given to men or women matters for child expenditures. Some classes of widely used models (such as the unitary and the collective approach to household decision making) imply an income pooling result, where the source of funds does not matter for decision making. Clearly, such models cannot explain the observed empirical findings. We therefore focus on non-cooperative models of household decision making for most of our analysis.

As our main theoretical framework, we develop a tractable theory of spousal decision-making with a continuum of household public goods.[1] Within this novel framework we explore the implications of preference differences between men and women, and we also develop alternative models in which men and women have symmetric preferences, but other constraints lead to outcomes that appear as-if women placed higher weight on their children's welfare. In particular, we show that a gender wage gap can lead women to specialize in home production and therefore act like they have a higher weight on children relative to their husbands. We also also show that gender differences in investment opportunities can lead women to act like they value children relatively more.

Our main findings are as follows. First, we show that, in the light of our theory, some of the empirical evidence may deserve a re-interpretation. For example, if there are both goods and time components in public goods (children), an increase in spending on goods (say, because of an increase in female wages or less labor-market discrimination) may come at the expense of time expenses, leading to an uncertain effect on overall public good provision and welfare. We also find that temporary and permanent policy changes may have very different implications,

[1]The previous literature on non-cooperative models of the household has mostly relied on setups with a discrete number of goods (such as one public and one private good). In such models, equilibria tend to be characterized by corner solutions, where only one spouse contributes to the public good. Such an extreme outcome is inconsistent with empirical evidence that generally shows that both husbands and wives contribute to public goods, albeit in different proportions.

i.e., a one-time income shock for the wife may well have effects due to either uncertainty or timing, but the same may not be true for regular payments to the wife because the offsetting transfers from the husband would adjust (although at least some evidence is based on regular payments). Further, the increase in child/public good expenditure out of female income gains may come at the expense of savings/investment, which may not be favorable after all. More general point is that the short-run and long-run effect on public good provision may be different if there is an asymmetry in the access to/use of saving/investment by husbands and wives. If women spend less on children because they spend less on investment goods, then it is not obvious that giving more money to women is a desirable policy.

Second, we show that for the constraint-based theories, the gender differences disappear in the long run as countries develop. For example, if it is the lack of access to "female specific goods" that makes women behave more child-friendly, then, as the country develops (and women gain more access), the female "bias" towards children will disappear.

Similarly, an increase in female labor force participation removes differences based on endogenous preference differences and also removes differences based on the importance of sons. Also, if women invest more in children because they are discriminated against in the labor market (or have lower returns to investment), then, again, as women and men become more equal through the development process, the result that women favor children will disappear.

A general conclusion arising from this work is that more measurement and empirical work is needed to distinguish between the various theoretical models that can explain the observed empirical pattern. Clearly, the most common frameworks of the family-economics literature, the unitary model and the collective model, cannot explain the data. While all models that we present built on the non-cooperative approach to household bargaining, they have quite distinct implications for the effects of various gender-based policies. Only once we have some confidence in which of these models provides the best guide to reality will we be in a position to provide credible policy recommendation for gender-based development initiatives. The good news is that the empirical implications of the models are quite distinct and could be tested. Future research should be devoted to deciding which of the proposed models is the most empirically plausible.

The remainder of this paper is organized as follows. In Section 2 we survey the empirical literature. In Section 3 we survey the existing literature on spousal bargaining and summarize its predictions for child expenditure patterns. In Section 4 we build a new theory based on the non-cooperative approach. Section 5 concludes.

2 What are the Facts?

In this section, we survey the empirical literature on the link between gender-specific income, education, and transfers on consumption expenditure shares and investment in and outcomes of children. Tables 1 and 2 in the appendix provide a brief comparison of the main findings of some key studies.

2.1 Expenditures on Children

2.1.1 Empirical Evidence on the Effects of Female Empowerment

Lundberg, Pollak, and Wales (1997) use a natural experiment in the United Kingdom and find that redistributing income from fathers to mothers increases, among other things, spending on children's clothing. The experiment is provided by a change in the Child Allowance Law in the 1970s. The universal child benefit that previously consisted of reduced tax withholding from the father was replaced by a cash payment to the mother. The authors find that the change in the law significantly increased the expenditure of children's clothing (and women's clothing) relative to men's clothing.

Duflo and Udry (2004) use a natural experiment in Cote d'Ivoire where the exogenous variation in women's relative income is produced by variation in rainfall. In Cote d'Ivoire, women and men tend to cultivate different crops that are differently affected by the same pattern of rainfall. This creates exogenous variation in their income. Duflo and Udry (2004) find that a rainfall shock that increases women's crop has different effects on the structure of expenditures than a shock that increases men's crop. More specifically, an increase in the output of crops cultivated mainly by women increases expenditures on food. An increase in output cultivated by men has no impact on food, except in the case of yam. The authors claim that yam is a special crop with strong social norms associated with using the income from it on household public goods. They find that an increase in the output of yam is associated with increase in the expenditures on education and food. More specifically they find that a 10 percent increase in yam income is associated with a 3 percent increase in education expenditure, while the same increase in female and male (non-yam) income is associated with 1 percent decline in education expenditure. A 10 percent increase in income from woman's crops is associated with a 4 percent increase in expenditure on purchased foods, while the same increase in man's crops is associated with a 0.3 percent decrease.

2.1.2 Empirical Evidence on the Benefits of Larger Household Resources

There are several studies that find that giving more resources to women is associated with an increase in children's outcomes. These studies focus on aid programs that give transfers only to women. When the participants of such programs are randomly chosen, it is possible to identify the impact of these transfers. One of these programs is PROGRESA in Mexico, and Attanasio and Lechene (2002) and Rubalcava, Teruel, and Thomas (2009) have addressed the question of the impact of the PROGRESA transfers on expenditures. Another such program is a conditional cash transfer program in Nicaragua that is analyzed in Gitter and Barham (2008). However, these studies are not able to answer the question of whether the outcomes would be any different if the additional resources were given to men. The general finding in these studies (that children benefit from an increase in household income), is unsurprising, since we expect people in developing countries to have binding budget constraints.

2.1.3 Correlations between Resource Allocation by Gender and Children's Outcomes

Since natural experiments are rare and field experiments (at least until recently) are difficult to organize, there is a sizeable literature that does not address causality direction and instead documents correlations between gender-specific resources (income, assets, human capital) and the allocation in the household and children's outcomes. For a survey of this literature see the handbook chapter by Behrman (1997). While some of the findings in this literature are suggestive, it does not give an answer to the question of whether giving women more income and education would improve children's outcomes. Neither does it answer the question of whether outcomes would be better compared to the situation where additional income and education was given to men.

Relative income: The above-mentioned studies Attanasio and Lechene (2002) and Rubalcava, Teruel, and Thomas (2009) use data from the PROGRESA program in Mexico and find that in households that receive the transfer compared to households that have the same after-transfer income but did not receive the transfer, the share of income spent on children clothing is higher. Attanasio and Lechene (2002) find that the magnitude of the effect differs across specifications, but according to one of the specifications an increase of 10 percentage points in the share of income of the wife is associated with an increase of girl's clothing expenditure share of 12 percent and of boy's clothing of 6 percent. Additionally, Attanasio and Lechene (2002) find that the share of income spent on alcohol is lower in the households that used to be poorer but now received the transfer that equalized their income with the richer households (according to one specification the an increase of 10 percentage points in the share of income of the wife is associated with a decrease in the alcohol expenditure share of 3 percent). Their results regarding food expenditures are mixed and depend on the regression specification, while Rubalcava, Teruel, and Thomas (2009) find that in households that receive PROGRESA transfer the spending on food is higher in absolute terms and the income share spent on food is lower.

It is important to recognize that the effect associated with PROGRESA transfers cannot be interpreted as the gender effect of the transfer, since the households that differ in their initial income are likely to behave differently even when the transfer equalizes their income.[2] Given the data, it is not possible to identify the gender effect. Moreover, the interpretation of the results is complicated, since people in the PROGRESA treatment group are subject to additional measures, they receive incentives for their children to attend school, modest food supplement, and nutrition counseling. Overall, the results do not allow us to assess whether if the PROGRESA transfer was given to men, results would have been any different.

Other studies use similar methods. Examples include Hoddinott and Haddad (1995) who use data from Cote d'Ivoire, where they find that an increase in the wife's share of income is associated with an increase in the share of expenditures on food and a decrease in the share of expenditures on alcohol and cigarettes. Phipps and Burton (1998) use data from Canada and find that the share of wives' income matters (even when both spouses work full time) for several expenditure categories, such as child care, children's clothing, and food. They find that women's income is associated with higher child care expenditures, while men's income is not.

Gitter and Barham (2008) look at the conditional cash transfer program in Nicaragua, which gives the cash transfers to women. They test the hypothesis whether women's relative education compared to her husband is associated with larger treatment effect of the conditional cash program. They find that not the relative education but the number of years of schooling itself are associated with higher expenditures on food. Additionally, as mentioned above they find that the impact of the cash transfer program increases expenditures on children.

Rubalcava and Thomas (2000) exploits differences across U.S. states and time in the aid paid to single women with children (Aid to Families with Dependent Children, AFDC). Since the aid increases the outside option of married women,

[2] Attanasio and Lechene (2002) and Rubalcava, Teruel, and Thomas (2009) look at the households where the after transfer incomes are equal and compared the households that received the transfer to the ones that did not, interpreting all the difference in the expenditures as the impact of the transfer. In other words, they assume that all the income differences before the transfer were purely random.

it should also increase their bargaining power in the household. The results show that larger aid is associated with a lower share of income allocated to food, which the author claims that reflects the increase in the bargaining power of women.

Loans: A few studies look at microfinance in Bangladesh and find that when women take a loan they tend to use it for different purposes than men. Pitt and Khandker (1998) find that for every 100 additional taka borrowed by women the annual household consumption expenditure increases by 18 taka compared to 11 taka when the borrower is a man. However, this may just reflect the selection into borrowing or not borrowing. Namely, men from richer households tend to borrow more and women from poorer households tend to borrow more. Also, the effects are not statistically significantly different from each other. Khandker (2005) finds that when women borrow then the household's per capita food as well as non-food expenditure increases, while men's borrowing does not have a significant effect.[3]

Assets: Doss (2006) finds that in households where women have larger asset holdings the share of expenditures on food and education are larger, but on alcohol is smaller. The evidence is based on data from Ghana. Once again, the design of the study does not allow drawing conclusions about causality.

Female headed households vs male headed households: There are a few studies comparing expenditures in female vs male headed households. For example, it has been found that in female headed household compared to male headed households, there are smaller expenditures on alcohol (Kennedy and Peters (1992), Case and Deaton (1998)). Kennedy and Peters (1992) compare female vs male headed households in Kenya and Malawi and find that in female headed households, a larger share of budget is spent on food. Case and Deaton (1998) make the same comparison in South Africa and find that in female headed households,

[3] de Mel, McKenzie, and Woodruff (2009) find that random grants provided to women's microenterprises in Sri Lanka have lower returns than those invested in men's microenterprises and the gender gap persists even in the same industries.

there are smaller expenditures on alcohol. Moreover, in female headed households there are lower expenditures on everything except insurance and clothing. Since there is no exogenous variation in household heads, these papers cannot identify the effect on expenditures of female heading the household.

2.2 Children's Education

2.2.1 Empirical Evidence on the Effects of Female Empowerment

Pitt and Khandker (1998) study the impact of microcredit by gender. They use a field experiment of microcredit availability in Bangladesh, where in some villages there is microcredit available only to men or only to women. They find that credit provided to women increases children's schooling significantly, while credit provided to men does not. They study the effect on the school enrollment of children aged 5–17 at the time of the survey. They find that a 1 percent increase in Grameen Bank credit to women is associated with an increase in the probability of girls' school enrollment by 1.86 percentage points. Credit from other banks or credit to men has no statistically significant effect on girls school enrollment. In case of boys' school enrollment, credit to both men and women has significant effects. A 1 percent increase in Grameen Bank credit to women and men is associated with an increase in the probability of boys' school enrollment by 2.4 and 2.8 percentage points, respectively. A 1 percent increase in the BRDB credit to women is associated with the increase in the probability of boys' school enrollment by 3.1 percentage points. Note that Pitt and Khandker (1998) test the null hypothesis whether men's and women's credit effects on school enrollment are equal, and find that they cannot reject this.

2.2.2 Correlations between Resource Allocation by Gender and Children's Outcomes and Empirical Evidence on the Benefits of Larger Household Resources

The above cited study by Gitter and Barham (2008) finds that the the cash transfer program increases school enrollment. They also find that in the households where women's relative education is higher, the expenditures on children's education are larger and school enrollment is larger.

2.3 Children's Health

Wolpin (1993) gives an overview of the literature on the impact of mothers' and fathers' resources on mortality and health of infants.

2.3.1 Empirical Evidence on the Benefits of Larger Household Resources

Atkin (2009) uses data from Mexico to study the effect of mothers' employment in manufacturing on children's health outcome, namely height for age. To identify the effect, the geographic variation in the opening of new factories at the time women enters the labor market is used. The study finds that child health outcomes improve for the women who end up working in manufacturing due to the new factory opening but would have not worked in manufacturing otherwise. Namely, children are between 1.18 and 1.75 standard deviations taller than children whose mothers did not have their first job in manufacturing. The difference between boys and girls is not significant, but girls are between 1.92 and 2.61 standard deviations taller, and boys are between 0.67 and 1.22 standard deviations taller. The paper identifies the effect of mothers' work in manufacturing on children's health, but it does not address the question of whether changing the resource distribution between mothers and fathers have has impact on children health.

The above cited study by Rubalcava, Teruel, and Thomas (2009) finds that in households that received the PROGRESA transfer, caloric intake is larger by 100 calories per person per day, compared to similar households that did not receive the transfer.

2.3.2 Correlations between Resource Allocation by Gender and Children's Outcomes

Duflo (2000) and Duflo (2003) uses survey data from South Africa to analyze whether the gender of the cash transfer recipient matters for the health impact on children. The cash transfers in the data set are old age pensions.[4] Duflo (2003) finds that in households where there is a woman receiving an old-age pension compared to households household where no one receives a pension, girls have better anthropometric status (weight for height and height for age), while there is no significant difference for boys. (Girls in households with a women receiving the pension have 1.19 standard deviation large weight for height.) No similar difference is found when comparing households where a man receives a pension to households where no one receives one. Note that the identification of this effect of the impact of the gender of the cash transfer recipient using this data is difficult, since first the households with and without grandparents eligible for pensions might not be the same and becoming eligible for a old-age pension might have other effects on children that are not related to the cash transfer.

Thomas (1990) studies gender differences in the impact of non-wage income on health and nutrition in Brazil. The non-wage income (pensions, social security, worker compensation, rents and income from physical assets, financial assets, gifts, and other irregular income) of mothers has a larger benefit for family's health and for child survival probabilities; in fact, the effect is almost 20 times bigger compared to that of the income of the father. He finds that the null hypothesis that mothers' and fathers' non-wage income is associated with equal health outcomes can be rejected in case of child survival rate, child's weight for height, and household per capita protein intake, but equality cannot be rejected in case of child's height for age and household per capita calory consumption. He also finds that mothers' non-wage income has a significant effect on daughters' weight for height, and that the effect is significantly larger than the effect on sons' weight for height. Fathers' non-wage income has a significantly larger effect on sons' weight for height compared to the effect on the daughters. Thomas also

[4] Burns, Keswell, and Leibbrandt (2005) gives an overview of South Africa's pension system and the literature on the gender differences of its effects.

looks at the relationship between parents' education and children's health. At some education levels, he finds a significant difference in the impact of mothers' and fathers' education on girls' and boys' height.

The above cited study by Rubalcava, Teruel, and Thomas (2009) finds that in households that received the PROGRESA transfer, caloric intake is lower but protein intake per calories is larger, compared to the households that did not receive the transfer but that have the sane after-transfer income.

2.4 Effects on Other Outcomes

2.4.1 Empirical Evidence on the Effect of Women's Empowerment on Public Good Provision

Chattopadhyay and Duflo (2004) study how the gender of political leaders affects public good provision in rural India using data from a field experiment. In India, one third of the local government head positions have been randomly reserved to women. They find that leaders invest more in infrastructure that is directly relevant to the needs of their own genders. Namely, female leaders favor drinking water and roads in West Bengal and drinking water in Rajasthan. (Women collect drinking water in these places, and are employed building roads in West Bengal.) They invest less in public goods that are more closely linked to men's concerns: education in West Bengal and roads in Rajasthan.

2.4.2 Experimental Evidence on Gender Differences in Preferences

One underlying reasons for gender differences in behavior could be differences in various aspects of preferences such as risk aversion, altruism, time preferences etc.. For a recent overview of the experimental evidence on this issue see Croson and Gneezy (2009). They conclude that there exists robust evidence that women are more risk averse. They also find that there exist gender differences in other-regarding preferences (altruism, inequality aversion, reciprocity). Namely, their finding is that women are not generally less nor more other-regarding than men, but women's social preferences are more situation specific.

For example, Bauer and Chytilová (2009) test for gender differences in the discount rate and risk aversion using data from a lab experiment (in the field) in rural India. They find evidence of gender differences in discount rate, but not in attitudes toward risk. Namely, they find that childless men and women have the same discount rates, but women with children under 18 appear more patient than men with children. The more under-18 children the women have (up to 4), the more patient they are relative to men with the same number of children. Magnitude of difference appears large.

3 Overview of Models of Spousal Decision Making

In this section we provide a brief overview of the main frameworks for modeling decision making in marriage. This includes unitary decision-making, collective decision-making with fixed and endogenous bargaining weights, Nash bargaining, "separate spheres bargaining," and noncooperative bargaining. In each model, we explore the implications of preference differences between the spouses (in particular that women care more about children) for expenditure shares on children. In particular, we want to know in which models an increase in the wife's income leads to an increase in the expenditure share on children. Not surprisingly, the unitary model and the collective models do not deliver the desired result. However, even the bargaining models lead to income-pooling results in a number of circumstances, meaning that only total income, but not the source of income, matters for the consumption.

3.1 Unitary Model

Becker (1973) models marriage as a union in which two economic agents become one – within marriage, couples maximize a single utility function subject to a budget constraint in which incomes are pooled. This unitary model of marriage can be captured by the following maximization framework:

$$\max_{c_f, c_m, C} \quad U(c_f, c_m, C) \tag{1}$$

$$\text{s.t.} \qquad c_f + c_m + C \leq y_f + y_m$$

where c_f is consumption by the female partner in the marriage, c_m is her husband's consumption. C is consumption of a public good in the marriage. We interpret as C as spending on children. Finally, y_f and y_m are wife's and husband's income, respectively.

It is fairly obvious that gender preference differences within this framework do not generate the desired positive relationship between wife's income and expenditure share on children's goods. The reason is that when the household acts as a single economic agent, any distinction in whose income it is irrelevant as only the sum of the incomes enters into the decision problem. Thus, C^* adjusts symmetrically in response to changes in either husband's or wife's income, and so the **share** of expenditure devoted to C cannot change any differently whether the husband or the wife has an income increase.

3.2 Collective Model with Fixed Bargaining Weights

Consider the collective bargaining model developed in Chiappori (1988) and Chiappori (1992). In this model, partners in marriage make decision by solving a Pareto problem, with different weights on husband and wife that represent their relative bargaining power. We first consider exogenous bargaining weights. The choice problem looks thus:

$$\max_{c_f, c_m, C} \quad \theta u_f(c_f, c_m, C) + (1-\theta) u_m(c_f, c_m, C) \tag{2}$$

$$\text{s.t.} \qquad c_f + c_m + C \leq y_f + y_m$$

where θ is the weight on the wife's utility. Again, only the sum of the income enters into the joint budget constraint and hence it is immediately obvious that the optimal expenditure share on C cannot be a function of relative incomes. This result is independent of the details of preferences, i.e. it holds even if spouses disagree about the importance of children.

3.3 Collective Model with Endogenous Bargaining Weights

In this section, we modify the assumption that bargaining weights in a collective bargaining model are exogenously given. Instead, we consider a model in which a spouse's bargaining weight is proportional to his/her share of income. Thus, θ, or the weight on the wife's utility, increases with $\frac{y_f}{y_f+y_m}$. We write the maximization problem as:

$$\max_{c_f,c_m,C} \quad \theta\left(\frac{y_f}{y_f+y_m}\right)u_f(c_f,c_m,C)+\left(1-\theta\left(\frac{y_f}{y_f+y_m}\right)\right)u_m(c_f,c_m,C) \tag{3}$$

$$\text{s.t.} \qquad c_f+c_m+C \leq y_f+y_m$$

We assume that a wife's bargaining power increases as her share of household income increases. That is,

$$\frac{\partial\theta}{\partial\frac{y_f}{y_f+y_m}} > 0$$

Then, as long as women put a higher weight on child expenses than men, an increase in female income will lead to higher spending on children. However, without explicitly modeling how such a change in bargaining position comes about this is an *ad hoc* formulation that does not provide insight into the true source of the observed gender differences.

3.4 Nash Bargaining

We now turn to explicit game-theoretic models of marital bargaining. The baseline model is the Nash bargaining model studied by Manser and Brown (1980) and McElroy and Horney (1981).

$$\max_{c_f,c_m,C} \quad \left(u_f^m(c_f,c_m,C)-u_f^s(y^f)\right)\left(u_m^m(c_f,c_m,C)-u_m^s(y^m)\right) \tag{4}$$

$$\text{s.t.} \qquad c_f+c_m+C \leq y_f+y_m$$

where u_f^s and u_m^s is utility of a single female and single male respectively. The problem amounts to maximizing a weighted welfare function of the two spouses subject to a joint budget constraint. Income is pooled in the budget constraint, so that from the constraint alone no differences in behavior should be observed. However, changes in gender-specific income can affect income shares through their effect on the outside options u_f^s and u_m^s. A change in female income that equally affects earnings opportunities within and outside marriage would raise women's outside option, which implies that women will have more say in marital decision making. If then women also have different preferences, a gender-specific effect on expenditure shares can follow.

However, a limitation of this approach is that the only relevant outside option is the end of the relationship, i.e., divorce. The empirical literature finds gender-specific effects on consumption expenditure shares for a number of experiments that only affect married people, without changing outcomes in the case of divorce. Thus, while explicit bargaining models are generally a promising framework for the analysis, ideally one would like to see a model in which the outside option is not exclusively given by utility after divorce. One such model is the separate spheres model of Lundberg and Pollak (1993), in which there is an outside option of non-cooperation while continuing the marriage. The interpretation of the state of non-cooperation in difficult, however, because in the model this state never occurs in equilibrium, so that it is difficult to tie this model to empirical evidence.

3.5 Noncooperative Bargaining: Nash Equilibrium

The final possibility is noncooperative bargaining. In this model, the spouses have separate budget constraints, and outcomes are given by a Nash equilibrium of the game played between the spouses. We will use this framework for the bulk of our analysis, and discuss it further in the sections below.

4 Gender Differences in Public-Good Provision: The Noncooperative Case

From here on, we focus on the noncooperative model of spousal decision making. This has the obvious advantage that in this framework gender effects on consumption expenditure shares are possible and can be linked to the explicit structure of the game played between the spouses. Criticisms of the noncooperative models have focused on the fact that the spouses play a repeated game for a long time, suggesting that it should be relatively easy to sustain some form of cooperation to avoid inefficient Nash equilibria. However, in our view this criticism can be countered in two ways. First, as we discuss briefly below even under noncooperative bargaining outcomes may be close to efficient if the spouses are altruistic towards each other. The fact that the spouses play a Nash equilibrium does not imply that they do not care for each other; if they care for each other a lot, there is little need for additional cooperation to avoid inefficient outcomes. Second, even if one does not take the noncooperative model literally, it is still the case that in cooperative bargaining models noncooperative outcomes have some role to play, namely as the description of the outcome that serves as the threat point in marital bargaining. Thus, one can also view the analysis below as describing the threat point that drives a larger bargaining game. Most of the results derived here would carry over to that larger game.

4.1 The Basic Model with Continuum of Public Goods

In the literature, the noncooperative model is usually considered under the assumption of a finite number of goods (i.e., one public and one private good). However, such a formulation is characterized by corner solutions in which only one spouse contributes to public goods, which is not a useful outcome to relate the model to the data we are interested in. We therefore adopt a model with a continuum of public goods as our baseline framework.

Consider a husband and wife with preferences:

$$u(c_f) + \int_0^1 U(C_i)\, \mathrm{d}i, \tag{5}$$

$$u(c_m) + \int_0^1 U(C_i)\, \mathrm{d}i, \tag{6}$$

Here c_f and c_m are the private goods of wife and husband, and the C_i are a continuum of public goods for the household, indexed from 0 to 1. Husband and wive have symmetric preferences. The functions u and U are both increasing, concave, continuously differentiable, and satisfying the usual Inada conditions.

Husband and wife face the following separate budget constraints:

$$\begin{aligned} c_f + \int_0^1 C_{f,i}\, \mathrm{d}i =& y_f, \\ c_m + \int_0^1 C_{m,i}\, \mathrm{d}i =& y_m. \end{aligned}$$

Here $C_{f,i}$ and $C_{m,i}$ are the wife and husband's contributions to public good i, so that we have:

$$C_i = C_{f,i} + C_{m,i}.$$

The incomes of wife and husband are given by y_f and y_m.

4.1.1 Income Pooling Result

We are interested in Nash equilibria. That is, each spouse separately chooses private consumption and the contributions to public consumption, taking as given the choices of the other spouse and the budget constraint. Taking as given the expenditures of the spouse, each spouse would spend to satisfy the condition:

$$U'(C_i) \leq u'(c_f),$$

for all i, with equality whenever the spouse contributes to good i. The only reason that a spouse may not contribute to a given public good is if the other spouse already supplies at least the desired amount.

This condition implies that in Nash equilibrium, it will never be the case that both spouses contribute to the same public good, because then one spouse could lower his or her contribution, thereby saving money, without changing the provision of the good (it would still be determined by the other spouse's marginal valuation). Thus, the space of public goods will be divided into female and male provided goods. Given homogeneous preferences, all goods will be provided at the same level since for any goods i and j both the conditions

$$U'(C_i) \leq U'(C_j),$$

$$U'(C_i) \geq U'(C_j),$$

have to be satisfied (combining the perspective's of the two spouses), so that we must have:

$$U'(C_i) = U'(C_j)$$

and hence $U'(C_i) = U'(C_j)$. We therefore obtain an income pooling result: we will observe:

$$u'(c_f) = U'(C_i) = u'(c_m)$$

in equilibrium, which corresponds to the problem of maximizing:

$$u(c_f) + u(c_m) + \int_0^1 U(C_i)\,\mathrm{d}i, \tag{7}$$

subject to the pooled budget constraint:

$$c_f + c_m + \int_0^1 C_i\,\mathrm{d}i = y_f + y_m.$$

This result holds as long as income of each spouse is high enough to provide at least some positive fraction of the public goods. If income inequality is very large, there can be corners where one spouse only provides the private good. If the female spouse is the poor one, in the corner case we would have:

$$u'(y_f) > U'(C_i) = u'(c_m).$$

In the interior region, the equilibrium reacts to changing relative income by changing the fraction of public goods provided by husband and wife, respectively. Notice that it is not determined here which goods are provided by husband and wife; only the number (measure) of goods provided by each spouse is determined.

This finding applies even if husband and wife attach different relative weights to public versus private goods: For example, consider a case where preferences are:

$$u(c_f) + \int_0^1 U(C_i)\,\mathrm{d}i, \tag{8}$$

$$u(c_m) + \gamma \int_0^1 U(C_i)\,\mathrm{d}i, \tag{9}$$

with $\gamma < 1$, so that the husband cares relatively less about public goods. Despite the asymmetry in preferences and non-cooperative bargaining, the income pooling result still applies, where the equilibrium condition now becomes:

$$u'(c_f) = U'(C_i) = \gamma^{-1} u'(c_m).$$

The husband will consume a greater share of household income than the wife, but income transfers to either spouse have the same effect on each spending category.

Thus, we see that a preference asymmetry together with noncooperative decision making is not enough to get different reactions to income transfers.

To break the income pooling result, we have to do one of the following things (or both of them):

- Drop assumption that both spouses have same (relative) preferences across public goods (i.e., the MRS between two public goods i and j may depend on gender).
- Drop assumption that contributions of the two spouses to each public good are perfect substitutes.

In the following sections, we will explore how modifications to these assumptions lead to new implications for how the allocation depends on male and female income.

4.1.2 Altruism and Efficiency

Before proceeding to new models, we would like to remark on the efficiency of the non-cooperative outcome. The income pooling may suggest that the Nash equilibrium outcome solves a planning problem. This is not quite correct, because the objective function implicitly solved by the Nash equilibrium is:

$$u(c_f) + u(c_m) + \int_0^1 U(C_i)\,\mathrm{d}i,$$

whereas a social planner would solve:

$$u(c_f) + u(c_m) + 2\int_0^1 U(C_i)\,\mathrm{d}i.$$

That is, the planner accounts for the fact that both spouses care about public goods and would therefore give more weight to the public goods, whereas this concern does not arise in the Nash equilibrium outcome.

Some economists have used the inefficiency of the Nash outcome to argue against non-cooperative bargaining in a family context, making the argument that in a long repeated relationship the partners should be able to find ways to avoid this inefficiency. We would like to briefly point out that the ineffiency would also be lowered by altruism. Consider a model in which the spouses care for each other with weight α, i.e., utility is:

$$u(c_f) + \alpha u(c_m) + \int_0^1 U(C_i)\,\mathrm{d}i, \tag{10}$$

$$u(c_m) + \alpha u(c_f) + \int_0^1 U(C_i)\,\mathrm{d}i. \tag{11}$$

In this case, the objective function solved by the Nash equilibrium is:

$$u(c_f) + u(c_m) + (1+\alpha)\int_0^1 U(C_i)\,\mathrm{d}i,$$

whereas a social planner would solve:

$$u(c_f) + u(c_m) + 2\int_0^1 U(C_i)\,\mathrm{d}i.$$

Thus, as α approaches one, the two problems converge. We therefore would like to recognize that altruism does not rule out non-cooperative bargaining; in fact, the more altruistic the spouses are, the closer the Nash equilibrium comes to the efficient outcome, and the less need would there be to find ways to avoid this inefficiency. Thus, in our view the Nash outcome may in fact be quite reasonable.

Introducing altruism does not lead to any qualitative changes in our results. For simplicity, we will frame the remaining analysis without altruism, but the same argument about efficiency could be applied to each of the models below.

4.2 Gender-specific Preferences over Public Goods

We now consider a model in which men and women have different preferences over public goods. There are some public goods that women find more important, and others that are more attractive to men. We will see that in this framework the income pooling result no longer applies.

We still consider a non-cooperative outcome in a model with a continuum of public goods. Consider a husband and wive with preferences:

$$u(c_f) + \int_0^1 i\,U(C_i)\,\mathrm{d}i, \tag{12}$$

$$u(c_m) + \int_0^1 (1-i)\,U(C_i)\,\mathrm{d}i, \tag{13}$$

That is, husband and wife have symmetric preferences overall, but they evaluate the continuum of public goods differently. The public goods are indexed in such a manner that women's relative preference for a good rises with the index i. The functions u and U are both increasing, concave, and continuously differentiable, and satisfying the usual Inada conditions.

Husband and wife face the budget constraints:

$$\begin{aligned} c_f + \int_0^1 C_{f,i} \,\mathrm{d}i =& y_f, \\ c_m + \int_0^1 C_{m,i} \,\mathrm{d}i =& y_m, \end{aligned}$$

where $C_{f,i}$ and $C_{m,i}$ are the wife and husband's contributions to public good i. The public good then is:

$$C_i = C_{f,i} + C_{m,i}$$

for all i. Husband and wife seek to maximize utility subject to the budget constraint and non-negativity constraints on consumption and their contributions to each public good. We are interested in Nash equilibria, i.e., each spouse maximizes taking the other spouse's contributions as given.

We start by characterizing the best response. Given assumptions on utility, a spouse will contribute to the private good and all public goods that the other spouse does not contribute to. Maximization for the wife implies:

$$u'(c_f) \geq iU'(C_i),$$

with equality for all goods that the husband does not contribute to. Similarly, from the husband's perspective we have:

$$u'(c_m) \geq (1-i)U'(C_i),$$

with equality for all goods that the wife does not contribute to.

Consider first the simple case with $y_f = y_m$. One can conjecture that there is a Nash equilibrium with the following properties:

$$c_f = c_m = c, \quad C_{f,i} = 0 \;\; \forall i \in [0, 0.5], \quad C_{m,i} = 0 \;\; \forall i \in (0.5, 1],$$

and:

$$
\begin{aligned}
u'(c) =& (1-i)\, U'(C_i) \quad \forall i \in [0, 0.5], \\
u'(c) =& i\, U'(C_i) \quad \forall i \in (0.5, 1].
\end{aligned}
$$

This equilibrium is in fact the only Nash equilibrium.

To see this, first note that the individual decisions are clearly optimal given the range of public goods that the other spouse elects to provide. We therefore only need to check that there are no other equilibria with a different range of goods provided by the spouses.

Consider a situation in which the husband deviates from the Nash equilibrium by only providing public goods in the interval $[0, 0.5-\epsilon]$, with $\epsilon > 0$. Then the wife in her best response would also provide the goods in the interval $(0.5-\epsilon, 0.5]$. However, her chosen level of provision would be lower than what the husband would have chosen. The best response to the wife's choice would be to top off the wife's provision. Thus, the original decision to provide a smaller range of public goods cannot be part of the Nash equilibrium. Clearly, it also cannot happen in equilibrium that both spouses contribute to a given public good, because the spouse who values the good less could lower the contribution without a decline in provision.

Generalizing from the symmetric case, the unique Nash equilibrium for general income levels has the feature that there is a cutoff $\bar{i}$ such that the following conditions are satisfied:

$$
\begin{aligned}
u'(c_m) =& (1-i)\, U'(C_i) \quad \forall i \in [0, \bar{i}], \\
u'(c_f) =& i\, U'(C_i) \quad \forall i \in (\bar{i}, 1].
\end{aligned}
$$

The cutoff is characterized by:

$$
\lim_{i \to \bar{i}^+} C_i = \lim_{i \to \bar{i}^-} C_i,
$$

that is, at the cutoff, husband and wife would like to provide equal amounts of the public good.

Given this characterization, we can now assess how changes in the division of income affects the equilibrium. When female income increases keeping male income constant, the wife's willingness to pay also goes up relative to that of the husband, so that $\bar{i}$ declines and more public goods are provided by the wife. Consumption of all public and private goods increases, because the wife has more money and the husband ends up providing fewer public goods. However, the consumption of public goods provided by the wife should increase relatively more.

As a concrete and tractable example, we consider the case of logarithmic utility where:

$$U(c) = u(c) = \log(c).$$

The equilibrium conditions can now be written as:

$$\begin{aligned}\frac{C_i}{c_m} =& (1-i) \quad \forall i \in [0, \bar{i}],\\ \frac{C_i}{c_f} =& i \quad \forall i \in (\bar{i}, 1].\end{aligned}$$

The cutoff condition implies that:

$$(1-\bar{i})c_m = \bar{i}c_f,$$

so that:

$$\bar{i} = \frac{c_m}{c_f + c_m}.$$

The male budget constraint is:

$$c_m + \int_0^{\bar{i}} C_{m,i}\, \mathrm{d}i = y_m.$$

Using the optimality conditions, this gives:

$$c_m\left(1 + \bar{i} - \frac{\bar{i}^2}{2}\right) = y_m. \tag{14}$$

The corresponding derivation for the female budget constraint is:

$$c_f \left(\frac{3 - \bar{i}^2}{2} \right) = y_f. \tag{15}$$

We can characterize how consumption depends on $\bar{i}$. If public good i is provided by the husband and j is provided by the wife, we have the following ratio:

$$\frac{C_j}{C_i} = \frac{i}{1-i} \frac{1-\bar{i}}{\bar{i}}.$$

This follows from the fact that husband and wife prefer the same provision at the cutoff. Thus, when female income goes up and consequently the cutoff shifts from $\bar{i}$ to $\hat{i} < \bar{i}$, the ratio of consumption of female-provided to male-provided public goods goes up by a factor of:

$$\frac{\frac{1-\hat{i}}{\hat{i}}}{\frac{1-\bar{i}}{\bar{i}}}.$$

We can also characterize the relative private consumption and income of husband and wife:

$$\frac{c_f}{c_m} = \frac{1-\bar{i}}{\bar{i}}.$$

Using the budget constraint and rearranging, the income ratio is given by:

$$\frac{y_f}{y_m} = \frac{3 - 3\bar{i} - \bar{i}^2 + \bar{i}^3}{2\bar{i} + 2\bar{i}^2 - \bar{i}^3}. \tag{16}$$

The ratio of total expenditure on public goods to total private consumption is given by:

$$\frac{C}{c_f + c_m} = \frac{1}{2} \left(1 - \bar{i} + \bar{i}^2 \right). \tag{17}$$

This ratio is minimized at $\bar{i} = 0.5$ and maximized at the two extremes $\bar{i} = 0$ and $\bar{i} = 1$, i.e. total public goods expenditures are u-shaped in the income ratio. Figure I shows how the share of public goods in total spending varies with the female income share $y_f/(y_f + y_m)$.

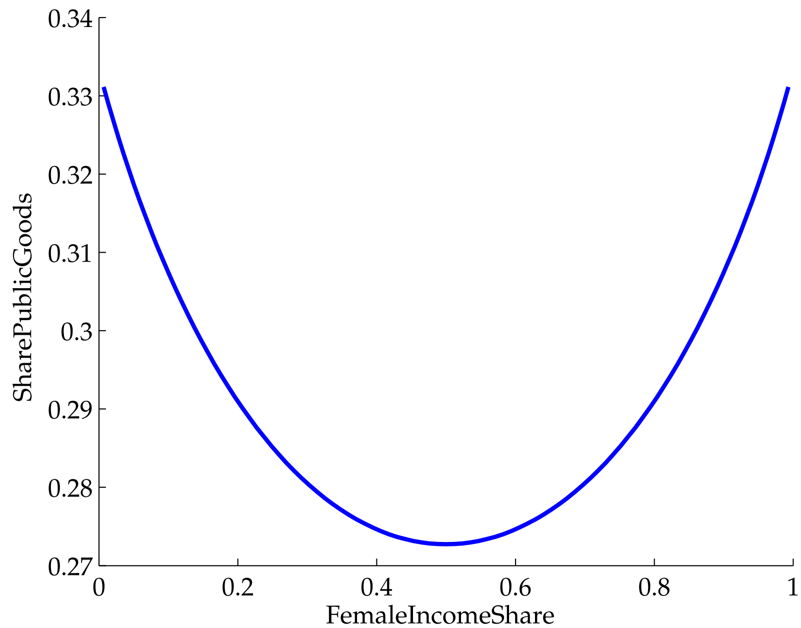

Figure I: Share of Public Consumption as a Function of Female Income Share

So far we haven't said anything about child goods specifically. Let us now assume that some of the public goods are child specific (and that those are the more time intensive ones) while others are general public goods, such as cooked meals. Specifically, assume that there is a cut-off a so that all goods $i \in [a, 1]$ are child goods and all goods in $i \in [0, a)$ are general public goods. Let C^k be total expenditures on child-related public goods and C^g be total expenditures on general public goods. Assume we start with an income division such that $\bar{i} < a$. If we now increase the relative income of women, what will happen to the expenditure share of child goods?

Since we started with an equilibrium where all child goods are provided by women and since more income for women moves the threshold $\bar{i}$ to the left, total expenditures on child goods are given by:

$$C^k = \int_a^1 C_{if} di = \int_a^1 i c_f di = \frac{1}{2}(1 - a^2) c_f.$$

The expenditure share on child goods is

$$\frac{C^k}{y_m + y_f} = \frac{\frac{1}{2}(1-a^2)c_f}{y_m + y_f}.$$

Using the budget constraints and simplifying, this can be written as

$$= \frac{\frac{1}{2}(1-a^2)}{(1+1/2-1/2\bar{i}^2) + (1+\bar{i}-1/2\bar{i}^2)\frac{\bar{i}}{1-\bar{i}}}.$$

This expression decreases in $\bar{i}$. Therefore, as y_f increases relative to y_m (and hence $\bar{i}$ declines), total child expenditures increase. We therefore have a first example of a model where giving additional resources to women (an increase in y_f) will increase the expenditure share of child goods.

What happens if initially $\bar{i}$ is to the left of a? In this case, some of the original child goods are provided by the husband and some by the wife. As the wife's income increases, she will be taking over more child goods and spend more on each. However, the child goods that remain under the control of the husband will increase less than proportionally, so it's not clear what the overall effect will be. Total expenditures on children for this case are

$$C^k = \int_a^{\bar{i}} (1-i)c_m di + \int_{\bar{i}}^1 ic_f di = (\bar{i} - 1/2\bar{i}^2 - (a - 1/2a^2))c_m + (1/2 - 1/2\bar{i}^2)c_f :$$

As a fraction of total income we have

$$\frac{C^k}{y_m + y_f} = \frac{\bar{i} + 1/2\frac{1}{\bar{i}} - 1/2 - a + \frac{a^2}{2}}{\frac{\bar{i}}{2} + 3/2\frac{1}{\bar{i}} - 1/2}.$$

This expression is hump-shaped in $\bar{i}$. It depends on where $\bar{i}$ is relative to a. Define

$$F(\bar{i}) \equiv \frac{\bar{i} + 1/2\frac{1}{\bar{i}} - 1/2 - a + \frac{a^2}{2}}{\frac{\bar{i}}{2} + 3/2\frac{1}{\bar{i}} - 1/2}.$$

Then, $F'(\bar{i})|_{\bar{i}=1} > 0$ and $F'(\bar{i})|_{\bar{i}=a} < 0$. In other words, when $\bar{i}$ is close to 1, so that initially women have no income, then an increase in women's income leads to a decrease in expenditures on children. On the other hand, if $\bar{i}$ is close enough to

a, so that initially men do not pay too many of the child goods, then an increase in women's income leads to an increase in child expenditures.

4.3 Endogenous Preference Differences through Limited Availability of Female-specific Consumption Goods

While it is typically assumed that the empirical finding that women spend more on children results from preference differences between spouses, this conclusion is far from obvious. We now consider an alternative channel that has the same implication in that expenditure shares on children go up when women have a higher income share, even though there are no preference asymmetries between men and women.

We now show how the lack of access to female-specific private goods can lead women to want to spend more on children relative to their husbands. There is no intrinsic preference difference between spouses, rather, women are restricted in their private consumption and therefore endogenously spend more on children. If over the course of development, this restriction is lifted, then women converge in their "preferences" to their husband, and thus the effect that a transfer to women means higher expenditure share on children disappears.

To show the exact workings of this logic, we now consider a model where men and women both spend money on themselves and on children. There is a continuum of private goods, but the range of private goods is smaller for women. A second crucial assumption is that child inputs of mothers and fathers are not perfect substitutes. Concretely, we assume a child quality production function of the following form

$$C^k = e_f^{\alpha} e_m^{1-\alpha}.$$

Again we solve for the Nash equilibrium in this economy. The wife's problem is:

$$\int_0^a \ln(c_{if})di + \ln(C^k)$$
$$C_k = e_f^{\alpha} e_m^{1-\alpha}$$
$$\int_0^a c_{if}di + e_f \leq w_f$$

This can be simplified to

$$\int_0^a \ln(c_{if})di + \alpha \ln(e_f),$$
$$\int_0^a c_{if}di + e_f \leq w_f.$$

The solution is

$$\begin{aligned} e_f &= \frac{w_f \alpha}{a+\alpha}, \\ c_{if} &= \frac{w_f \alpha}{(a+\alpha)\alpha}. \end{aligned}$$

The husband's problem is analogous. The only difference is that we set $a_m = 1$, while $a_f = a < 1$. The solution to the husband's problem then is

$$\begin{aligned} e_m &= \frac{w_m(1-\alpha)}{1+(1-\alpha)}, \\ c_{im} &= \frac{w_f}{(1+(1-\alpha))}. \end{aligned}$$

The expenditure share on children is

$$E = \frac{e_f + e_m}{w_f + w_m} = \frac{\frac{\alpha}{a+\alpha} w_f + \frac{1-\alpha}{1+(1-\alpha)} w_m}{w_m + w_f}.$$

This expression increases in w_f if and only if $\alpha > \frac{a}{1+a}$. This is intuitive, the child expenditure share increases in female income as long as the wife is productive enough in child production (α high enough) and she is sufficiently constrained in the goods she can buy: a small enough.

Finally, consider the expression for child quality. (here we consider the symmetric case where $\alpha = 1/2$.)

$$C^k = \sqrt{e_f e_m}$$

Plugging in the solutions for e_f and e_m from above and rearranging, this is

$$C^k = \sqrt{\frac{w_m w_f}{3(2a+1)}}$$

So here w_m and w_f enter completely symmetrically. Note, however, that as long as $w_m > w_f$ it is the case that child quality increases faster in wife's income than in husband's income. This is no longer true once they both have the same income. In fact, the difference shrinks as the incomes get closer to each other.

To summarize, in this section we have presented a framework in which the only asymmetry between genders is that private consumption goods are gender specific, and there is a smaller range of female-specific goods available compared to make-specific goods. In male-dominated societies, such restrictions are quite plausible; there are countries, for example, where women are not allowed to visit bars, movie theaters, or in some cases even drive cars. We have shown that such a setting could give rise to the expenditure patterns found in the data. However, empowering women (by removing discriminatory restrictions on consumption goods) would result into these asymmetries disappearing.

4.4 Endogenous Preference Differences through Technology for Producing Public Goods

We now consider a second channel through which differences in constraints can lead to outcomes that give the appearance of a preference difference between men and women. In this model, public goods are distinguished by the relative importance of goods and time in producing them. If women have lower wages and hence their time is less valuable, they will endogenously specialize in providing the public goods that are most time intensive, even though they don't care about these goods any more than their husbands do. Still, if women receive transfer income, this will disproportionately affect the public goods that they provide. If children are relatively time intensive, the model is consistent with the empirical findings described above. Thus, it may appear as though women care more about child goods, even though in fact they do not. Once again, we get the result if underlying gender differences were removed (in wages and transfer income) the observed difference in behavior would also disappear.

4.4.1 Model with a Continuum of Public Goods

In this model, we return to the assumption that husbands and wives have the same preferences over all public goods. The utility functions are:

$$
\begin{gathered}
u(c_f) + \int_0^1 U(C_i)di \\
u(c_m) + \int_0^1 U(C_i)di.
\end{gathered}
$$

However, the constraints are now different. Women maximize utility subject to the constraints:

$$
\begin{aligned}
C_i &= c_{if} + c_{im} \\
c_{if} &= x_{if}^{\theta_i} h_{if}^{1-\theta_i} \\
c_f + \int_0^1 x_{if}di &= w_f(1-h_f) + T_f \\
\int_0^1 h_{if}di &= h_f
\end{aligned}
$$

Women have wages w_f and transfer (i.e., unearned) income T_f. They have a time endowment of one, which they divide between working and providing household goods. h_f is the total time devoted to household production, and h_{if} is the time devoted to providing good i. Each public good i is produced with a combination of time h_{if} and goods x_{if}, where the weight of goods θ_i varies across goods. In particular, we assume:

$$\theta_i = i,$$

that is, goods with a low index i are time intensive and those with a high index are goods-intensive. The constraint set for men is analogous:

$$
\begin{aligned}
C_i &= c_{if} + c_{im} \\
c_{im} &= x_{im}^{\theta} h_{im}^{1-\theta_i} \\
c_m + \int_0^1 x_{im} di &= w_m(1-h_m) + T_m \\
\int_0^1 h_{im} di &= h_m.
\end{aligned}
$$

We conjecture that if $w_f < w_m$, then there exists a cut-off $\bar{\theta}$ such that men specialize in all goods that are more money-intensive (i.e. those with $\theta_i > \bar{\theta}$ while women specialize in the more time-intensive goods, i.e. those with $\theta_i < \bar{\theta}$.

Assuming this conjecture is right, we can write the problem for the women as

$$
\begin{aligned}
u(c_f) + \int_0^{\bar{\theta}} U(x_{if}^{\theta_i} h_{if}^{1-\theta_i}) di \\
c_f + \int_0^{\bar{\theta}} x_{if} di = w_f - w_f \int_0^{\bar{\theta}} h_{if} di + T_f
\end{aligned}
$$

Specializing to logarithmic utility, can write this as:

$$
\begin{aligned}
\log(c_f) + \int_0^{\bar{\theta}} \theta_i \ln(x_{if}) + (1-\theta_i) \ln(h_{if}) di \\
c_f + \int_0^{\bar{\theta}} x_{if} di = w_f(1 - \int_0^{\bar{\theta}} h_{if} di) + T_f.
\end{aligned}
$$

Letting λ_f be the multiplier on the budget constraint, from the first order conditions we have

$$
\begin{aligned}
c_f &= \frac{1}{\lambda_f} \\
x_{if} &= \frac{\theta_i}{\lambda_f} \\
h_{if} &= \frac{1-\theta_i}{w_f \lambda_f}.
\end{aligned}
$$

Plugging these back into the budget constraint, one can solve for λ_f:

$$\frac{1}{\lambda_f} + \int_0^{\bar{\theta}} \frac{\theta_i}{\lambda_f} di = w_f - w_f \int_0^{\bar{\theta}} \frac{1-\theta_i}{w_f \lambda_f} di + T_f$$

canceling terms we get

$$\frac{1}{\lambda_f} = w_f - \int_0^1 \frac{1}{\lambda_f} di + T_f,$$

which gives

$$\lambda_f = \frac{1+\bar{\theta}}{w_f + T_f}.$$

The analysis for men follows similar lines. Once again assuming again that in equilibrium there will be a cut-off $\bar{\theta}$ and specializing to logarithmic utility, the man's problem is:

$$\log(c_m) + \int_{\bar{\theta}}^1 \theta_i \ln(x_{im}) + (1-\theta_i)\ln(h_m) di$$
$$c_m + \int_{\bar{\theta}}^1 x_{im} di = w_m(1 - \int_{\bar{\theta}}^1 h_{im} di) + T_m.$$

Letting λ_m be the multiplier on the budget constraint, from the first order conditions we have

$$c_m = \frac{1}{\lambda_m}$$
$$x_{im} = \frac{\theta_i}{\lambda_m}$$
$$h_{im} = \frac{1-\theta_i}{w_m \lambda_m}$$

Plugging these back into the budget constraint, one can solve for λ_m:

$$\frac{1}{\lambda_m} + \int_{\bar{\theta}}^1 \frac{\theta_i}{\lambda_m} di = w_m - w_m \int_{\bar{\theta}}^1 \frac{1-\theta_i}{w_m \lambda_m} di + T_m$$

which gives

$$\lambda_m = \frac{1+(1-\bar{\theta})}{w_m + T_m}.$$

To find $\bar{\theta}$, we conjecture that at the margin (i.e. at $\bar{\theta}$), the amount of the public good is the same, whether it is provided by the husband or the wife.

$$c_{if} = c_{im} \text{ for } i \text{s.t.} \theta_i = \bar{\theta}.$$

Plugging in the production function

$$x_{if}^{\theta} h_{if}^{1-\theta_i} = x_{im}^{\theta} h_{im}^{1-\theta_i}$$

and now the solutions from above yields:

$$(\frac{\theta_i}{\lambda_f})^{\theta}(\frac{1-\theta_i}{w_f \lambda_f})^{1-\theta_i} = (\frac{\theta_i}{\lambda_m})^{\theta}(\frac{1-\theta_i}{w_m \lambda_m})^{1-\theta_i}.$$

Canceling terms and rearranging gives:

$$(\frac{\lambda_m}{\lambda_f}) = (\frac{w_f}{w_m})^{1-\bar{\theta}}$$

plugging in the solutions for λ_f and λ_m from above gives

$$(\frac{\frac{1+(1-\bar{\theta})}{w_m+T_m}}{\frac{1+\bar{\theta}}{w_f+T_f}}) = (\frac{w_f}{w_m})^{1-\bar{\theta}}$$

which is also equal to

$$\left(\frac{w_f + T_f}{w_m + T_m}\right)\left(\frac{1+(1-\bar{\theta})}{1+\bar{\theta}}\right) = (\frac{w_f}{w_m})^{1-\bar{\theta}}.$$

This equation implicitly defines $\bar{\theta}$, although a close-form does not exist.

We now present computed results for this model (continuing to use log utility). Figure II shows how the cutoff for θ varies with relative female income. Due to the symmetry of the environment, the cutoff reaches 0.5 when men and women have the same income.

As an example, Figure III shows the distribution of public consumption over all public goods for the case where female income is half of male income, $w^f/w^m =$

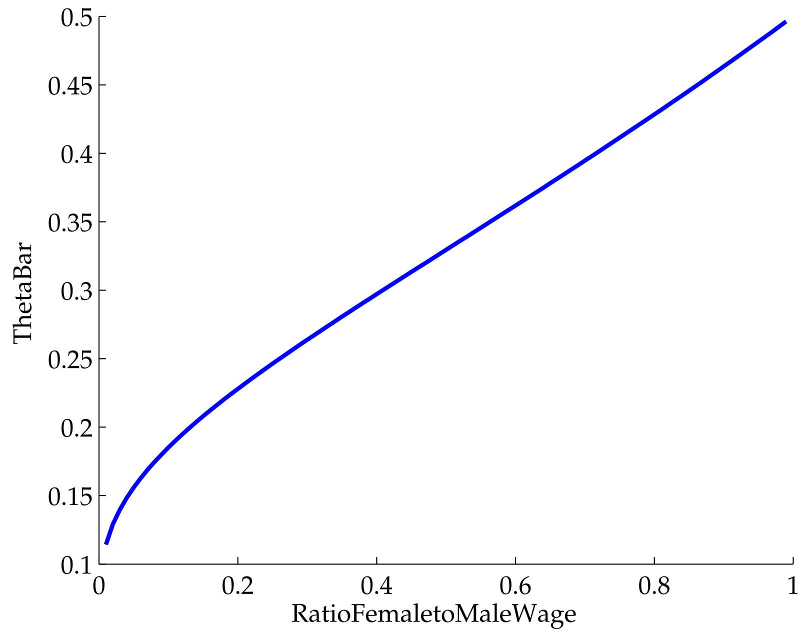

Figure II: The Cutoff $\bar{\theta}$ as a Function of Relative Female Income

0.5. The solid line is actual consumption, and the dashed line shows what consumption would have been if the other spouse (i.e., the one not actually specializing in this good) would have provided the good. The vertical line denotes the cutoff $\bar{\theta}$: to the left of this point, goods are provided by the wife, to the right they are provided by the husband. Not surprisingly, we see that in equilibrium each good is provided by the spouse who is willing to contribute a higher amount. The consumption distribution has a kink at the cutoff. The good with the highest provision is the one that requires only a time input.

We are now interested in how the provision of various public goods depends on male and female wages and on transfers to (i.e., unearned income of) each spouse. To this end, Figure IV shows public consumption distributions for varying female wages, holding the male wage constant at $w^m = 1$. There is no unearned income in this example. First, we can see that the cutoff $\bar{\theta}$ (which corresponds to the kink in the consumption distribution) increases with the female wage, which is not surprising. Consumption of all public goods that are pro-

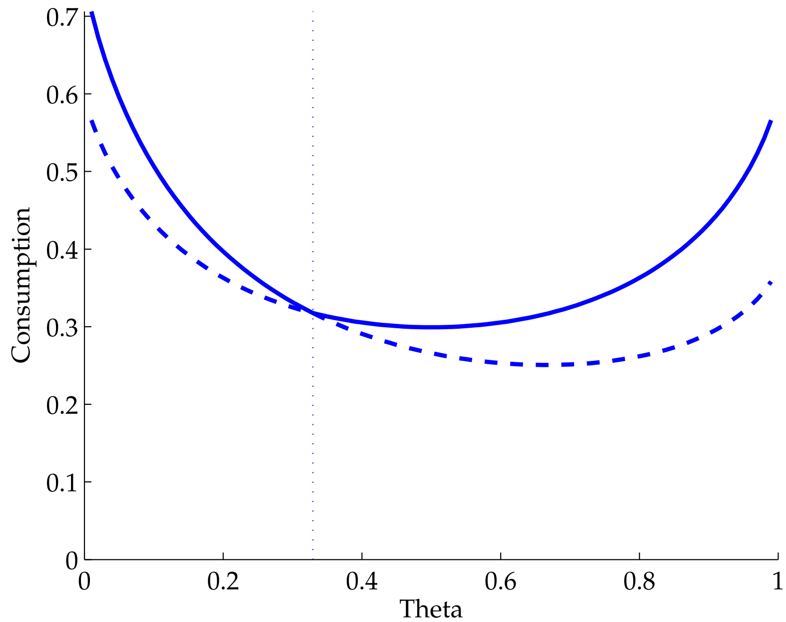

Figure III: Consumption of Each Public Good for $w^f/w^m = 0.5$. Solid line: Actual Consumption. Dashed Line: Hypothetical Provision by Spouse

vided by the husband increases as the female wage goes up. From the husband's perspective, the only change is that $\bar{\theta}$ goes up, which makes it possible to concentrate spending on fewer goods and therefore consume more. For the female-provided goods, there is two different effects. On the one hand, the wife has access to more resources, which tends to increase provision. But on the other hand, because of the higher wage time-intensive goods become expensive relative to goods-intensive goods, which induces a reallocation towards public goods that are less intensive in time. Consequently, we see that provision of the most time-intensive goods declines as female wages go up, whereas above some threshold public goods provision increases. Notice that if we interpret child goods as being highly time intensive (i.e., low θ), this would imply that an increase in female earnings power lowers the provision of child goods.

We can now contrast this outcome to an experiment where we hold male and female wages constant, but vary unearned transfers that are given to husband or wife. The female wage is held constant at $w^f = 0.5$, and the husband does not

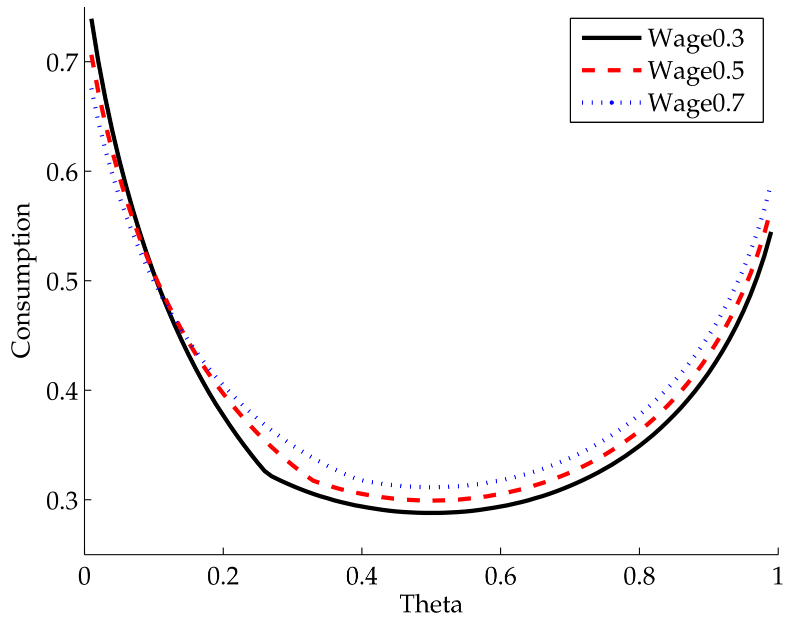

Figure IV: Consumption of Each Public Good for Three Levels of Female Wage, Holding Male Wage Constant at $w^m = 1$

receive unearned income. Figure V shows that the provision of all public goods is increasing in the wife's unearned income. However, the effect is larger for goods that are provided by the wife. This effect can be seen more clearly in Figure VI, which shows the same information as a ratio of goods provision relative to the case of zero unearned income for the wife ($T^f = 0$). Here we can see that when the female transfer income goes up, provision of all public goods that are always provided by the wife increases by a fixed percentage, and provision of all goods provided solely by the husband increases by a smaller fixed percentage. There is also a range of goods which are provided by the husband before the increase in the transfer, but are provided by the wife once the transfer goes up. The increase in the provision of these goods is a convex combination of the increase in the solely male- or female-provided goods.

Figures VII and VIII display parallel results for the case of increasing the male transfer T^m, this time holding the female transfer income at zero. This time it is the solely male-provided public goods that are more reactive to a change in

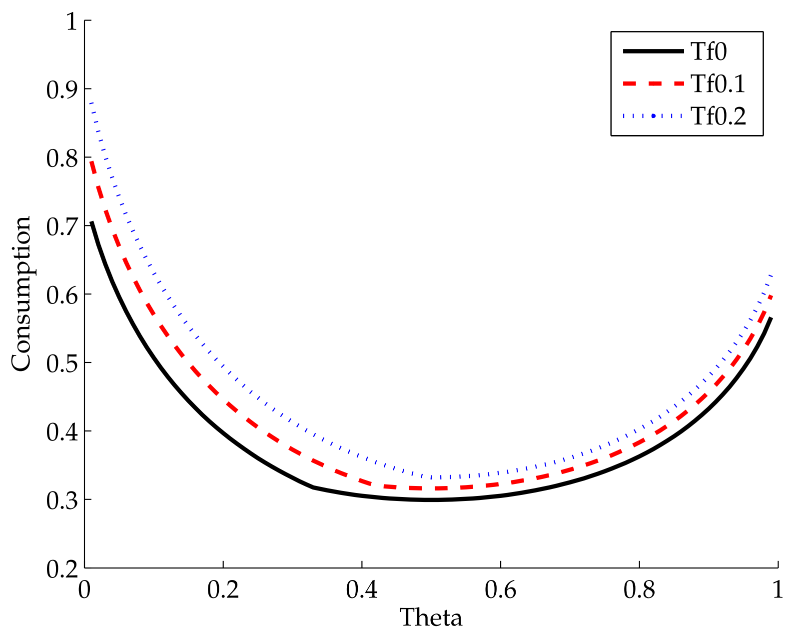

Figure V: Consumption of Each Public Good for Three Levels of Female Unearned Income

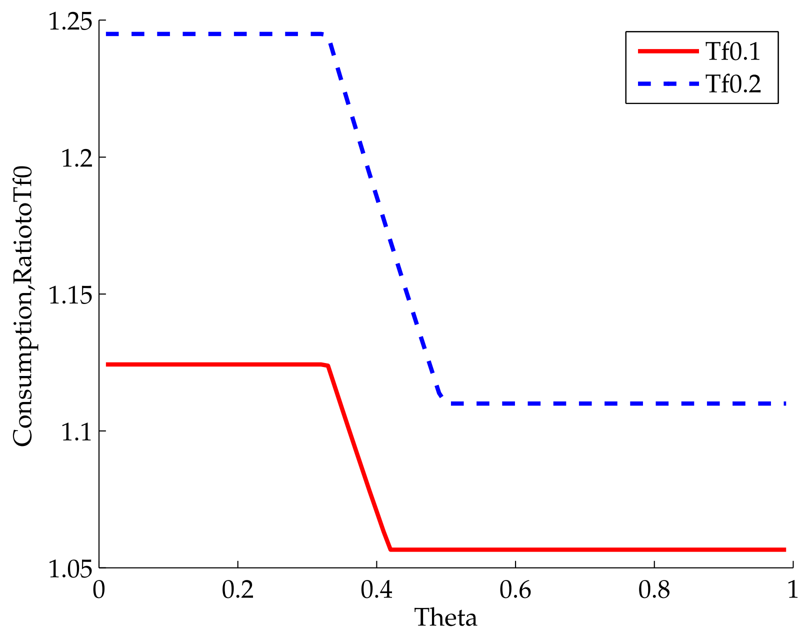

Figure VI: Consumption of Each Public Good for Two Levels of Female Unearned Income relative to Zero Unearned Income

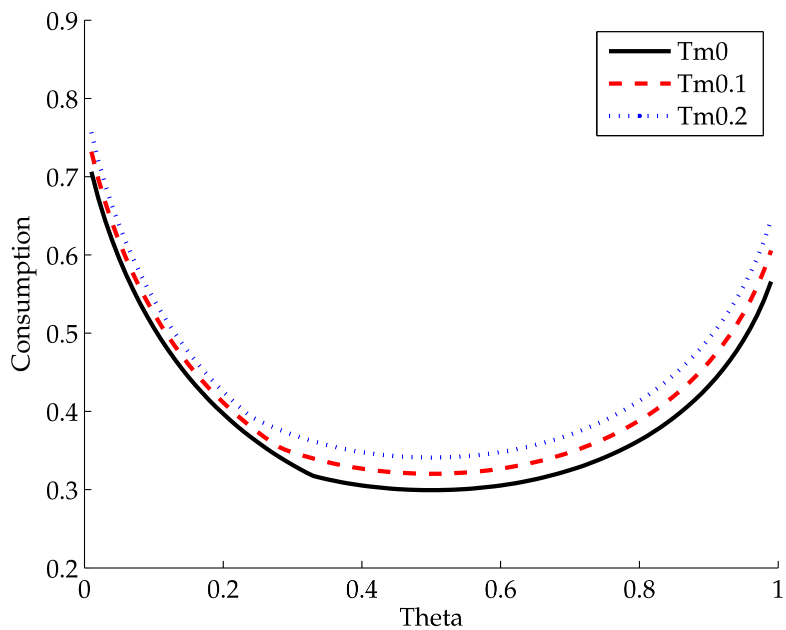

Figure VII: Consumption of Each Public Good for Three Levels of Male Unearned Income

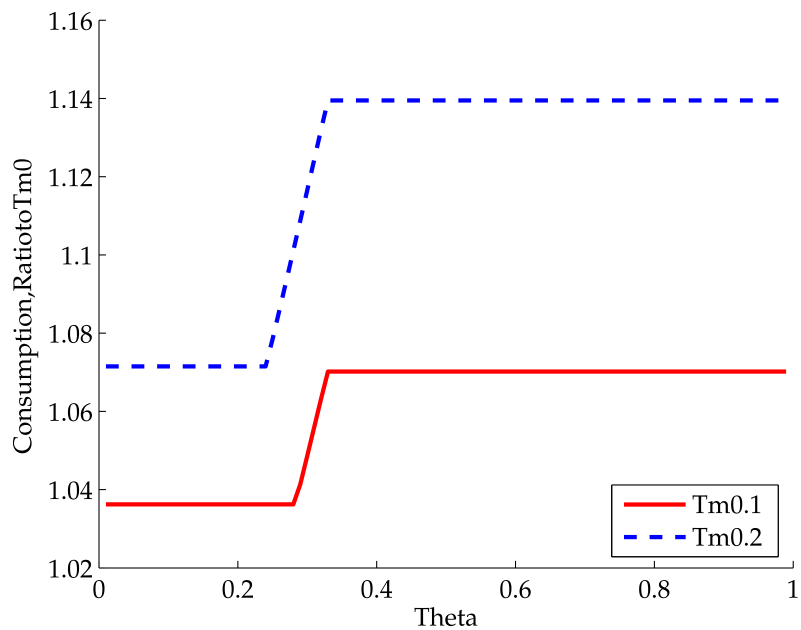

Figure VIII: Consumption of Each Public Good for Two Levels of Male Unearned Income relative to Zero Unearned Income transfers.

Combining these results, the model is consistent with the empirical finding that transfers to women have a larger impact on the provision of child goods, provided that child goods are also female-provided goods. This holds, however, only for increases in unearned income: an increase in the female wage tends to achieve the opposite.

This model can be extended further by allowing for voluntary transfers between the spouses. For example, if the wife is much poorer than the husband, it may be in the husband's interest to give money to the wife in order to increase the provision of public goods. It can be shown that once voluntary transfers are positive in equilibrium, marginal changes in unearned income have the same effect regardless of whether the transfer is given to husband or wife. The reason is that, on the margin, the person providing transfers will exactly offset exogenous changes in transfers. At the same time, there is a wide range of conditions under which neither spouse provides a voluntary transfer, so that we are still in the situation described above. Given lack of commitment, the spouse receiving a transfer will use only a portion of the transfer for public goods, and the remainder for private goods that do not enter the other spouse's utility. Voluntary transfers will therefore only arise if the difference in wealth between the spouses is large. Interestingly, it is not enough for the wages of the two spouses to be different. If, for example, the wife has a much lower wage than the husband, in equilibrium she will provide only a fairly small range of the public goods. This also implies that she will use most of any additional transfers for private consumption, which discourages the husband from making transfers. Thus, voluntary transfers will only arise if there is a large difference in unearned income between the spouses.

4.5 Appearance of Preference Differences through Investment Distortions

The common theme of the last few sections was that even if men and women have the same underlying preferences, distortions in their choice sets may have implications that look as if there were gender differences over public good provision.

In this section, we add a further example where the distortion arises because of the possibility of intertemporal investment.

We envision a framework with two spouses with identical income and at least some altruism. There are two time periods, 0 and 1. Preferences for gender i are given by:

$$\ln(c_{i,0}) + \alpha \ln(c_{-i,0}) + 2\gamma \ln(C_0) + \ln(c_{i,1}) + \alpha \ln(c_{-i,1}).$$

Thus, people care about their own consumption and that of their spouse, where they attach a weight α with $0 < \alpha < 1$ to the spouse's consumption. They also care about the provision of a public good C_0. For simplicity (and without loss of generality), we assume that the public good is only provided in the first period and that there is no discounting between the periods.

In each period each spouse receives a fixed income Y_i. Each spouse has access to a saving technology with return $1+r > 1$. Savings are denoted by s_i. Finally, after receiving income but before (in the first period) deciding on saving, the spouses have the option of making a monetary transfer t_i to their spouse.

As in some of the models above, it is going to be important here that the contributions of the two spouses to the public good are not perfect substitutes. For simplicity, we assume that the public-good technology is Cobb-Douglas:

$$C_0 = \sqrt{C_{f,0} C_{m,0}},$$

implying that there is no direct interaction between male and female contributions (the results would still go through with higher substitutability, as long as it is less than perfect).

We are interested in how the possibility of making transfers affects incentives for saving and for public-good spending in this economy. First, notice that at most one of the spouses will make a positive transfer to the other one in any period, due to the asymmetry of preferences over own and spouse's consumption. Moreover, since α is strictly lower than one there is a range of incomes, sufficiently close together, where both transfers are zero, and the spouses behave as if they were on their own.

The interesting results come into play when the income asymmetry is sufficiently large such that one spouse starts to transfer income to the other. We assume that the husband has higher income, $Y_m > Y_f$.

We continue to work under the assumption of non-cooperative equilibria, and we also assume that commitment is not possible. We can therefore solve for the outcome by using backward induction.

In the second period (assuming that the income asymmetry is sufficiently large to lead to a positive transfer) the husband essentially acts as a planner and solves:

$$\max\left\{\ln(c_{m,1}) + \alpha \ln(c_{f,1})\right\}.$$

subject to:

$$c_f + c_m = (1+r)(s_f + s_m) + Y_f + Y_m.$$

The resulting consumption choices are:

$$\begin{aligned} c_f =& \frac{\alpha}{1+\alpha}\left[(1+r)(s_f+s_m) + Y_f + Y_m\right], \\ c_m =& \frac{1}{1+\alpha}\left[(1+r)(s_f+s_m) + Y_f + Y_m\right]. \end{aligned}$$

The transfer from husband to wife that implements this allocation is:

$$\begin{aligned} t_{m,1} =& c_f - [(1+r)s_f + Y_f] \\ =& \frac{\alpha}{1+\alpha}\left[(1+r)(s_f+s_m) + Y_f + Y_m\right] - [(1+r)s_f + Y_f] \\ =& \frac{\alpha[(1+r)s_m + Y_m] - [(1+r)s_f + Y_f]}{1+\alpha}. \end{aligned}$$

This expression shows that the transfer is decreasing in the wife's saving. Implicitly, the husband is imposing a tax on the wife's saving. This is the distortion that we are interested in.

We now go back in time to the first period after the first transfer has been made, i.e., the spouses only have to decide on consumption and savings given their current resources. Both spouses make this decision at the same time, and we are therefore solving for a Nash equilibrium (i.e., each spouse optimizes taken the other spouse's savings as given). However, because the transfer in the second period is made in the future, the wife does take into account that the second transfer depends on her own saving.

We start with the wife's problem. The wife solves (omitting constant/exogenous terms):

$$\max_{s_f, c_{f,0}, C_{f,0}} \left\{ \ln(c_{f,0}) + \gamma \ln(C_{f,0}) + \ln(c_{f,1}) + \alpha \ln(c_{m,1}) \right\}.$$

subject to the constraints:

$$\begin{aligned} c_{f,0} + C_{f,0} + s_f &= Y_f + t_{m,0}, \\ c_f &= \frac{\alpha}{1+\alpha} \left[(1+r)(s_f + s_m) + Y_f + Y_m \right], \\ c_m &= \frac{1}{1+\alpha} \left[(1+r)(s_f + s_m) + Y_f + Y_m \right]. \end{aligned}$$

Here the wife takes into account how the transfer received in the second period adjusts to s_f.

Plugging in the constraints and omitting constants gives:

$$\max_{s_f, c_{f,0}, C_{f,0}} \left\{ \ln(Y_f + t_{m,0} - C_{f,0} - s_f) + \gamma \ln(C_{f,0}) + (1+\alpha) \ln((1+r)(s_f + s_m) + Y_f + Y_m) \right\}.$$

The first-order condition for s_f is:

$$\frac{1}{c_{f,0}} \geq \frac{(1+r)(1+\alpha)}{c_{f,1} + c_{m,1}} = \frac{(1+r)}{c_{m,1}},$$

where the inequality is strict if $s_f = 0$. The corresponding first-order condition for the husband is:

$$\frac{1}{c_{m,0}} \geq \frac{(1+r)(1+\alpha)}{c_{f,1} + c_{m,1}} = \frac{(1+r)}{c_{m,1}}.$$

Notice that the right-hand side for the first-order conditions are the same, whereas the left-hand sides are different (as long as $Y_f \neq Y_m$). Thus, we must have either $s_f = 0$ or $s_m = 0$. If, as we assume, $Y_m > Y_f$, we must also have $c_m > c_f$, which implies that $s_f = 0$: the wife never saves in this model. Whether the husband saves depends on the interest rate. We assume that the return on saving is sufficiently large to induce positive saving, $s_m > 0$.

The full solution to the wife's problem at this stage is thus:

$$\begin{aligned} c_{f,0} =& \frac{1}{1+\gamma}(Y_f + t_{m,0}), \\ C_{f,0} =& \frac{\gamma}{1+\gamma}(Y_f + t_{m,0}), \\ s_f =& 0. \end{aligned}$$

The solution of the male problem is:

$$\begin{aligned} c_{m,0} =& \frac{1}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right), \\ C_{m,0} =& \frac{\gamma}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right), \\ s_m =& \frac{1+\alpha}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right) - \frac{1}{1+r}(Y_f + Y_m). \end{aligned}$$

At this stage, we can already see that men and women differ in their propensity to spend any funds received after the first-period transfer has been made. Specifically, wives would spend fraction $\gamma/(1+\gamma)$ on public goods with the rest going to personal consumption, whereas men would only spend fraction $\gamma/(2+\gamma+\alpha)$ on public goods, with the rest divided between consumption and savings.

For the full solution to the decision problem, we now move back to the initial stage when the husband makes the first transfer. Given that the wife has less income, she will be at zero corner for the transfer, so that we do not have to consider her decision problem. Taking account of our existing findings, the husband solves:

$$\max_{t_m} \{\ln(c_{m,0}) + \alpha \ln(c_{f,0}) + \gamma \ln(C_{f,0}) + \gamma \ln(C_{m,0}) + \ln(c_{m,1}) + \alpha \ln(c_{f,1})\}$$

subject to:

$$
\begin{aligned}
c_{f,0} =& \frac{1}{1+\gamma}(Y_f + t_{m,0}), \\
C_{f,0} =& \frac{\gamma}{1+\gamma}(Y_f + t_{m,0}), \\
c_{m,0} =& \frac{1}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right), \\
C_{m,0} =& \frac{\gamma}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right), \\
c_{f,1} =& (1+r)\frac{\alpha}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right), \\
c_{m,1} =& (1+r)\frac{1}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)\right).
\end{aligned}
$$

Plugging the constraints into the objective and omitting constants yields:

$$
\max_{t_m}\left\{(\alpha+\gamma)\ln(Y_f + t_{m,0}) + (2+\gamma+\alpha)\ln(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m))\right\}
$$

The first-order condition gives:

$$
\begin{aligned}
\frac{\alpha+\gamma}{Y_f + t_{m,0}} =& \frac{2+\gamma+\alpha}{Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)}, \\
(\alpha+\gamma)(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f + Y_m)) =& (2+\gamma+\alpha)(Y_f + t_{m,0}), \\
t_{m,0} =& \frac{(\alpha+\gamma)(Y_m + \frac{1}{1+r}(Y_f + Y_m)) - (2+\gamma+\alpha)Y_f}{2(1+\alpha+\gamma)}.
\end{aligned}
$$

This transfer implies the following first-period private consumption values for husband and wife:

$$
\begin{aligned}
c_{f,0} =& \frac{1}{1+\gamma}(Y_f + t_{m,0}), \\
=& \frac{1}{1+\gamma}\left(Y_f + \frac{(\alpha+\gamma)(Y_m + \frac{1}{1+r}(Y_f+Y_m)) - (2+\gamma+\alpha)Y_f}{2(1+\alpha+\gamma)}\right), \\
=& \frac{1}{1+\gamma}\left(\frac{(\alpha+\gamma)(Y_f + Y_m + \frac{1}{1+r}(Y_f+Y_m))}{2(1+\alpha+\gamma)}\right), \\
=& \frac{\alpha+\gamma}{2(1+\gamma)(1+\alpha+\gamma)}\frac{2+r}{1+r}(Y_f+Y_m), \\
c_{m,0} =& \frac{1}{2+\gamma+\alpha}\left(Y_m - t_{m,0} + \frac{1}{1+r}(Y_f+Y_m)\right), \\
=& \frac{1}{2+\gamma+\alpha}\left(Y_m - \left(\frac{(\alpha+\gamma)(Y_m + \frac{1}{1+r}(Y_f+Y_m)) - (2+\gamma+\alpha)Y_f}{2(1+\alpha+\gamma)}\right) + \frac{1}{1+r}(Y_f+Y_m)\right), \\
=& \frac{1}{2+\gamma+\alpha}\left(\frac{(2+\alpha+\gamma)Y_m + (2+\gamma+\alpha)Y_f + (2+\alpha+\gamma)\frac{1}{1+r}(Y_f+Y_m)}{2(1+\alpha+\gamma)}\right), \\
=& \frac{Y_m + Y_f + \frac{1}{1+r}(Y_f+Y_m)}{2(1+\alpha+\gamma)}, \\
=& \frac{1}{2(1+\alpha+\gamma)}\frac{2+r}{1+r}(Y_m+Y_f).
\end{aligned}
$$

We therefore have:

$$
\frac{c_{f,0}}{c_{m,0}} = \frac{\alpha+\gamma}{1+\gamma},
$$

which is consistent with the weight of the female-provided goods in male utility.

Notice that any amount received BEFORE the initial transfer is made would not have a differential impact on public goods provision (depending on who receives the transfer), because all expenditure is proportional to the present value of total initial income (as long as the transfers are sufficiently small not to change the savings regime).

5 Policy Implications and Outlook

In this paper, we have addressed from a theoretical perspective the empirical observation that money in the hands of women appears to lead to higher spending on public goods, and in particular to higher spending on child-related goods. These observations have already led to a trend in development policy to target more resources to women and more generally to envision female empowerment as a key measure to foster economic development. The questions that we have aimed to address is what kind of frictions or asymmetry in marital decision making can give rise to the empirical facts, and what such models, in turn, imply for the effects of gender-based development policy.

From the perspective of the theory of the household, a first finding is that a large class of commonly used models if marital decision making are not able to explain the facts. In particular, models such as the unitary model or the collective model imply an income pooling result, which is clearly inconsistent with the data. While this fact is not surprising and well known, we show that the income-pooling result survives even if decision-making is non-cooperative and if there are preferences asymmetries between men and women in terms of the overall appreciation of public goods. To break the income-pooling result, further frictions or asymmetries are needed. We present a series of models that can deliver the fact, which are built on: preference asymmetries in the relative appreciation of different public goods; household production with variation in the importance of time and goods components in the production of different public goods, coupled with a gender wage differential; limited availability of female-specific private goods, coupled with imperfect substitutability of male and female contributions to public goods; and gender-specific distortions in the consumption-saving choice, either through the endogenous provision of transfers between the spouses, or because of institutional restrictions.

While these different models have distinct policy implications, two overall themes stand out. First, even when the models confirm a positive effect of transfers targeted to women on expenditures on child goods, it may be the case that this higher spending comes at the expense of other important public goods. For example, in the model with time and goods components of household production an increase in goods spending may be offset by a decline in time inputs. Similarly, in the intertemporal model an increase in current spending may correspond to a decline in household saving and therefore lower future spending. In such settings, it is far from obvious whether targeting transfers to women is good policy.

Second, the models suggest that different ways of achieving "female empowerment" may have different or even opposite effects. In some of our models, the differences in gender spending patterns are themselves endogenous and would disappear if other gender differences were removed. Thus, while targeting transfers to women may increase spending on children, reducing gender discrimination in goods or labor markets may result in women behaving more like men, which reduces the effect of targeted transfers on public good provision. The models therefore provide a warning against viewing female empowerment as a generic concept and advocate a more differentiated view that distinguishes various channels.

Perhaps the most important conclusion arising from this work is that more measurement and empirical work is needed to distinguish between the various theoretical models outlined above. The empirical implications of the models are quite distinct and could in principle be tested. Only once we have some confidence in which of these models provides the best guide to reality will we be in a position to provide credible policy recommendation for gender-based development initiatives.

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Source	Type of Study	Outcome Variables	Variable capturing woman's power	Results regarding the effect of the increase in women's power
(Attanasio and Lechene 2002)	Cross-sectional data and field experiment	HH budget share of some good	Woman's income share	Share of expenditure on children's clothing increases, alcohol decreases. (In some specifications, the share of expenditures on food increases.)
(Doss 2006)	Cross-sectional data	HH budget share of some good	Woman's asset holdings	Share of expenditure on education and food increases, and on alcohol decreases.
(Duflo and Udry 2004)	Natural experiment using variation in rainfall	Change in the HH expenditures of some good	Woman's income	Expenditures on food increase, and on education decrease.
(Gitter and Barham 2008)	Cross-sectional data and field experiment	Per capita expenditure of some good and school enrollment	Woman's years of schooling relative to her husband	Does not increase the treatment effect of the conditional cash transfer program? But women's higher relative education is associated with higher expenditures on children's education and higher school enrollment.
(Hoddinott and Haddad 1995)	Cross-sectional data?	HH budget share of some good	Woman's share of income	Share of expenditure of food increases, while alcohol and cigarettes decreases.
(Lundberg, Pollak, and Wales 1997)	Natural experiment with child allowance	Ratio of children's (or women's) clothing expenditure to men's clothing expenditures	Woman's income	Relative expenditure on children's (or women's) clothing increased.
(Rubalcava, Teruel, and Thomas 2009)	Cross-sectional data and field experiment	HH budget share on some good and per capita expenditure on some good	Woman's income share	Share of expenditure on children's clothing increases and on food decreases, while the expenditure on food increases in absolute terms.

Table 1: Evidence on Gender Effects on Household Expenditures

Source	Type of Study	Outcome Variables	Comparison	Results regarding gender differences in expenditures
(Case and Deaton 1998)	Cross-sectional data	Expenditures of some good	Female vs Male headed HH	In female headed HHs, there are smaller expenditures on alcohol and tobacco, and lower expenditures on everything except insurance and clothing
(Kennedy and Peters 1992)	Cross-sectional data	Expenditures of some good	Female vs Male headed HH	In female headed HHs, there are smaller expenditures on alcohol and a larger share of budget is spent on food.
(Khandker 2005)	Cross-sectional data	HH per capita expenditure of some good	Woman's borrowing vs man's borrowing	In HHs where woman has borrowed a loan, food as well as non-food expenditures are larger, while in HHs where man borrowed a loan no such effects.
(Phipps and Burton 1998)	Cross-sectional data	Expenditures of some good	Wife's income vs husband's income	In HHs where woman's income is larger, expenditures on child care are larger.
(Rubalcava and Thomas 2000)	Cross-sectional data using variation across US states and time	Share of HH expenditures on allocated on food	Size of the aid paid to single women	Larger aid paid to single women (increases married women's outside option) is associated with decrease in the share of income allocated to food.

Table 2: Evidence on Gender Effects on Household Expenditures