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Sharing of Resources within the Family and the Economics of Household Decision-making

Running head: Sharing of Resources within the Family

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Abstract

Over the last thirty years, economic models have been developed that recognize that potentially conflicting interests may shape household decisions and the sharing of resources within families. This paper provides an overview of how decision-making within households has been modeled within economics, presents the main benefits and limitations of those models and critically assesses their usefulness to those from other disciplines interested in the within-household distribution of resources. Our main focus is on the theory, empirical application and results of the currently dominant collective models, but we also look at developments that led up to them and some subsequent extensions and alternative approaches. Given the weight placed by policy-makers and others on economic and quantitative evidence, it is incumbent on researchers of all disciplines to understand the achievements and limitations of the models used, explicitly or implicitly, to produce such evidence and the assumptions that lie behind them.

JEL codes: C7, D01, D1, D7

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The aim of this mainly methodological paper is to provide a non-technical overview of how decision-making within households has been modeled within economics and to make the case for why those from other disciplines who are interested in the within household distribution of resources might benefit from understanding the achievements and limitations of such models. Previous surveys (such as, among others, Vermeulen, 2002; Browning, Chiappori, & Weiss, 2011) have been aimed more at those who take the benefits of economic modeling for granted; here our aim is to contribute more to debates on methodologies for within household research and critically assess the usefulness of these models for that purpose.

Becker's path-breaking "Treatise on the Family" (Becker, 1981) was the first to insist on the need for an economic model of how people with differing preferences living in multi-person households make decisions, a process misleadingly called "household decision-making". Until then, the outcomes of such collective decisions had been modeled using the tools of rational choice theory that had been developed for the analysis of individual decision-making. Indeed this practice of modeling the outcomes of household decisions as if they were made by individuals remains normal practice to this day in most theoretical and applied economic reasoning that is not directly concerned with understanding what goes on within households.

Why was it so important to develop economic models that opened up the previously impenetrable "black box" of the household? First, on theoretical grounds, such models were needed to avoid an inconsistency in economic theory. Rational choice theory assumes that it is in the nature of individuals to hold consistent preferences and behave according to them. But when modeling collectivities within which interests may differ, such as multi-person households, there are no logical grounds for assuming such consistency of the group's preferences. Second, from a

policy standpoint, assuming that a household behaves according to models developed for individuals precludes acknowledging the intra-household effects of policies, in particular that policies benefitting some household members may make others worse off. Finally, because multi-person households typically include both men and women, with intrahousehold roles and relationships structured by gender, modeling households as having internal relationships is necessary to explain one of the crucial sites of interaction between men and women; indeed, such models typically, though not exclusively, focus on male-female couples (with or without children). This makes these models a rare contribution to the economic modeling of gender issues and, because they are designed to apply to all decisions made by household members, they can be used to analyze not only the allocation of financial and other resources, but also many other crucial gender issues, such as the division of paid and unpaid labor within the household.

As research has evolved in this area, three broad categories of models have been developed that recognize the impact of more than one member's preferences on household decisions. The first are "unitary models", where the family is still assumed to act as a single decision making unit, but close attention is paid to specifying the conditions under which that assumption holds.

Second, there are "bargaining models" that use either cooperative or non-cooperative game theory to model bargaining by individuals whose preferences differ. Bargaining models draw on assumptions about intra-household bargaining processes to model how factors affect outcomes.

More recent "collective" models are a generalization of cooperative bargaining models that share their assumption of a cooperative outcome, but make no assumptions about process and are therefore more open to empirical applications by not requiring a particular bargaining framework to be specified.

In practical terms, bargaining and collective household models do not suffer from the policy limitations of unitary models. For example, a unitary model of the family would predict that only the total income of the family, and not who brings it into the family, influences what is bought with that income. Nevertheless, using bargaining and collective models, it has been found that reallocating income from fathers to mothers tends, on average, to increase children's consumption, nutrition and well-being (for a review see Lechêne, 2008). In some developing countries, recognition of these intra-household distributional effects has been important in directing family benefits and targeted transfers to mothers rather than fathers. To take account of such effects requires policy makers to escape the unitary model of the family that still dominates policy prescriptions and economic textbooks, and recognize a more complex model in which the size of contributions of family members with differing preferences and varying amounts of power influence how household resources are spent.

The paper is organized as follows. Section two presents the common rationale behind economic modeling to consider its benefits and limitations for improving understanding of within-household distributional issues. Section three presents an overview of the development of the unitary model of the household, and some critiques and extensions of it. Section four does the same for bargaining models. Section five, in three sub-sections, examines collective models: their underlying theoretical assumptions, their interpretation through a household sharing rule, the further assumptions needed for their empirical estimation and their main empirical applications and findings. The final section concludes with an evaluation, discussing some alternative models and avenues for further research.

ECONOMIC MODELS OF THE HOUSEHOLD

Economic reasoning works by building models that draw out the implications of a limited number of simple core assumptions. This enables understanding of observed phenomena by demonstrating whether they can be explained as the implications of those assumptions or whether explanations using different or more nuanced assumptions are needed. The modeling of household decision-making has proceeded along such a path. The first economic models were based on the simplest core assumptions: first, that households behaved like individuals and, second, that individuals behaved according to the tenets of rational choice theory.

Most subsequent economic models of household decision-making do not model multi-person households as if they were individuals, but nevertheless retain a rational choice theory of individual behavior. In rational choice theory, a “utility function” represents the preferences of an individual decision-maker over all potential outcomes, including how all resources are used. More preferred options give higher utility, and a budget constraint determines which options are feasible. “Rational choice” requires that the most preferred of feasible options is chosen, which amounts to the maximization of such a utility function. It provides the model of *individual* decision making and behavior that nearly all economic models use, including those of household decision-making. It is important to note that rational decision makers do not necessarily ignore the interests of others; individuals can have “altruistic” preferences in which the well-being of others enters into their utility function.

Rational choice has some limitations even for modeling individual decision making. Rational choice models cannot investigate issues that question their core assumptions, such as the distinction between having control over spending and benefitting from how the income is spent present in sociological theories of within household distribution (Bennett et al., 2012), because rational choice models entail a notion of benefit or well-being that equates to the utility that

individuals attempt to maximize in making their choices. This subjective notion of well-being has been criticized on many fronts, including on the grounds that aspirations and expectations are adaptive so that individuals may get used to getting a poor share; this limitation is particularly relevant when considering intra-household distributional questions (Sen, 1990), though adaptation has been taken into account in some models (Basu, 2006).

Such limitations of economic models also give rise to their strengths. The simplicity of their assumptions means that what is being said about causal mechanisms can be clearly specified and empirically tested. The simpler the assumptions the more straightforward it is to test the model empirically and investigate which factors are significant and estimate the size of their effects. Thus, it is easy to draw policy implications from these models. Because economic models are based on deliberately minimal assumptions about actual behavioral processes, for example about bargaining within households, a model's empirical tests are not seen as confirming the accuracy of those assumptions *per se* but just showing whether they are consistent with observed outcomes. So, although the exact mechanism by which differential bargaining power translates into more or less benefit from household decisions cannot be confirmed, such models can be used to analyze outcomes which demonstrate the existence of such differential power. For example, they can be used to discover whether earning more than one's partner is likely to lead to a greater share in household spending, without being able to say exactly how that happens. Indeed, although the term "spending" is sometimes used, such economic models are in practice concerned only with the final outcome, that is, who within the household consumes what, and not with who actually spends the money that achieves that outcome; in this, they differ from some of the sociological literature.

Household decision-making models can be applied to all the different types of decisions made in the context of a household. We talk about a “household’s” decisions as shorthand for all the decisions made by its individual members, who are grouped together in this way through a recognition that they make their decisions in contexts shaped by the behavior of other household members and, in many models, by concern for their welfare. Such decisions include, at the very least, how household income is spent on goods consumed privately by household members. But, for multi-person households, they can also include decisions about how much to spend on household public goods, whose consumption is inherently shared by household members collectively in a “non-rival” way: examples include a clean or a well heated house and, for some models, children’s welfare as a public good for their parents.

Household decision-making models can consider not only the consumption that household income enables, but also how and to what extent household members give up “leisure” time to contribute to that income, that is, they are also market labor supply models. More gender aware models recognize that not all non-employed time is leisure, and take account of time spent in domestic production of either privately or collectively consumed outputs, such as cooking, cleaning and the care of children; these models form the core of what became known as the “New Household Economics” (Apps & Rees, 1997; Becker, 1965, 1981; Gronau, 1977).

Household decision-making models enable the specification and empirical testing of clear hypotheses concerning the basis of differential power within households, the estimation of effects and the drawing out of inferences for policy. Empirical applications of these models can therefore be of use to those investigating intrahousehold distributional issues, provided researchers are aware of the limitations of these models and the assumptions on which they are based. Although often retaining in their assumptions only limited aspects, if any, of the processes

at stake, such models complement well the more nuanced, but often untestable, understandings of the sources of differential power investigated by other disciplines.

UNITARY MODELS

Although rational choice models were not in general meant to apply to how groups of people make decisions, much economics proceeds as though households, even when they have many members, behave like individual decision-makers. Households, according to such unitary models, make decisions about how to spend their income by maximizing a single utility function for the whole family subject to a single budget constraint, given by the sum of all family members' income. A key implication of this type of model is a specific notion of "income pooling": that it does not matter who is contributing what to the pooled household budget, as this gives them no more say in how it is spent, so only its total size affects what is done with it. This is a different meaning of "income-pooling" from its use to characterize specific money management practices found elsewhere in the literature (Bennett, 2013). The economists' definition arises from a focus on the relationship between incomes and expenditures, rather than on any process that may connect them. Such income-pooling is a necessary feature of a unitary model and criticism of this assumption (which has failed to be verified empirically) was a major reason for the development of more complex household models.

Samuelson (1956), in investigating the conditions under which a group's preferences might be represented by a single utility function, suggested that if family members care about one another to such an extent that they have identical preferences, then through such mutual concern a family would behave according to the unitary model. Becker (1981) pointed out that this was inconsistent with the individualist basis of rational choice theory and specified conditions under

which individuals with differing utility functions would nonetheless behave as if they maximized a single utility function, that was in practice that of the household's "head". These conditions are met when Becker's "Rotten Kid theorem" holds, making it in all household members' interest not to be a 'rotten kid' and to act to maximize the household's, that is the household head's, utility. This decision process does not imply equal treatment of household members or their agreement that the outcome is the best use of household resources. Members of the household, other than its head, do not have the power to alter that outcome without hurting themselves, because any other outcome that they can reach through behaving differently would end up worse for themselves. In particular, earning a larger proportion of the household's income gives members no more say in how it is spent.

There are three types of critiques made of Becker's unitary model. The first is a technical one: that the conditions under which the Rotten Kid theorem justifies the use of a unitary model are more restrictive than Becker claimed and severely limit its potential applicability. Bergstrom (1989) shows that the theorem is based on highly specific assumptions about individual preferences, wrongly claimed to apply more generally. The second type of critique is that it is an ideological model based on the patriarchal family. Becker's (1981) model assumes a family directed by an altruistic dictator, personified, explicitly or implicitly, by the "pater familias". In particular, there is no rationale for assuming that only the household head is altruistic, and that he is both altruistic and powerful enough to make it in everyone's best interest to pander to his wishes (Bergmann, 1995; England, 2003; Pollak, 2003). The third critique of the unitary model comes from the empirical front, mainly directed towards its income pooling assumption. Any redistribution from one member of a family to another of non-labor income (family benefits, for example) without changing the total family budget constraint should, according to the unitary

model, have no impact upon the composition of household expenditure. Most empirical studies show that who brings income into the household matters for how that income is spent however. In particular, an increase in income received by the man increases the expenditure share on tobacco and alcohol more than additional income received by the woman (see Fortin & Lacroix, 1997; Schultz, 1990 for similar examples).

Despite these drawbacks, the unitary model still plays an important role in modern economics. Standard textbooks and most macroeconomic policy analysis, by talking about households as having utility functions, implicitly model consumption and labor supply decisions as being made on the basis of a unitary household model. Policy makers use it too in assuming that increasing a household's income necessarily benefits all members. And the household means-testing of benefits, the construction of household equivalence scales and the standard measures of income inequality and poverty rates go even further in ignoring intrahousehold differences of interests by implicitly assuming that household members enjoy the same standard of living. (Recent exceptions using collective models are Alessie, Crossley, & Hildebrand, 2006; Bradbury, 2008; and Browning, Chiappori, & Lewbel, 2006).

BARGAINING MODELS

Other models have been proposed that do not suffer from the above limitations. "Household bargaining" models use tools from game theory to model a bargaining process within households (Lundberg & Pollak, 1993; Manser & Brown, 1980; McElroy & Horney, 1981; Pollak, 2005).

Game theory analyses how people make decisions using rational choice theory when the outcome depends on what a small number of others do, making it an obvious candidate for modeling interactions in the family. In contrast to unitary models, household bargaining models

in economics, like many sociological models, explicitly take the view that the family can be a place of both conflict and cooperation (Bennett et al., 2012; Nyman & Dema, 2007; Sen, 1990).

In cooperative bargaining models, household members have their own utility function and negotiate with one another to achieve a “Pareto-efficient” outcome, one in which one person cannot achieve greater utility without the utility of the other being reduced; the long-term nature of relationships between members of a household, by reducing the gains from short-term game-playing, is used to justify the assumption that an efficient “cooperative” outcome is reached.

Figure 1 is drawn for a couple, with the man’s utility measured along the horizontal axis and the woman’s up the vertical axis. The area inside the curve shows the combination of levels of utility for the couple of all feasible outcomes, with the frontier from W to M giving the Pareto-efficient outcomes that bargaining should be able to achieve.

[Figure 1: A household’s utility possibility frontier with the outcome of a bargaining model]

Figure 1 shows that there are many possible Pareto-efficient outcomes, varying in the extent to which they favor each household member; those nearer W favor the woman more and the man less, than those nearer M. The eventual outcome depends on relative bargaining power. In these models, the bargaining power of an individual is determined by their utility at the “threat point”, shown as T in Figure 1, the utility level that each individual would achieve if cooperation broke down. Neither will agree to an outcome that will make them worse off than at the threat point, so the woman will not agree to outcomes below M* and the man will not agree to outcomes to the left of W*; the range of possible bargaining outcomes is therefore restricted to between W* and M*. In some models, the outcome is specified to be the so-called “Nash Bargaining Solution”, the outcome, N, on the frontier that maximizes the product of the two partners’ gains in utility

terms over the threat point (represented for any outcome by the area of the rectangle drawn between it and the threat point and shown on Figure 1 for outcome N). The better off individuals are at the threat point, T, the more bargaining power they have and so the better the outcome, N, will be for them. The resource theory of power, influential within sociological perspectives on intra-household distribution, draws on the same insight (Bennett, 2013).

There are broadly two types of cooperative bargaining models, corresponding to two different notions of what is meant by cooperation breaking down and thus two different kinds of threat points. In “divorce threat” models, as in sociological “exchange theory”, the threat point is household dissolution (Manser & Brown, 1980; McElroy & Horney, 1981). An alternative threat point is the outcome if the couple stays together but cooperation between them breaks down; such models resemble the sociological marital dependency theory in which the option of dissolution is not considered (Bennett, 2013). Such an internal threat point can be defined in terms of each fulfilling their socially recognized gender roles in producing particular household public goods, as in the separate spheres model of Lundberg and Pollak (1993, 1996).

Cooperative bargaining models can be seen as an advance on the unitary model. They stand up better to empirical tests, their assumptions correspond better to sociological insights about intra household power and they have, directly and indirectly, led to some interesting applications. Although bargaining models have not been falsified empirically in the way that unitary models have, their empirical application can be cumbersome, mainly due to the need to model the breakdown of cooperation and identify a threat point (Chiappori, Donni, & Komunjer, 2010; but see McElroy, 1990). Lundberg et al. (1997) shed some light on the choice of threat points by showing that a change in policy which resulted in the transfer of state payments for children from fathers to mothers in intact households in the UK in the late 1970s affected the household

allocation of resources, as the explicitly gendered “separate spheres” model of Lundberg and Pollak (1993) would predict. This result not only differs from what would be predicted by a unitary model, but also from the outcome of a divorce threat model, where such a transfer of payments while a marriage was intact would not affect the threat point; on divorce the parent with custody of the child would receive such payments both before and after the policy change. But similar results were not found after a much larger transfer of payments in Australia, and the interpretation of the original UK findings of Lundberg et al. (1997) as relating to intrahousehold rather than external shifts in spending patterns has been questioned (Hotchkiss, 2005).

COLLECTIVE MODELS OF THE HOUSEHOLD

“Collective models” were developed to overcome some of the limitations of unitary and bargaining models (Apps & Rees, 1988; Bourguignon et al., 1993; Chiappori, 1988, 1992). Like cooperative bargaining models and *a fortiori* unitary models, collective models assume that the outcome of household decision-making must be Pareto-efficient. Indeed, this assumption, which Chiappori (1988), calling it “collective rationality”, justifies as the minimum expression of the desire to live in a couple, is the only assumption that collective models make about the outcome of household decision-making. They do not specify any process by which the outcome is achieved. Amongst household models which assume Pareto efficiency, collective models are therefore the most general. This makes them easier to apply empirically, and they include both cooperative bargaining models and unitary models as special cases (Browning et al, 2011).

Collective models are flexible enough to accommodate individuals caring for each other and more than two decision-makers. They can include household production, taxes and spending on both private and household public goods (Blundell, Chiappori, & Meghir, 2005; Chiappori &

Ekeland, 2006; Fong & Zhang, 2001). As well as both partners' labor supply hours, they can also investigate the choice of whether to participate in the labor market at all (Donni, 2003; Vermeulen, 2006).

Theoretical assumptions

If the collective rationality assumption holds, any outcome of a household's decision-making process can be represented as the result of maximizing a function that is a weighted sum of all members' utility functions subject to their household's total budget constraint. The weights, known as "Pareto weights", used to combine individual utility functions can be thought of as representing the respective power of each member over the outcome of household decisions.

[Figure 2: A household's utility possibility frontier with the outcome of a collective model]

Figure 2 shows the same couple's household utility possibility frontier as in Figure 1. For any given set of Pareto weights, points giving the same level of household utility lie on a straight line, whose slope depends on the ratio of the Pareto weights, that is, the relative power of the man and the woman. In Figure 2, two straight lines of different slopes have been drawn.. The line through point A represents Pareto weights that are relatively higher for the man than the line through point B. On each line, the point of tangency, A or B, would be the outcome actually chosen (among feasible outcomes, no other outcome within the frontier achieves that level of weighted total utility, while no outcome achieving a higher level is feasible). Point A, the point of tangency of the line representing Pareto weights that are relatively higher for the man, gives the outcome that is better for him; outcome B is better for the woman.

Collective models can allow for any factor not affecting individual preferences influencing the Pareto weights and thus the outcome of a collective model. These can include factors that enter

the family budget constraint and therefore shift the range of possible outcomes too, such as individual wage rates, prices of purchased goods and individual or household non-labor incomes. But Pareto weights may also depend on “distribution” factors that affect neither preferences nor the variables that determine the household’s budget constraint. When such distribution factors change, the set of Pareto-efficient outcomes (the frontier in Figure 2) is unchanged. But a change in a distribution factor will cause a shift in the relative power of household members, altering the relative weight of individual utility functions (the slope of the tangents in Figure 2) and consequently changing which Pareto-efficient outcome the household chooses.

Proposed factors influencing bargaining power and the household’s budget constraint include wage levels, individual or household non-labor incomes (Chiappori et al., 2002, and Rapoport et al., 2011, among others). Proposed distribution factors, that do not affect the household’s budget constraint, include characteristics of individual members of households, such as their relative age or human capital (Browning et al., 1994; Kalugina, Radtchenko, & Sofer, 2009a, 2009b; Koolwal & Ray, 2002; Maitra & Ray, 2002), and of the household, such as the number and age of children (Kalugina et al., 2009a, 2009b, among others). The share of earnings of each partner is frequently taken to be a distribution factor in collective models of spending decisions (Bonke & Browning, 2009a, 2009b; Browning et al., 1994; Koolwal & Ray, 2002).

Environmental parameters external to the household have also been proposed as distribution factors, for example, legal and welfare rules affecting men’s and women’s relative position, such as those over the division of property after divorce (Chiappori et al., 2002). Similarly, the ratio of the number of men to women in an age bracket has been suggested as a distribution factor to capture the state of the “remarriage market”: the larger this ratio, the greater divorced women’s relative chances of remarrying, giving women greater bargaining power within marriages

(Chiappori et al., 2002; Grossbard-Shechtman & Neuman, 1988), though the interpretation of this variable can be debated (see below).

Suggested distribution factors have also included sociological or cultural variables, such as those relating to the partners' social background (for example, whether the woman's mother was in employment), to their gender role attitudes (for example, towards women's employment), to money management practices within the household (for example, whether they have a common bank account) (Clark, Couprie, & Sofer, 2004; Couprie, 2007), and to more broadly national customs such as the amount of dowry (Zhang & Chang, 1999) or the share of the marriage costs paid by the bride's family (Hendy & Sofer, 2010). But sociological or cultural variables can be problematic as distribution factors, because they are usually also part of the background context in which preferences are formed, making it impossible to separate out their effects.

The sharing rule interpretation of collective models

Under certain conditions, outcomes in a collective model can be thought of as the result of a "sharing rule" being used to share out household income between members, who then independently use their share to maximize their own utility. The focus can then shift to how the factors influencing the model's Pareto weights determine the sharing rule; this is convenient, since outcomes in terms of utility cannot be directly observed and, as an indicator of relative control over household resources, a sharing rule is easy to interpret. It is not meant however to describe any actual allocation process, but rather to convey that the outcome is the same as if such a process had been used.

For a sharing rule to lead to Pareto efficient decisions, the income that it divides up must be exogenous, that is unaffected by any of the decisions the partners might subsequently make. So

what the sharing rule covers depends on the scope of household decision-making being modeled; for spending decisions alone, all current income would be treated as exogenous, for decisions including employment as well as spending, just non-labor income would be seen as exogenous.

An adapted sharing rule interpretation can be used for some more complex collective models too. Where household production is included, the maximum possible “profit” from household production, the excess of the monetary value of the goods produced at home over their production costs (both of the time and of goods used as inputs), must be added to the household’s non labor income to be shared out between partners (Rapoport et al., 2011). Taking account of household public goods also complicates the sharing rule allocation, since members’ views may differ not only about shares of private consumption but also about how much to spend on public goods. The household decision-making process can then be seen, under strong assumptions, as consisting of a preliminary stage in which part of household income is allocated to household public goods, and then what remains is divided using a sharing rule.

When partners care about each other, so that partners care only about the level of utility the other reaches (“whatever makes you happy”), and are not concerned about how it is achieved (“cigarettes are fine then”), then a sharing rule interpretation can still apply. Such preferences, often called “caring” preferences, will affect the sharing rule itself, and rule out some unequal distributions as not Pareto-efficient, but not how shares are spent. But if the partners are concerned about what the other actually does with their share, e.g. that they buy healthy food rather than cigarettes, then leaving each to spend their own share will not necessarily produce a Pareto-efficient outcome. Such externalities in preferences (one partner caring about the “private goods” consumed by the other) effectively convert private goods into household public goods, making the need to take the latter into account in collective models even more pressing. Because

of its ease of interpretation, being able to derive a sharing rule is so convenient that preferences are usually assumed to be either egotistic or caring, despite a certain lack of realism in that assumption (Chiappori 1988, 1992). Similarly, the conditions required for a sharing rule interpretation are generally assumed to hold with respect to household public goods (Fong & Zhang, 2001; Blundell et al., 2005; Chiappori & Ekeland, 2006) and household production (Chiappori, 1997; Apps & Rees, 1997; Rapoport et al., 2011).

Empirical estimation and results

Empirical applications of economic models are of two types. The first type consists of tests of whether a model works at all, by deriving some general predictions from its assumptions and seeing whether they are empirically supported. Without giving the technical detail of such tests, we can note that collective models usually pass the test of their key assumption of “collective rationality”, that the outcome of household decision-making is Pareto-efficient. This success contrasts with the unitary model’s frequent failure to pass the tests of its assumptions (see Behrman, 2003; Browning et al., 2011; Donni, 2008; Vermeulen, 2002 for overarching discussions and surveys). In some studies, using data from agricultural households in developing countries, the collective rationality assumption is rejected. Collective rationality would predict that who produces what should be decided on efficiency grounds alone. Gender disaggregated data gathered from rural households show that is often not the case, suggesting that although the assumption of collective rationality is almost invariably validated in the consumption sphere, it is not once household production is included (see Udry, 1996; Udry & Duflo, 2004).

The second type of empirical application of a model is to consider causal relationships, to find out which factors have significant effects and to estimate their influence on outcomes in which

we are interested. Unlike bargaining models, which require the *a priori* specification of a threat point to test the influence of factors, distribution factors in collective models can be identified directly from the outcomes of household decision-making. But, because neither utility nor income shares are readily observable, identifying the effects of changing distribution factors on household outcomes usually requires additional assumptions to make use of available data. For example, since expenditure data is usually collected only at household level, there have to be some observations of expenditure on goods that can be assumed to be consumed by one partner or the other in order to be able to identify the sharing rule. Moreover, in most cases the actual shares of household income allocated to each partner cannot be recovered. In general, only *how* the sharing rule depends on individual exogenous incomes, prices and/or any distribution factors, i.e. the sharing rule's "derivatives" with respect to these factors, can be estimated.

Such empirical applications of collective models have developed in two directions: using either expenditure or employment data. Studies which analyze consumption patterns generally use household based expenditure data, sometimes coupled with information about household members' production (especially in developing countries). Unfortunately such data sets often do not include the distribution factors in whose effects on relative power researchers are interested. In these studies, in the absence of changes in prices or household incomes, changes in the amount spent on different goods are assumed to be responses to changes in the household's sharing rule, which in turn must be due to changes in distribution factors or the distribution of income between the partners. To turn observations on household expenditure into estimates of changes in the sharing rule requires connecting particular spending to individuals in the household, i.e., the identification of at least one assignable or two exclusive goods. The usual candidate for an assignable good is clothing, because amounts spent on men's and women's

clothing are usually separately observed (Browning et al., 1994) and no other assignable or exclusive goods are available in the data. To treat clothing as an assignable good implicitly assumes that neither partner cares what the other wears. But if the man cares about what the woman wears, any spending on “her” clothes partly benefits him, and therefore his share of household spending would be underestimated (if she cares less about what he wears). The very fact that expenditure surveys classify men’s and women’s clothing separately shows that clothing is a more gendered good than most, and hardly a typical good on which to base intrahousehold decision-making analysis. Data sets in which individuals are asked who benefits from goods and services purchased (available currently to our knowledge only for Denmark) would allow assessment of whether the choice of assignable good matters by enabling different assignable goods to be used (Bonke & Browning, 2009a).

Collective models including the allocation of time were initially based upon labor survey data, with the assignable good used in these studies being leisure time, assumed to be the same as non-employed time. But because such surveys do not record time spent in household production, they do not measure “leisure” satisfactorily, as only time-use surveys, ideally collected using a 24 hour diary, can. Models using time use data take into account time spent on household production, which is particularly important given the typically uneven domestic contributions of men and women (Bourguignon & Chiuri, 2005; Couprie, 2007; Rapoport et al., 2011).

To apply empirically collective models that include household production, the questionable assumption that all home produced goods are tradable in the market generally needs to be made, as well as that individual productivity in household production does not affect the sharing rule, so, for example, being a good cook does not increase one’s share (Apps & Rees, 1997; Chiappori, 1997); but no test of the latter assumption has been made up to now. Recent empirical

studies now often also include household public goods, most importantly the welfare of children, reflecting their typically gendered effects on parental labor supply (Blundell et. al, 2005).

Some results of studies investigating the impact of distribution factors on the sharing rule have significant societal or policy implications and/or are in line with theories from other disciplines.

These include the findings that:

- Partners' allocations resulting from the sharing rule increase with their own wage rate, and with their share of household earnings and non-labor income (Bonke & Browning, 2009a, 2009b; Clark et al., 2004).
- The sex ratio, the proportion of men to women in the population, has been found to have a positive impact on the woman's allocation resulting from the sharing rule in many, but not all, studies (Chiappori et al., 2002; Grossbard-Shechtman & Neuman, 1988). Whether the sex ratio really captures the state of the "remarriage market" however remains controversial, since either could be correlated with variables more directly affecting the sharing rule, such as gender norms or men's and women's relative wages (Clark et al., 2004). The sex ratio's easy availability made it the first distribution factor used and it continues to be widely used despite these criticisms.
- Women have greater bargaining power within marriage the more the division of household wealth after divorce tends to favor them (Chiappori et al., 2002).
- Results so far using cultural variables as distribution factors have been less convincing. The "share of marriage costs paid by the bride" shows a positive effect on women's allocation resulting from the sharing rule in Egypt (Hendy & Sofer, 2010). But for Great Britain, cultural and sociological variables, such as partners' social background, gender role attitudes and

household money management practices have been found to have insignificant effects on the sharing rule (Clark et al., 2004; Couprie, 2007).

- Women's share of household expenditures is affected by the share of their earnings in household income, but answers to a question about how money is pooled within the couple do not seem to affect results (Bonke and Browning 2009a, using Danish survey data). Indeed, the collective model seems to perform well whatever the couple's "pooling regime".

Finding variables that affect the sharing rule and measuring their effects is one of the main aims of collective models. Nevertheless, a few studies go beyond estimating effects on the sharing rule and try to estimate the sharing rule itself as a direct measure of the influence of each partner in household decision-making. This is possible only by making some additional assumptions. A common estimation strategy is to use data for both single person and couple households, by assuming that preferences do not differ in important respects between single people and those in couples with otherwise similar characteristics (Browning, Chiappori, & Lewbel, 2006; Couprie, 2007; Lewbel & Pendakur, 2008). Another strategy is to use answers to income satisfaction or life satisfaction questions (Kalugina et al. 2009a, 2009b), or to financial satisfaction questions (Alessie, Crossley, and Hildebrand (2006), Bonke and Browning (2009b)) as direct measures of the utility derived from consumption to estimate parameters of the sharing rule.

Some studies have estimated a sharing rule that favors women (Lise and Seitz, 2004; Alessie et al. 2006). Their identification strategies are however questionable. Lise and Seitz, for example, interpreted all non-employed time as leisure. In one of the few papers to estimate the sharing rule itself, Couprie (2007), using a more precise definition of leisure time that excludes the time devoted to household production, found that on average women receive just under 40 per cent of

household resources. Couprie ruled out this unequal outcome being purely an effect of the gender wage gap through unequal wage rates being used to value leisure time; she showed that even if a couple's wage rates and thus the valuation of their leisure time were equal, the sharing rule would give the woman on average just 44 per cent of household resources. Using a different methodology and Russian data, Kalugina et al. (2009a) obtained similar results. Finding such systematic differences across different studies using large numbers of households implies that these models are capturing an important facet of gender inequality that merits attention.

In development economics there has been a rapid growth in research on intrahousehold resource allocation, much of which uses and expands collective models, while other research, not explicitly using such models, draws on insights from these and from bargaining models. For example, Dauphin and Fortin (2001) increase the number of decision-makers to model polygamous families, and find that both husbands and co-wives have influence on household decisions. Among other types of extended families studied, Case and Deaton (1998) study the effect of cash transfers to the elderly, while Duflo (2003) examines outcomes in households in South Africa that include grandmothers.

DISCUSSION

This paper has reviewed the development over the past five decades of household decision making models that use the rational choice framework of mainstream economic thinking. Among the broad field of the economics of the family, we have focused on household decision-making models because these are of direct relevance to issues of within-household distribution of resources. The paper explained the rationale for, and limitations of, the assumptions required by these models, and some of their virtues. It compared and contrasted earlier attempts at modeling

the family with the subsequent bargaining and collective models in which more than one person's preferences are modeled and explicitly influence household decisions. Reflecting the literature, we have focused mainly on models with two decision makers - implicitly male-female couples (see Bennett, 2013, this volume), though we noted some exceptions. A few results relevant to gender now seem well-established, such as the finding that in male-female couples a woman's bargaining power and thus her influence over household decisions is positively related to the share of her earnings in household income.

Although collective models remain the basis of most empirical research that takes explicit account of differing preferences coexisting within the same household, there remain theoretical and empirical limitations. On the empirical front, the sharing rule itself is difficult to recover, and even its derivatives are not easy to estimate: values found vary greatly, throwing their reliability into question, although meta-studies have found convergence in the sign (positive or negative) and significance of the effect of some interesting variables.

The main questions for the collective model arise from its underlying theory. One criticism is that gender norms and roles may not only affect Pareto weights and the sharing rule (or the threat point in bargaining models) but also limit what is bargained over (Agarwal, 1997). For example, if bargaining over the division of labor within the home is restricted by gender norms then women's relative share of housework may not change when they take employment, even if they have more say over how other resources are distributed within the household. Sen (1990) argues that social norms prevent women from bargaining on their own behalf, partly as a result of social coercion, but more often through a deeply rooted belief that they are not entitled to make such claims; he therefore concludes that it is gendered perceptions of contributions, rather than actual contributions, that affect bargaining power. However, such theories are in practice hard to

implement empirically because of the difficulty of measuring perceptions, social norms and the benefits from household income that go beyond its consumption benefits (but see De Henau and Himmelweit; 2013; Carter & Katz, 1997).

Another criticism is that collective models assume efficient outcomes that can only be guaranteed by cooperation. However, lack of cooperation may be at the root of many inefficient outcomes observed in both developing and developed countries, especially those related to the division of unpaid labor or resulting in domestic violence. As we have seen, there is mounting evidence from data on rural households' agricultural production and its economic value that gender norms may prevent contributions to production being allocated efficiently. Further, although it is generally found that as a woman's earnings rise her share of housework decreases (Rizavi & Sofer 2010), it may not continue to do so if her earnings rise beyond the point where they equal the man's (Sevilla-Sanz et al., 2011), findings that are in line with evidence from qualitative studies (reviewed in Bennett, 2013). Bittman et al., (2003) and Brines (1994) explain these results by referring to the concept of "doing gender", arguing that when men earn less than their wives a gender norm violation occurs. Thus, the wife, the husband, or both revert to more traditional behavior in order to neutralize this deviance. "Doing gender", insofar as it is an explanation for apparently inefficient outcomes, lies outside the scope of collective models.

There is still much room for both empirical and theoretical developments. On the empirical front, quantitative data sets specifically designed to study intrahousehold inequalities could strengthen available evidence. In the meantime, imaginative use has been made of existing data such as the unusually useful Danish data set, which asks for whom in a household goods and services are purchased (Bonke & Browning, 2009a), or of more commonly available variables not usually analyzed by economists. For example, answers to satisfaction questions as direct measures of the

utility derived from consumption have been used to estimate parameters of the sharing rule (Bonke & Browning, 2009b; Kalugina et al., 2009a, 2009b) and to provide estimates of household equivalence scales based on a collective model (Alessie et al., 2006). In a similar vein, but not using a rational choice model, De Henau and Himmelweit (2013) use individual answers to a question about satisfaction with household income in an attempt to take into account the full benefits - including intangible ones such as financial autonomy - that household members may individually gain from household income. Alternatively, more “sociological” variables, especially those relating to a couple’s money management practices, could be explored as distribution factors, though those used so far have not yet been found very influential (Bonke & Browning, 2009b).

On the theoretical front, an interesting avenue for future research would be to provide a unifying framework that incorporates non-cooperative behavior within the ‘collective’ approach, as D’Aspremont and Dos Santos Ferreira (2011) and Cherchye, Demuyneck and De Rock (2011) do. Lack of cooperation can be depicted as a commitment failure in a dynamic setting where the sharing rule is renegotiated in every period, rather than established initially for all periods as efficiency would require. Proposing a dynamic collective model of this sort, Mazzocco (2007) rejects the hypothesis that household members commit themselves to future allocations of resources. Understanding the circumstances under which couples cooperate, and over what resources, is crucial in devising policies that may affect the distribution of household resources. As we have seen, cooperation over home production may differ from cooperation over monetary resources, leading to shares of housework remaining unequal while the intrahousehold allocation of monetary resources shifts in response to women’s increased bargaining power.

Thus collective and other household decision-making models have contributed to understanding intrahousehold distributional issues, and may be able to make better contributions in the future. We have also seen how the assumptions and rigor of these models impose limitations, so that qualitative studies are necessary to fill in the many gaps that they leave. It is because of both the virtues and the limitations of these models that we believe that all researchers interested in within-household distributional questions would benefit from understanding recent developments in economic models of the household. Given the weight placed by policy-makers and others on economic and quantitative evidence, it is incumbent on researchers of all disciplines and on those who might have influence on data collection in the future to understand the achievements and limitations of the models used, explicitly or implicitly, to produce such evidence and the assumptions that lie behind them, as well as the data limitations that stand in the way of making more extensive use of such models. We hope that this survey has been a contribution to developing such an interdisciplinary understanding.

REFERENCES

- Agarwal, B. (1997). "Bargaining" and Gender Relations: Within and Beyond the Household. *Feminist Economics*, 3(1), 1-51.
- Alessie, R., Crossley, T. & Hildebrand, V. (2006). Estimating a collective household model with survey data on financial satisfaction. IFS Working Paper 06/19.
- Apps, P. & Rees, R. (1988). Taxation and the Household. *Journal of Public Economics*, 35, 355-69.
- Apps, P. & Rees, R. (1997). Collective Labor Supply and Household Production. *Journal of Political Economy*, 105, 178-190.
- Basu, K. (2006). "Gender and Say: a Model of Household Behaviour with Endogenously Determined Balance of Power," *Economic Journal, Royal Economic Society*, 116(511), 558-580.
- Becker, G.S. (1965). A Theory of the Allocation of Time. *Economic Journal*, 75 (299), 493-517.
- Becker, G.S. (1981). *A Treatise on the Family*. Cambridge MA: Harvard University Press.
- Behrman, J. R. (2003). 'Intrahousehold distribution and the family', in M. R. Rosenzweig & O. Stark (Eds.), *Handbook of Population and Family Economics*. Amsterdam: North Holland.
- Bennett, F., De Henau, J., Himmelweit, S. & Sung, S. (2012). Financial togetherness and autonomy within couples. In J. Scott, S. Dex and A. Plagnol (eds), *Gendered Lives:*

- Gender Inequalities in Production and Reproduction* (pp. 97–122): Cheltenham: Edward Elgar.
- Bennett, F. (2013) Researching within-household distribution. *Journal of Marriage and Family*, *special issue*
- Bergmann, B. (1995). Becker's Theory, of the Family: Preposterous Conclusions, *Feminist Economics*, *1*, 141-150.
- Bergstrom, T (1989). A Fresh Look at the Rotten Kid Theorem--and Other Household Mysteries, *Journal of Political Economy*, *97(5)*, 1138-1159.
- Bittman, M., England P., Folbre N., Sayer L., and Matheson, G. (2003). When Does Gender Trump Money? Bargaining and Time in Household Work. *The American Journal of Sociology*, *109(1)*, 186–214.
- Blundell, R., Chiappori, P. A. & Meghir, C. (2005). Collective labor supply with children. *Journal of Political Economy*, *113(6)*, 1277-1306.
- Bonke, J. & Browning, M. (2009a). 'Pooling of Income and Sharing of Consumption within Households'. Economics Series Working Papers, 4228, University of Oxford.
- Bonke, J. & Browning, M. (2009b). The distribution of financial well-being and income within the household. *Review of Economics of the Household*, *7(1)*, 31-42, DOI: 10.1007/s11150-008-9044-3.
- Bourguignon, F., Browning, M., Chiappori, P. A. & Lechêne, V. (1993). Intra-Household Allocation of Consumption: a model and some evidence from French data. *Annales d'Economie et de Statistique*, *29*, 137-156.

- Bourguignon, F. & Chiuri, M.C. (2005). Labor market time and home production: A new test for collective models of intra-household allocation. *CSEF Working Papers*, 131.
- Bradbury, B. (2008), Time and the Cost of Children. *Review of Income and Wealth*, 54, 305–323.
doi: 10.1111/j.1475-4991.2008.00277.x
- Brines, J. (1994). Economic Dependency, Gender, and the Division of Labor at Home. *American Journal of Sociology*, 100(3), 652–88.
- Browning, M., Bourguignon, F., Chiappori, P. A. & Lechêne V. (1994). Income and Outcomes: A Structural Model of Intra-Household Allocation. *Journal of Political Economy*, 102, 1067-1096.
- Browning, M. & Chiappori, P. A. (1998). Efficient intra-household allocations: a general characterization and empirical tests. *Econometrica*, 66, 1241-1278.
- Browning, M., Chiappori, P. A. & Lewbel, A. (2006). 'Estimation consumption economies of scale, adult equivalence scales and household bargaining Power', Economics Series Working Papers, 289, University of Oxford.
- Browning, M., Chiappori, P. A. and Weiss, Y. (2011). *Family Economics*.
http://www.tau.ac.il/~weiss/fam_econ/ (accessed on 14 December 2011).
- Carter, M. & Katz, E. (1997). Separate Spheres and the Conjugal Contract: Understanding the Impact of Gender-Biased Development (p 95-111). In L. Haddad, J. Hoddinott & H. Alderman (Eds.), *Intrahousehold Resource Allocation in Developing Countries: Methods, Models and Policies*, Baltimore: Johns Hopkins University Press.

- Case, A & Deaton, A. (1998). Large Cash Transfers to the Elderly in South Africa. *The Economic Journal*, 108 (450), 1330–1361.
- Cherchye, L., T. Demuynck, and B. De Rock (2011), Revealed preference analysis of noncooperative household consumption. *Economic Journal*, 121, 1073–1096.
- Chiappori, P. A. (1988). Rational household labor supply. *Econometrica*, 56, 63-89.
- Chiappori, P. A. (1992). Collective Labor Supply and Welfare. *Journal of Political Economy*, 100, 437-467.
- Chiappori, P. A. (1997). Introducing Household Production in Collective Models of Labor Supply. *Journal of Political Economy*, 105, 191-209.
- Chiappori, P. A., Donni, O. & Komunjer, I. (2010). Learning From a Piece of Pie (mimeo)
- Chiappori, P. A. & Ekeland, I. (2006). The micro economics of group behavior: General characterization. *Journal of Economic Theory*, 130, 1-26.
- Chiappori, P.A., Fortin, B. & Lacroix, G. (2002). Marriage market, divorce legislation and household labor supply. *Journal of Political Economy*, 110, 37-72.
- Clark, A., Couprie, H. & Sofer, C. (2004). La modélisation collective de l'offre de travail: mise en perspective et application aux données britanniques. *Revue Economique*, 55(4), 767-789.
- Couprie, H. (2007). Time allocation within the family: welfare implications of life in a couple. *Economic Journal*, 117, 287-305.

- D'Aspremont, C. and Santos Ferreira, R. (2011). Household behavior and individual autonomy: A Lindahl approach. *Bureau d'Economie Théorique et Appliquée (BETA)*, Document de Travail, 2011 – 19.
- Dauphin, A. & Fortin, B. (2001). A Test of Collective Rationality for Multi-Person Households. *Economics Letters*, 71, 211-216.
- De Henau, J. & Himmelweit, S. (2013) Unpacking within household gender differences in partners' subjective benefits from household income. *Journal of Marriage and Family*, special issue
- Donni, O. (2003). Collective household labor supply: Non-participation and income taxation. *The Journal of Public Economics*, 87(5/6), 1179-98.
- Donni, O. (2008). Collective models of the household. In S. N. Durlauf and L. E. Blume (Eds.), *The New Palgrave Dictionary of Economics*, second edition, London: Palgrave Macmillan.
- Duflo, E. (2003). Grandmothers and Granddaughters: Old-Age Pensions and Intrahousehold Allocation in South Africa. *World Bank Economic Review*, 17(1), 1-25.
- England, P (2003) Separative and Soluble Selves: Dichotomous Thinking in Economics, in *Feminist Economics Today: Beyond the Economic Man*, 33- 46 (Marianne A. Ferber & Julie A. Nelson eds).
- Fong, Y. & Zhang, J. (2001). The Identification of Unobservable and Independent Spousal Leisure. *Journal of Political Economy*, 109(1), 191-202.
- Fortin, B. & Lacroix, G. (1997). A Test of the Unitary and Collective Models of Household Labor Supply. *Economic Journal*, 107, 933-955.

- Gronau, R. (1977). Leisure, Home Production and Work: The Theory of the Allocation of Time Revisited. *Journal of Political Economy*, 85, 1099-1124.
- Grossbard-Shechtman, S. A. & Neuman, S. (1988). Women's Labor Supply and Marital Choice. *Journal of Political Economy*, 96, 1294-1302.
- Hendy, R. & Sofer, C. (2010). Do Distribution Factors Matter: Within Resource Allocation in Egyptian Couples. (mimeo)
- Hotchkiss, J. L. (2005). Do husbands and wives pool their resources? Further evidence. *Journal of Human Resources*, 40(2), 519-31.
- Kalugina, E., Radtchenko, N. & Sofer, C. (2009a). How Do Spouses Share their Full Income? Identification of the Sharing Rule Using Self-Reported Income. *Review of Income and Wealth*, 55(2), 360-391.
- Kalugina, E. Radtchenko, N. & Sofer, C. (2009b). Intra-Household Inequality in Transitional Russia. *Review of Economics of the Household*, 7(4), 447-471.
- Koolwal, G., & Ray, R. (2002). *Estimating the Endogenously Determined Intra Household Balance of Power and its Impact on Expenditure Pattern: Evidence from Nepal*. Unpublished manuscript, Ithaca, NY: Department of Economics, Cornell University.
- Lewbel, A. & Pendakur, K. (2008). Estimating Collective Household Models with Engel Curves. *Journal of Econometrics*, 147, 350-358.
- Lundberg, S. & Pollak, R. (1993). Separate Spheres Bargaining and the Marriage Market. *Journal of Political Economy*, 10, 987-1010.

- Lundberg, S. J., & Pollak, R.A. (1996). Bargaining and Distribution in Marriage. *Journal of Economic Perspectives*, 10(4), 139–58.
- Lundberg S. J., Pollak, R. & Wales A. T. (1997). Do husbands and wives pool their resources? Evidence from the United Kingdom Child Benefit. *Journal of Human Resources*, 32(3), 463-480.
- Manser, M., & Brown M. (1980). Marriage and Household Decision Theory-A Bargaining Analysis. *International Economic Review*, 21, 21-34.
- Mazzocco, M. (2007). Household Intertemporal Behavior: A Collective Characterization and a Test of Commitment. *Review of Economic Studies*, 74(3), 857-895.
- McElroy, M. B. & Horney, M. J. (1981). Nash-bargained household decisions: toward a generalization of the theory of demand. *International Economic Review*, 22(2), 333-49.
- McElroy, M. B. (1990). The Empirical Content of Nash-bargaining Household Behavior. *Journal of Human Resources*, 25, 559-583.
- Nyman, C., & Dema, S. (2007). An overview: Research on couples and money. In J. Stocks, C. Diaz and B. Hallerod (Eds.), *Modern couples sharing money, sharing life* (pp. 7-29). Basingstoke: Palgrave Macmillan.
- Pollak, R. A. (2003). Gary Becker's Contributions to Family and Household Economics, *Review of the Economics of the Household*, 1, 111-112.
- Pollak, R. A. (2005). 'Bargaining power in marriage: earnings, wage rates and household production', *NBER Working Paper Series* 11239.

- Rapoport, B., Sofer, C. & Solaz, A. (2011). Household Production in a Collective Model: Some New Results. *Journal of Population Economics*, 24, 23-45.
- Rizavi, S. S. & Sofer, C. (2010). Household division of labor: Is there any escape from traditional gender roles? *Documents de travail du Centre d'Economie de la Sorbonne 10009*.
- Samuelson, P. A. (1956). Social Indifference Curves. *Quarterly Journal of Economics*, 70, 1-22.
- Schultz, T. P. (1990). Testing the Neoclassical Model of Family Labor Supply and Fertility. *Journal of Human resources*, 25, 599-634.
- Sen, A. (1990). Gender and cooperative conflicts. In Tinker, I. (Ed.), *Persistent Inequalities*. New York: Oxford University Press.
- Sevilla-Sanz, A. & Gimenez-Nadal, J. I. & Fernandez, C. (2010). Gender Roles and the Division of Unpaid Work in Spanish Households. *Feminist Economics*, 16(4), 137-184.
- Udry, C. (1996). Gender, Agricultural Production and the Theory of the Household. *Journal of Political Economy*, 104, 1010-1046.
- Udry, C. & Duflo, E. (2004). Intrahousehold Resource Allocation in Cote D'Ivoire: Social Norms, Separate Accounts and Consumption Choices. *NBER Working Paper No. w10498*
- Vermeulen, F. (2006). A collective model for female labor supply with nonparticipation and taxation. *Journal of Population Economics*, 19(1), 99-118.
- Zhang, J., & Chan, W. (1999). Dowry and Wife's Welfare: A Theoretical and Empirical Analysis. *Journal of Political Economy*, 107(4), 786-808.

Figure 1: A household's utility possibility frontier with the outcome of a bargaining model

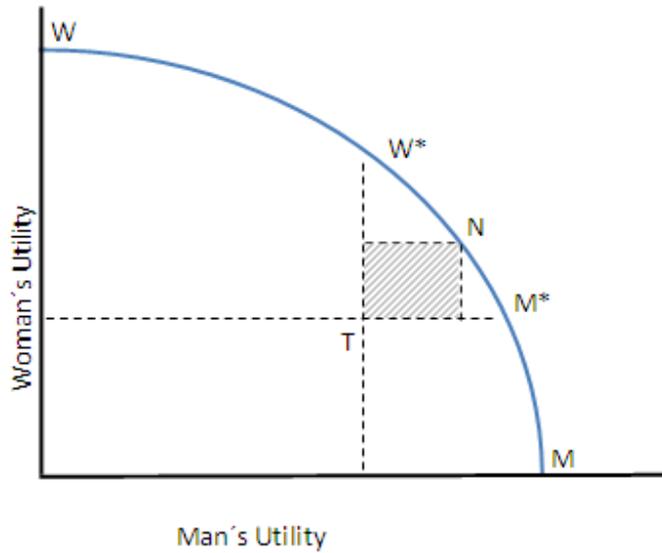


Figure 2: A household's utility possibility frontier with the outcome of a collective model

