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Do Men Care? Estimating Men's Preferences for Spending Time with Their Children

Leif Andreassen[a], Maria Laura Di Tommaso[b,c,d] and Anna Maccagnan[b]

[a]Research Department, Statistics Norway, Oslo, Norway; [b]Department of Economics and Statistics Cognetti de Martiis, University of Torino, Torino, Italy; [c]Collegio Carlo Alberto, Torino, Italy; [d]Frisch Center for Economic Research, Oslo, Norway

ABSTRACT

Is the time men use on childcare and household work the result of preferences or cultural, institutional and economic constraints? Can such constraints be measured when we only observe men's choices (functionings) but not their capabilities? Using a random utility model together with stochastic specifications of the probability of having different capabilities, this paper shows that it is possible to distinguish between preferences and capabilities. Utilising time use data for Spain, we find that even though men do relatively little childcare, it is important to them. So, men do care to care. Our estimates show that, given our model, only about 9% of men with children have the full capability set, while 58% of them are constrained to a low level of care and housework. According to our model, many of these would not change behaviour if they had the full capability set, but about 20% of fathers would choose to provide more childcare and housework.

KEYWORDS
Household production; random utility models; time use; capabilities; childcare

JEL CLASSIFICATION
C25; D13; J13

Introduction

This paper estimates men's preferences for unpaid work (consisting of childcare and housework), taking into consideration that they may not be free to provide as much time on these activities as they would like. It provides a novel way of assessing the degree to which men might be limited in the choices they can make regarding paid work and time used on childcare.

The role of men in childcare is important in assessing the well-being of all members of the household. For example, the importance of the presence of fathers for young children has been documented in the psychological literature (WHO 2007). It is also important when considering the labour supply and fertility decisions of households and as a consequence, it can also influence inequality in the labour market (seen in observed gender wage gaps, gaps in

CONTACT Anna Maccagnan anna.maccagnan@unito.it Department of Economics and Statistics Cognetti de Martiis, University of Torino, Lungo Dora Siena 100/A, 10153 Torino, Italy
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participation and quality of employment). When parental leave includes a non-transferable quota for the fathers, their opportunities increase and they take up more paternal leave, which has an impact on both male and female wages (Rege and Solli 2013; Andersen 2018; Duvander and Jans 2008).

Men might be restricted in their ability to choose to stay home with children due to restrictions in the labour market (e.g. lack of part-time opportunities) or to social and cultural norms defining childcare as a predominantly female activity. The capability approach, as introduced by Sen (1985, 2009), points out the importance of studying what people are free to do and be (their capability sets), rather than what they do and who they are (their achieved functionings). Accordingly, the goal of this paper is to measure not only the observed functionings (how much unpaid work men do) but also their capability to provide it, i.e. whether they have restrictions in their freedom of being engaged in unpaid work. The capability set is not directly observable, but in our approach, is measured indirectly from behaviour. Our approach can thereby be viewed as an operationalisation of Sen's theoretical thinking on capabilities.

Men's supply of unpaid work is particularly low in Southern European countries. The restrictions faced by men in doing unpaid work are not necessarily hard restrictions implying that such work is physically or legally impossible. The restrictions are often of a softer type, reflecting cultural and social norms. According to Sevilla-Sanz, Gimenez-Nadal, and Fernandez (2010), men's low contribution in housework and childcare activities is likely to be the result of gender roles of masculinity and femininity which still dominate the Spanish society. Mothers seem unwilling to give up the role of primary child carer, regardless of their level of earnings relatively to their husbands'. Recent research for the USA (Pew Research Centre 2015) shows that more fathers (50%) than mothers (39%) say that they do not spend enough time with their kids. Also, in Europe, Kanji and Samuel (2017) find that male breadwinners feel constrained from participating as fully as they desire in family life, even if they do not have children. There might be cultural and gender norms against men looking after their children during the day, making it difficult, but not impossible for men to choose to do so. For example, paternal leave in Spain has been extended from 13 days to 16 weeks only in 2016.

In the following, we look at the time use of men, focusing on the time they spend together with their children. We consider whether the observed low level of childcare provided by men reflects an unwillingness to provide such care or whether it reflects cultural and economic restrictions.

In our model, men face a choice between different discrete states, some with him doing a high level of paid work and others where he does a high level of unpaid work. We use both the term "unpaid work" and the term "household production" to cover the total time used on "housework" (covering all unpaid work in the household except childcare) and on "childcare" (covering hours where time with the child is the main activity). The different states denote the possibilities the man faces. Each possible state is such that the household has a certain level of household consumption (based on the amount of paid work done by the couple and on their respective wages) and a certain level of household production (based on the amount of housework and childcare done by the couple) in that state. The characterisation of each state, also those not chosen, is derived from our data based on the assumption that time use is the result of household bargaining.

In order to disentangle preferences from constraints and therefore to estimate men's capabilities (opportunities) to provide unpaid work, we utilise a random utility model. This approach was pioneered by Luce (1959) and McFadden (1973, 1984).

The use of random utility modelling within the Capability Approach framework is rather new in the literature. It was proposed in a theoretical paper by Dagsvik (2013) and first applied by Andreassen and Di Tommaso (2018) to women's freedom of movement. This paper introduces two novelties. First, it takes into account couples' allocation of time between paid and unpaid work; second, it utilises a more complex random utility model estimating two capabilities rather than one. We use the random utility model to find (probabilistically) the wishes of the men in our sample and multinomial logit rationing functions to find the probability of the men having limited capability sets.

We utilise Spanish time-use data for 2002, taken from the Multinational Time Use Survey (MTUS). Spain has a Mediterranean welfare regime, with women providing a very high share of unpaid work (Sevilla-Sanz, Gimenez-Nadal, and Fernandez 2010).[1]

We find that even though men do relatively little unpaid work, it is important to them. Our estimates suggest that individual, household and institutional variables are important drivers in shaping the capability set and preferences.

There is good reason to treat our results with caution, while recognising that we are dealing with the difficult econometric problem of disentangling the choices of individuals from their unobservable capability sets. We thereby must devise ways of inferring the nature of these unobservable capabilities from observed behaviour.

By using economic theory and making assumptions about which variables may affect choices and constraints we are able to measure these constraints. We look at how changing our assumptions changes our estimates. We believe our result are important, but not definitive. Instead, they should be seen as giving one view of a phenomenon that needs to be viewed from other angles as well. We think our method for measuring the constraints faced by individuals is an important innovation in the study of capabilities and in the analysis of the household.

The paper is organised as follows: "Related Literature" section presents the related literature; "The Conceptual Framework" section presents the econometric model and in particular, it defines the state space, defines the utility function and the random utility model, and finally discusses identification issues. "Data" section describes the data, while descriptive statistics are presented in "Explanatory Variables and Descriptive Statistics" section. "Estimation of the Model" section presents the result of the empirical analysis, "Predicting Capability Sets and Counterfactual Predictions" section predicts the capability sets and "Conclusion" section concludes.

Related Literature

Many studies have analysed time spent by men and women on housework and childcare. The presence of children affects both males' and females' paid and unpaid work, but the effects are of very different magnitude and male's paid work is found to be hardly affected by the presence of children (Kalenkoski, Ribar, and Stratton 2005; Bloemen, Pasqua, and Stancanelli 2010; Mancini and Pasqua 2012). Parental education matters in the allocation of time towards unpaid work, with better-educated parents spending significantly more time with their children (Gutierrez-Domenech 2010; Guryan, Hurst, and Kearney 2008; Gimenez-Nadal and Molina 2013). An increase in own wages is also found to be positively related to own time with children for both parents (Connelly and Kimmel 2009). Moreover, higher women`s wages are associated with higher levels of fathers` unpaid work (Bloemen and Stancanelli 2014; Kalenkoski, Ribar, and Stratton 2009).

Our approach differs from the above in that we estimate men's preferences for unpaid work taking into account that they may be constrained. Even in surveys, one cannot be sure individuals will reveal constraints that they do not consider binding. For example, if social norms make it difficult for a man to spend time with his children, he may not consider this a constraint if he shares this social norm. He might not miss what he cannot have. Our model can find, by inferring his wishes from other men's behaviour, that in the absence of such a social norm the man would like to spend more time with his children.

There is a related literature based on subjective well-being. An interesting paper touching on our subject is Connelly and Kimmel (2015). They combine time-use data with accompanying emotional information to look at whether women like childcare more than men. Regressing a measure of happiness on different individual characteristics, they find that both mothers and fathers enjoy their time spent in childcare, with fathers reporting at least as much satisfaction as women. This is in line with our results. Our utility-based approach is more concerned with choice (and absence of choice) than with the accompanying emotions. This enables us to explicitly take into account, for example, the diminishing marginal utility of doing childcare. Connelly and Kimmel (2015) only implicitly control for this in their regressions by including time spent on an activity as a control. Furthermore, our approach allows us to explicitly consider the role opportunity cost, productivity, preferences and social norms play in explaining differences in time-use. Gimenez-Nadal and Sevilla (2016) use a random-effects model to find that higher educated mothers report lower well-being from childcare than others, while there is a weaker relationship between educational attainment and momentary well-being for fathers. Our results indicate that increased education among men will lead them to be more willing to reduce paid work in favour of unpaid work, including childcare.

The Conceptual Framework

We build on Sen's insight that, when analysing an outcome such as men's time use, one also needs to consider whether the men have full capability sets. Limitations on a capability set need not be absolute but can arise from social norms or inner psychological barriers. An example is women's freedom of movement, which was analysed in a similar manner to the present study, in Andreassen and Di Tommaso (2018). Freedom of movement can be restricted by physical handicap, restrictions set by family members, social norms about proper behaviour or feelings of vulnerability. In this paper, restrictions on the possible uses of time can arise from limitations on the type of jobs that are available, on the resources available (for example money for professional childcare), on one's social setting (having friends and family), on physical and psychological barriers and on social norms (for example the view that child rearing is basically a female responsibility).

The fundamental difficulty in implementing the capability approach empirically is that the capability set is inherently unobservable. Our challenge is to devise an empirical framework that distinguishes between choice and opportunity. To do this, we develop a modelling approach where choices and opportunities are assumed to each have certain statistical properties. These assumptions are necessarily ad hoc and our estimates are conditional on our model. In other words, our approach only gives a tentative answer to the question about the degree to which men in Spain were constrained in their capability of spending time with their children.

We utilise a random utility model to estimate men's preferences for unpaid work. To estimate such a model, we need to assume that the individual chooses among a set of finite states, each with its outcome. The outcomes in our model are based on the time used on different activities and the income of the couple (based on their hours of paid employment). Some individuals will have access to all the possible states, having a full capability set, while others will only have access to a few states, having limited capabilities. Men might not be directly hindered from spending time with their children, but need to devote more time to paid work than they wish, reducing the time they can spend with their children.

In the following, we devise two independent indicators giving the probability of having limited capability sets, one for paid work, r_e, and one for unpaid work (covering housework and time used on child care), r_h. These are necessarily simplifications. It is possible that individuals also might be constrained in other types of time use or that the two indicators are not independent of each other. Our main focus in the analyses is then on how these indicators of a limited capability set change with background variables, without inferring causal effects.

It should be noted, that while we use traditional utility theory to model choice, we do not use it in any way to make welfare judgements. Since we estimate the parameters of utility functions this is possible, see Dagsvik (2013), but we think that this would not be in accordance with the underlying philosophy behind the capability approach. We only describe the degree to which men might be constrained in spending time with their children. It is up to the reader to judge the importance of our findings.

Based on time use data for Spain from 2002 to 2003, we describe the characteristics of the discrete choices faced by men.[2] We follow the discrete choice literature, for example, McFadden (1973), in calling these characteristics "alternative specific variables". They describe the characteristics of each alternative that can be chosen. Consumption will for example be different in a state where the man has a high level of paid work than in a state where he has a low level of paid work. Individual specific variables such as education will, on the other hand, be the same across states. The individual-specific variables can affect both preferences and the available choice sets. We look at different specifications for how they might do so.

Our model requires us to predict what would happen if a man chose a different state than the one he is observed in. An important feature of our prediction modelling is that men and women are treated symmetrically. Assuming that they know each other's desires, we assume they find outcomes where neither one regrets their choice (they find a Pareto-optimal equilibrium). This assumption is not a direct part of our econometric model, but is important because it assures us that we have a consistent model where the choices made by the household are derived from the individual utilities of the man and the women.[3] It forms the basis for our calculations of how time on different activities is shared within the couple.

We perform two types of robustness test. First, we compare our model with the same model where all individuals have full capability sets. We find that including limited capabilities is superior to a similar model where no one has a limited capability set. Secondly, we also perform two sensitivity analyses that indicate that our model is robust with respect to whether our variables are thought to affect choice or whether they are thought to affect the capability set.

Time Use in the Different States

We look at choices among four states categorised by high and low levels of paid employment and of unpaid work. Let e_{jm}, e_{jf} and $e_{jT} = e_{jm} + e_{jf}$ be the time used on paid employment in state j by respectively the male, the female and in total, where we, until further notice, drop subscripts indicating household. In the same manner, let h_{jm}, h_{jf} and $h_{jT} = h_{jm} + h_{jf}$ be the time used on housework in state j and let c_{jm}, c_{jf} and $c_{jT} = c_{jm} + c_{jf}$ be the time used on childcare in state j.

In addition to the above time use variables, each individual also uses time on travel to work, t_{jm} and t_{jf}, sleep, s_{jm} and s_{jf}, and leisure (encompassing all other activities), l_{jm} and l_{jf}, where the subscripts denote state and gender. It is assumed that travel time is the same for all states so $t_{jm} = t_m \; \forall j$ and $t_{jf} = t_f \; \forall j$. This could be because travel time is mainly determined by where the couple lives. The time constraint for the man in the household is thereby given as

$$e_{jm} + t_m + h_{jm} + c_{jm} + l_{jm} + s_{jm} = T, \tag{1}$$

where T is the total time constraint ($T = 24$ h = 1440 min), and a similar constraint applies for the woman. Letting sleep be residually determined, we have that each state j is characterised by the time variable set $\psi_j = \{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$. The utility of this time use for the man is given by the utility function $U_m(\psi_j)$ and for the women by $U_f(\psi_j)$.

In general, consider that all the possible choices regarding paid and unpaid work of the male and the female in a couple are grouped into K discrete states. Let S be the universal set of all possible states, so there are K elements in S. It is the absolute maximal set of alternatives that are relevant, regardless of whether or not they are available to everybody. The agents are assumed to have preferences over the alternatives in S. Let C denote the choice set of a particular agent. It consists of all the opportunities (functionings) available to the agent. For some agents C may be equal to S, but in many situations, the choice set will be a proper subset of S. It could be that cultural norms reduce the care opportunities for some men. In the context of Sen's capability approach, C represents the agent's capability set, and the elements of C (which we call states) are the functionings that are available to the agent. The universal set S contains all the functionings that are generally possible, i.e. is the full capability set (see also Andreassen and Di Tommaso 2018).

The states are defined in the same manner for men and women, but each state affects them differently due to gender differences in time use. For example, a woman working full time will generally expect to have a partner doing less unpaid work than a comparable man working full time. We view such gender differences as being the result of the strategic interaction within the couple, influenced by gender norms in society.

		Paid employment	
		A HIGH level of paid work	A LOW level of paid work
Unpaid household work	A HIGH level of unpaid work	$\tilde{\psi}_1$	$\tilde{\psi}_3$
	A LOW level of unpaid work	$\tilde{\psi}_2$	$\tilde{\psi}_4$

Figure 1. The available choices of the male given the anticipated behaviour of the female.
Note: $\tilde{\psi}_j$ represents the household outcome vector in each state, including male and female paid employment, housework, childcare, leisure and travel time to work: $\tilde{\psi}_j = \{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$.

Figure 1 summarises the possible outcomes between the male and female, negotiated for each state j, $\tilde{\psi}_j = \{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$. We do not make any particular assumptions about the type of negotiation within the couple, only assuming that what we observe is the outcome of such negotiation, including the possibility that some choices might not be available.[4]

Consumption and the Utility Function

Time used on paid work will determine the consumption possibilities of the household. Let R_j be the household's consumption in state j (which we equate to the household's wage income since we do not have information on taxes or other income),

$$R_j = w_m e_{jm} + w_f e_{jf}. \tag{2}$$

Let H_{jm} be the male's valuation of total household production,

$$H_{jm} = h_{jm} + c_{jm} + \beta_m (h_{jf} + c_{jf}), \tag{3}$$

and let H_{jf} be the female's valuation of total household production,

$$H_{jf} = \beta_f (h_{jm} + c_{jm}) + h_{jf} + c_{jf}, \tag{4}$$

where β_m indicates how the man evaluates the household production of his wife in comparison to his own and β_f the same type of evaluation for the female. These β's can be interpreted as the *perceived contribution* (see Sen 1990) of the other household member. The β_m and β_f parameters can be interpreted as implicit pricing of the household work of the persons in the couple. Sen (1990) underlines that the *perceived contribution* of household members can influence the outcomes of the bargaining process within the couple.

As household size, N, increases there is often considered to be economies of scale. This can be taken into account by assuming that size equivalent consumption, R_j^*, and size equivalent total household production (including childcare), H_{jm}^*, can be written as

$$R_j^* = R_j/N^{\gamma_R} \tag{5}$$

$$H_{jm}^* = H_{jm}/N^{\gamma_H}, \tag{6}$$

where the equivalence scale parameters γ_R and γ_H are equal to one if there are no economies of scale.[5]

We assume that each male derives utility from size equivalent consumption, R_j^*, his evaluation of total household production, H_{jm}, leisure, l_{jm}, and sleep (which is residually determined by the time constraint). In addition, he derives extra utility from own time spent with his children, c_{jm}. We consider R_j and H_{jm} (which includes childcare) to be important inputs determining child quality (an investment aspect), while own time with children, c_{jm}, reflects the consumption aspect of having a child. Time traveling to work, t_m, brings disutility. Introducing the subscript i for household, we can now write the utility function of the male m, in household i, in state j as

$$U_{ijm} = g_{jm}(R_{ij}/N_i^{\gamma_R}, c_{ijm}, H_{ijm}/N_i^{\gamma_H}, l_{ijm}, t_{im}; X_{im}), \tag{7}$$

where X_{im} is a vector of demographic characteristics of the male in household i. The utility function of the female can be written in the same way.

A Random Utility Approach to Measuring Capabilities

Following McFadden (1973, 1984), we assume that the utility function U_{ijm} is extreme value distributed with an additive independently distributed random error term with c.d.f. $\exp(-exp(-x))$. The random error term captures unobserved characteristics that affect the agent's welfare.

Let $J(C)$ denote the choice of the agent when the choice set is equal to C. It is assumed that the agent chooses the alternative in C that maximises utility. Furthermore, let $P_j(C)$ be the probability that the man shall choose j, given the choice set C. Following (McFadden 1984), the choice probabilities are then given by

$$P(J(C) = j) = P_j(C) = \frac{\exp(U_{ijm})}{\sum_{k \in C} \exp(U_{mik})} \tag{8}$$

which is the well-known Multinomial Logit Model. Assuming the utility function U_{ijm} is log-linear implies that Equation (7) can be written as

$$U_{ijm} = \beta_1 \log(R_{ij}/N_i^{\gamma_R}) + \beta_2 \log(c_{ijm}) + \beta_3 \log(H_{ijm}/N_i^{\gamma_H}) + \beta_4 \log(l_{ijm}) + \beta_5 \log(t_{im}) + X_{im}\delta_j, \quad (9)$$

where $\beta_1 - \beta_5$ are alternative specific parameters (they do not vary between states) and δ_j is a vector of individual-specific parameters. Combinations of alternative specific parameters and the variables N_i (household size) and t_{im} (commuting time) should be alternative specific but do not vary between alternatives so are not identifiable under our assumptions. They can be subsumed into the constant term, leading us to reformulate the utility function as

$$U_{ijm} = \beta_1 \log(R_{ij}) + \beta_2 \log(c_{ijm}) + \beta_3 \log(H_{ijm}) + \beta_4 \log(l_{ijm}) + X_{im}\delta_j, \quad (10)$$

where the parameter vector δ_j has a transformed constant term.

With the above specification Figure 1 is transformed into Figure 2, where the variables R_{ij}, c_{ijm}, H_{ijm} and l_{ijm} describe the different outcomes in the different states. Under our assumptions, these variables capture the effect of the household outcome vector $\tilde{\psi}_j = \{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$ in Figure 1.

This approach, assuming that preferences are stochastic, ensures that individuals are concerned with their whole capability set. The stochastic nature of their preferences means that tomorrow they may wish to make a different choice from today. So, even if they prefer a low level of paid work today, it is important that a high level is also available in case they wish to work more tomorrow. This implies that reducing the opportunities available to an agent while leaving him with the possibility of making his current choice, will nevertheless reduce his well-being because it reduces the range of possibilities in the future. Our stochastic structure thereby makes an agents' well-being depend, not only on his choices (functionings), but also on his opportunities (capability sets).

The Probabilities of Different Capability Sets

The stochastic model described above can be used to analyse the choices of men if they have full capability sets. Below we estimate such a model to compare it with a model including the possibility that some men faced limited capability sets.

To be able to allow for reduced capabilities within this framework we need to model how individuals might be constrained in their choices. This will, for example, allow us to estimate the degree to which men's capability to perform unpaid work might be constrained by norms or conditions in the labour market. We let $r(C_s)$ denote the probability that the capability set is equal to C_s,

$$r(C_s) = P(C = C_s), \tag{11}$$

where $\sum_s r(C_s) = 1$. The joint probability of having choice set C_s and choosing alternative j as can then be written as

$$P(J(C) = j, C = C_s) = P(J(C) = j \mid C = C_s) \cdot P(C = C_s) = P_j(C_s) \cdot r(C_s) \tag{12}$$

As mentioned earlier, we look at choices among four states categorised by high and low levels of paid employment, and two different levels of total unpaid work.[6] High and low levels of each activity are defined as being respectively above and below the median hours worked in the activities. The states were defined in the sections "Time Use in the Different States" and "Consumption and the Utility Function" above (see Figure 2) as

- *State 1*: A high level of paid employment and a high level of unpaid work
- *State 2*: A high level of paid employment and a low level of unpaid work
- *State 3*: A low level of paid employment and a high level of unpaid work
- *State 4*: A low level of paid employment and a low level of unpaid work.

These states define the opportunity set of the men (and women) in our sample. Taking into account the above four different states, Equation (12) leads to there being 15 different theoretically possible capability sets. They range from the full capability set, consisting of all of the possible states, {1, 2, 3, 4}, to the sets where one is constrained to only one state, such as {1}, {2}, {3} or {4}. To simplify this structure, we assume that these probabilities are the product of two underlying probabilities, one denoting the probability of being capable of providing different levels of paid labour, r_e, and one

		Paid employment	
		A HIGH level of paid work	A LOW level of paid work
Unpaid household work	A HIGH level of unpaid work	R_{i1}, c_{i1m} H_{i1m}, l_{i1m}	R_{i3}, c_{i3m} H_{i3m}, l_{i3m}
	A LOW level of unpaid work	R_{i2}, c_{i2m} H_{i2m}, l_{i2m}	R_{i4}, c_{i4m} H_{i4m}, l_{i4m}

Figure 2. The possible outcomes for the male given the anticipated behaviour of the female.

denoting the probability of being capable of providing different levels of unpaid work in the household, r_h. Each of these are defined over three outcomes: the probability of being constrained to a high state, to a low state or not being constrained at all. Let r_e^H be the probability of being constrained to a high level of paid employment and r_e^L the probability of being constrained to a low level. Denote r_h^H as the probability of being constrained to a high level of unpaid work (including childcare) and r_h^L as the probability of being constrained to a low level of unpaid work. The probability of having full capabilities regarding employment, i.e. not being restricted in employment, is denoted r_e^{NR}, while the probability of having full capabilities regarding unpaid work, i.e. not being restricted in housework, is denoted r_h^{NR}. We assume that the probabilities have a multinomial structure,

$$r_e^H = \frac{\exp(Y\theta_H)}{\exp(Y\theta_H) + \exp(Y\theta_L) + 1} \tag{13a}$$

$$r_e^L = \frac{\exp(Y\theta_L)}{\exp(Y\theta_H) + \exp(Y\theta_L) + 1} \tag{13b}$$

$$r_e^{NR} = \frac{1}{\exp(Y\theta_H) + \exp(Y\theta_L) + 1} \tag{13c}$$

and

$$r_h^H = \frac{\exp(Z\gamma_H)}{\exp(Z\gamma_H) + \exp(Z\gamma_L) + 1} \tag{14a}$$

$$r_h^L = \frac{\exp(Z\gamma_L)}{\exp(Z\gamma_H) + \exp(Z\gamma_L) + 1} \tag{14b}$$

$$r_h^{NR} = \frac{1}{\exp(Z\gamma_H) + \exp(Z\gamma_L) + 1} \tag{14c}$$

where Y and Z are vectors of individual characteristics and θ_j and γ_j are vectors of state-specific parameters. This simplified structure reduces the number of possible capability sets to 9, consisting of the 3×3 combinations of the r_e and r_h probabilities.

The probability of one type, such as r_e, does not vary if the other type changes, such as r_h. If one has a high probability of being constrained to working few hours (leading to a high r_e^L), then this applies equally whether r_h^H, r_h^L, or r_h^{NR} are high or low. This excludes capability sets that have more than one type of unemployment or one type of household work.

Assuming that the probabilities of being constrained in employment (r_e^H, r_e^L and r_e^{NR}) are stochastically independent of the probabilities of being constrained in unpaid work (r_h^H, r_h^L and r_h^{NR}), we have the following 9 possible capability sets with corresponding probabilities, $r(C_j)$:

$$C_1 = \{1\} \text{ with probability } r(C_1) = r_e^H \cdot r_h^H \tag{15a}$$

$$C_2 = \{2\} \text{ with probability } r(C_2) = r_e^H \cdot r_h^L \tag{15b}$$

$$C_3 = \{3\} \text{ with probability } r\,(C_3) = r_e^L \cdot r_h^H \tag{15c}$$

$$C_4 = \{4\} \text{ with probability } r(C_4) = r_e^L \cdot r_h^L \tag{15d}$$

$$C_5 = \{1, 2\} \text{ with probability } r(C_5) = r_e^H \cdot r_h^{NR} \tag{15e}$$

$$C_6 = \{1, 3\} \text{ with probability } r(C_6) = r_e^{NR} \cdot r_h^H \tag{15f}$$

$$C_7 = \{2, 4\} \text{ with probability } r(C_7) = r_e^{NR} \cdot r_h^L \tag{15g}$$

$$C_8 = \{3, 4\} \text{ with probability } r(C_8) = r_e^L \cdot r_h^{NR} \tag{15h}$$

$$C_9 = \{1, 2, 3, 4\} = S \text{ with probability } r(C_9) = r_e^{NR} \cdot r_h^{NR} \tag{15i}$$

The assumption of independency between the probabilities of having limited capabilities regarding employment and the probabilities of having limited capabilities in unpaid work is rather strong, but is necessary since it reduces the number of capability sets, making it possible for us estimate the model using a fairly small data set.

If we think of constraints in employment as being based on the behavior of the employers (by for example only offering part-time work or requiring overtime) and constraints in household work being based on cultural attitudes (that for example childcare is considered women's work), this can be, in our view, a workable assumption. Even so, it is possible that individuals who face more constraints in employment belong to groups that also have more restrictive views on gender roles, leading to the correlation between the two probabilities. But we try to control for this by including years of schooling and some regional variables in our estimations.

The probability of observing a person in state j is denoted Q_j. The probability of being in the different states can then be written as

$$Q_1 = r(C_1) + P_1\,(C_5) \cdot r(C_5) + P_1\,(C_6) \cdot r(C_6) + P_1\,(C_9) \cdot r(C_9) \tag{16a}$$

$$Q_2 = r(C_2) + P_2\,(C_5) \cdot r(C_5) + P_2\,(C_7) \cdot r(C_7) + P_2\,(C_9) \cdot r(C_9) \tag{16b}$$

$$Q_3 = r(C_3) + P_3\,(C_6) \cdot r(C_6) + P_3\,(C_8) \cdot r(C_8) + P_3\,(C_9) \cdot r(C_9) \tag{16c}$$

$$Q_4 = r(C_4) + P_4\,(C_7) \cdot r(C_7) + P_4\,(C_8) \cdot r(C_8) + P_4\,(C_9) \cdot r(C_9) \tag{16d}$$

The $P_j\,(C_s)$ probabilities are assumed to be determined by the log linear expressions U_{i1m}, U_{i2m}, U_{i3m} and U_{i4m}, defined in Equation (10), which depend on the alternative specific variables $\beta_1 - \beta_5$ (the same for all states) and on the vectors of state-specific parameters $\delta_1 - \delta_4$ (a separate vector for each state, defined in Equation (10)). The $r(C_s)$ probabilities are assumed to depend on the state-specific parameter vectors θ_H, θ_L, γ_H and γ_L. Equations (16a)–(16d) represent three independently observable equations, due to the Q-s summing to one, often represented as the three odd-ratios Q_j/Q_4, $j = 1, \ldots, 3$. The parameters are jointly estimated by maximum likelihood.

Identification of the Parameters in the Model

We identify the model through exclusion restrictions analogous to the exclusion restrictions used to identify supply and demand in the econometric analysis of markets. This implies that the vectors of individual-specific characteristics X (denoted X_{im} earlier, but here we drop subscripts), Y, and Z do not contain the same variables, but some variables are only to be found in one or two of the vectors of explanatory variables. Some variables will be unique to the choice probabilities, while others will be unique to the restriction probabilities. This does not exclude the possibility of using some variables in more than one explanatory vector or in both probabilities (though in our analysis we have different variables in the different vectors).

As an illustration of how this works, consider including a set of dummy variables only in the Z-vector, excluding them from the other explanatory vectors (assuming that there are no previous explanatory variables so that $Z \cdot \gamma_H = a_H$ and $Z \cdot \gamma_L = a_L$ before the dummy variables are included). Denoting these three dummy variables by $I_a \in \{0, 1\}$, $I_b \in \{0, 1\}$ and $I_c \in \{0, 1\}$, they divide the sample into $2^3 = 8$ different subgroups (all combinations of the binary dummy variables). For each of these non-overlapping subgroups there will be three odd-ratios, $Q_j/Q_4, j = 1, \ldots, 3$, giving us $8 \times 3 = 24$ independent equations. Assuming, as mentioned, that the dummy variables are only included in the r_h probabilities, the number of parameters only increases by $2 \cdot 3 = 6$, as follows:

$$Z \cdot \gamma_H = a_H + b_H I_b + c_H I_c + d_h I_d \tag{17}$$

$$Z \cdot \gamma_L = a_L + b_L I_b + c_L I_c + d_L I_d, \tag{18}$$

where the six additional parameters are b_H, c_H, d_H, b_L, c_L and d_L. In this example, we have thereby increased the number of empirical equations from 3 to 24, while only increasing the number of parameters by 6. As is well known, counting equations against parameters does not guarantee identification, but having at least as many equations as parameters is a requirement. A more detailed discussion of identification in a similar context is given in an appendix in Andreassen and Di Tommaso (2018).

Identification is complicated by the fact that it is not feasible to use all combinations of variables. Our data contain a large number of dichotomous variables, which can lead to estimation problems if there are empty cells for a combination of these in one of the states. In practice, empty cells lead to large insignificant estimates with extremely large standard errors.

Which variables to include in the two types of probabilities is mainly a modelling issue. Some variables will naturally be thought of as influencing choice while others affect the probability of being constrained. If there is doubt one can compare different specifications, such as one with the age of the youngest child in the choice probability and another specification where it is among the variables that affect the capability set. The stability of the estimates (how stable the coefficient of one variable is to inclusion or exclusion of others) depends on the covariances between these variables, and is thereby analogous to standard multicollinearity problems. Given our modest sample size, we strive to limit multicollinearity problems by not including variables in more than one explanatory vector, though, since our model is non-linear, this is not always necessary to achieve identification.

Data

The dataset used is the Multinational Time Use Survey (MTUS) for Spain for 2002. MTUS is a cross-country harmonised set of time use surveys composed of comparably recoded variables. The original Spanish dataset is composed of 42,675 individuals in 19,422 households. Our analysis focuses on heterosexual, married or cohabitating couples, with or without children.

The dataset consists of individuals writing a diary for one day with 10 min time increments. Both weekdays and weekends are included. The diary includes the time use of others in the household. Household income is included in the dataset, but only in 8 income brackets. Describing the full capability sets of the individuals based on these data is a challenge.

To have an as homogenous sample as possible, we exclude couples living together with grandparents, couples where both partners are retired, disabled or take care of other adults. We include only working couples defined as households where the sum of paid work is 5 h or more per day. We do not set an age limit, but our work requirement leads to our sample only including men from 19 to 73 years of age (see Table 4). We aggregate time use into six separate categories: paid work, housework, childcare, travel to work, sleep and leisure.

The final sample consists of 4625 couples. Of these, 2839 have children. By including couples without children, we increase our sample by more than 60 percent, making it possible to estimate our complex model. But it requires that we consider that couples with and without children have similar utility functions.

The State Space

We consider each male to be in one of four states, categorised by high and low levels of paid employment and two different levels of unpaid work. In our

Table 1. Number and distribution of men observed in the four different states, for the whole sample and by presence of children.

Men	Full sample		Couple with no children less than 18 years old		Couple with at least one child less than 18 years old	
	Freq.	%	Freq.	%	Freq.	%
State 1: High paid employment, high unpaid work	376	8.13	62	3.47	314	11.06
State 2: High paid employment, low unpaid work	3153	68.17	1298	72.68	1855	65.34
State 3: Low paid employment, high unpaid work	399	8.63	107	5.99	292	10.29
State 4: Low paid employment, low unpaid work	697	15.07	319	17.86	378	13.31
Total	4625	100.00	1786	100.00	2839	100.00

Source: Authors' calculations on MTUS Spain 2002–2003.

sample, the median of paid work for all individuals (men and women) is 8 h per day. Men whose paid work is higher than 8 h belong to the full-time work group, while those who work less than 8 h per day belong to the part-time work group.

The median of unpaid work for both men and women (household work and childcare) is 2 h and 20 min per day. Men who do more than 140 min of unpaid work belong to the high unpaid work group, while the low unpaid work group those who work less.

Table 1 shows the distribution of men across the four states defined above. Most men (68%) are in state 2, characterised by a high level of paid employment and a low level of unpaid work, followed by men in state 4 (low paid and low unpaid hours), in state 3 (low paid and high unpaid hours) and state 1 (high paid and low unpaid hours).

Explanatory Variables and Descriptive Statistics

Table 2 lists the definitions of the variables used in estimating the model. As mentioned earlier, estimation of the above model requires predicted values of household consumption, man's childcare, household production and leisure for the four states (also the states in which the man is not observed). In the terminology often used when applying the conditional logit model, this type of variable is referred to as state-dependent or alternative specific (e.g. in Cameron and Trivedi 2005), because when moving across states characterised by different levels of paid and unpaid work, the values of these variables are bound to vary.

To calculate the level of household consumption in each state, we multiply the predicted hourly wages of the two partners by their respective working hours in each state. The hourly wages for men and women are predicted applying the usual Heckman procedure (see Supplemental Material C).

The men's share of hours used on housework in each state,[7] α_{hj}, the share of hours used on paid work, α_{ej}, and the share used on childcare, α_{cj}, are predicted

Table 2. Definition of the variables used in the estimation.

Variable	Description
Alternative specific variables	
Consumption	(Man's predicted hours paid work·w_M) + (woman's predicted paid work · w_f)
Man's child care	Man's predicted hours of child care; 0 if no children
Couple's household production (evaluated by the man)	(Man's predicted hours of housework + predicted hours of child care) + β_m · (woman's predicted hours of housework + woman's predicted hours of child care)
Man's leisure·age	Man's predicted leisure·man's age
Individual specific variables	
Man's years of schooling	Man's education measured as years of schooling
Male regional unemployment rate	Male unemployment rate at the regional level (Source: Eurostat)
Education ratio (W/M)	Woman's years of schooling/man's years of schooling
Man unemployed	Binary variable = 1 if the man is unemployed
South	Binary variable = 1 if living in Andalusia or Murcia; 0 otherwise
Child's age	Age of the youngest child + 1; 0 if no children or children older than 18
Child's age squared	Squared age of the youngest child
Computer at home	Binary variable = 1 if there is a computer in the household
Woman's years of schooling	Woman's education measured as years of schooling

using a generalised linear model (GLM) with a logit form (also for the states in which the men are not observed in). Total hours are then calculated for each man using the predicted shares multiplied by predicted hours used on the activity. Supplemental material B describes these estimates.

The consumption of the household in the different states is calculated based on the predicted wages of the couple (from the estimations using the Heckman procedure) and the predicted hours of paid work. Leisure is imputed as the average by state and number of children (0, 1, 2, 3+). Sleep is residually determined so that the 24-h time constraint applies to all individuals. The resulting predicted consumption and hours of childcare, housework and leisure are shown in Table 3.

The use of predictions based on estimated relationships to construct a counterfactual choice set is a way of giving the capability approach an empirical basis. It would seem difficult to get around the task of devising a way of

Table 3. Mean predicted consumption and mean predicted hours of child care, housework and leisure in the different states. Used to calculate the state dependent variables Y.

	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
Household Consumption (€)	95.55	96.15	57.74	59.97
Male child care	1.33	0.22	1.68	0.21
Male housework	2.33	0.38	3.30	0.62
Male leisure	4.41	5.32	7.81	8.89
Woman's child care	2.17	1.52	1.43	1.02
Woman's housework	4.30	4.93	3.19	4.20

Source: Authors' calculations on MTUS Spain 2002–2003. 4625 observations.
Note: Child care time is computed considering only men and women with children (2839 observations). Predictions are estimated as shown in Supplemental Material B.

Table 4. Descriptive statistics for the men in the estimation sample (individual-specific variables).

	Mean	Standard Deviation	Min	Max
Man's age	44.22	9.55	19.00	73.00
Man's years of schooling	10.23	3.56	0.00	21.00
Male regional unemployment rate	8.13	3.30	2.40	17.00
Education ratio (W/M)	1.04	0.60	0	13.00
Man unemployed	0.02	0.14	0.00	1.00
South	0.22	0.41	0.00	1.00
Youngest child's age	5.28	5.91	0.00	18.00
Computer at home	0.61	0.49	0.00	1.00
Woman's years of schooling	10.00	3.51	0.00	21.00

Source: Authors' calculations on MTUS Spain 2002–2003. 4625 observations.

going from observed functionings to a set of possible outcomes. A transformation of this type is by its nature speculative but seems necessary if we are to empirically implement the capability approach.

Table 4 gives descriptive statistics for the individual-specific variables such as man's age and region of residence, which do not depend on the state in which the man is in, and therefore are the same across all states.

Estimation of the Model

Table 5 presents two different specifications of our model. Specification 2 is our preferred specification, while specification 1 gives the estimates for our model under which all men enjoy the full capability set $C_9 = \{1, 2, 3, 4\}$. This assumption leads to a traditional multinomial logit with both state-dependent and individual-specific variables, where only preferences are important for how many hours men use on childcare. It serves as a reference point for the estimation with the possibility of having a limited capability set.

Column 1 in Table 5 shows that the signs of the coefficients in this specification are generally the same as those in specifications including restrictions, except for household production and β_m. Men derive positive utility from consumption, childcare and leisure. Furthermore, they derive disutility from their household production (housework and childcare), while deriving positive utility from the household production of the woman (the parameter for household production is multiplied by β_m). In other words, this specification implies that men would prefer a very dirty house to have to do any cleaning themselves but are happy if their partner cleans it. This is in contrast to our results in the specification with the possibility of having limited capabilities, where men derive net positive utility from their contribution to household production. That the model with a full capability set leads to estimates implying that housework in total gives disutility (implying that the disutility from the work effort is greater than the utility of the produced outcome) while we observe men doing such work in all states can be seen as reflecting the underlying stochastic nature of the utility function. Even so, it can make the model seem internally

Table 5. Estimation results for two different specification – with and without limited capabilities.

	(1)	(2)
Alternative specific variables P_j		
Consumption	1.4633**	4.1233***
	(0.5814)	(1.3126)
Man's childcare	1.5254***	3.9559***
	(0.1480)	(0.5842)
Household production	−0.6896***	8.4448***
	(0.1738)	(2.6080)
Leisure	0.0468***	0.1658***
	(0.0083)	(0.0386)
β_m	−0.1528***	0.3803***
	(0.0096)	(0.1167)
Individual specific variables P_j		
State 2: High paid work, low unpaid work (ref. State 1)		
Man's years of schooling	−0.0346**	−0.0807***
	(0.0165)	(0.0288)
Constant	1.6485***	7.5369***
	(0.3473)	(1.2940)
State 3: Low paid work, high unpaid work (ref. State 1)		
Man's years of schooling	0.0040	0.4543***
	(0.0200)	(0.1713)
Constant	−0.1236	−7.5192***
	(0.3875)	(1.9624)
State 4: Low paid work, low unpaid work (ref. State 1)		
Man's years of schooling	−0.0080	0.3777**
	(0.0181)	(0.1684)
Constant	0.0066	−1.2177
	(0.4486)	(1.9756)
Variables affecting the capability set		
Constrained to paid work, r_e		
– to high paid work (ref. full capability set in paid work)		
Male regional unemployment rate		−0.0902**
		(0.0428)
Education ratio W/M		−0.5309**
		(0.2576)
Constant		2.1239***
		(0.6533)
– to low paid work (ref. full capability set in paid work)		
Male regional unemployment rate		−0.0053
		(0.0388)
Education ratio W/M		−0.2866**
		(0.1384)
Man unemployed		4.8064***
		(0.4801)
Constant		0.0477
		(0.6250)
Constrained to unpaid work, r_h		
– to high unpaid work (ref. full capability set in unpaid work)		
South		0.0150
		(0.4268)
Youngest child's age[1]		0.7173
		(0.4809)

(*Continued*)

Table 5. Continued.

	(1)	(2)
Youngest child's age squared[1]		−0.1474**
		(0.0748)
Computer at home		−0.4769
		(0.3899)
Woman's years of schooling		0.0869*
		(0.0526)
Constant		−2.1538*
		(1.2580)
– to low unpaid work (ref. full capability set in unpaid work)		
South		0.4247**
		(0.2058)
Youngest child's age[1]		−0.1634*
		(0.0969)
Youngest child's age squared[1]		0.0123***
		(0.0044)
Computer at home		−0.5785***
		(0.2127)
Woman's years of schooling		−0.0550*
		(0.0316)
Constant		1.4651**
		(0.5714)
Statistics		
ll	−4318.7246	−4115.9987
Aic	8659.4492	8291.9974
N	4625	4625

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: Authors' calculations on MTUS Spain 2002-2003
Note: Column 1 presents the results of a model a full capability set (i.e., with $r_h^{NR} = 1$ and $r_{he}^{NR} = 1$, with all men enjoying the full capability set $C_9 = \{1,2,3,4\}$). Column 2 presents the results of the model with the possibility of limited capabilities.

inconsistent. Specification 2 does not have this inconsistency. This is a positive feature of our models, indeed the simple conditional model in specification 1 would seem to be wrong.

Column 2 in Table 5 presents the results of our preferred model. Different variables determine constraints in paid work and constraints in unpaid work. We assume that men without children are not constrained in housework (i.e. the probabilities to be constrained in unpaid work for men without children are all equal zero).

The estimated parameters of the alternative specific variables, consumption, man's childcare, household production and leisure, are all positive and significant, implying that they have a positive effect on men's utility. The parameter β_m is positive and significant, but lower than 1, suggesting that men value their wife's household production less than their own.

The man's education level is the only individual-specific variable in the choice probability P_j. Our estimations use state 1 as the reference state. We find that an increase in men's years of schooling decreases the probability of choosing state 2, implying more educated men prefer to provide more unpaid work (as was the case in specification 1). They have a higher utility in states of low employment than less-educated men (though, they both generally

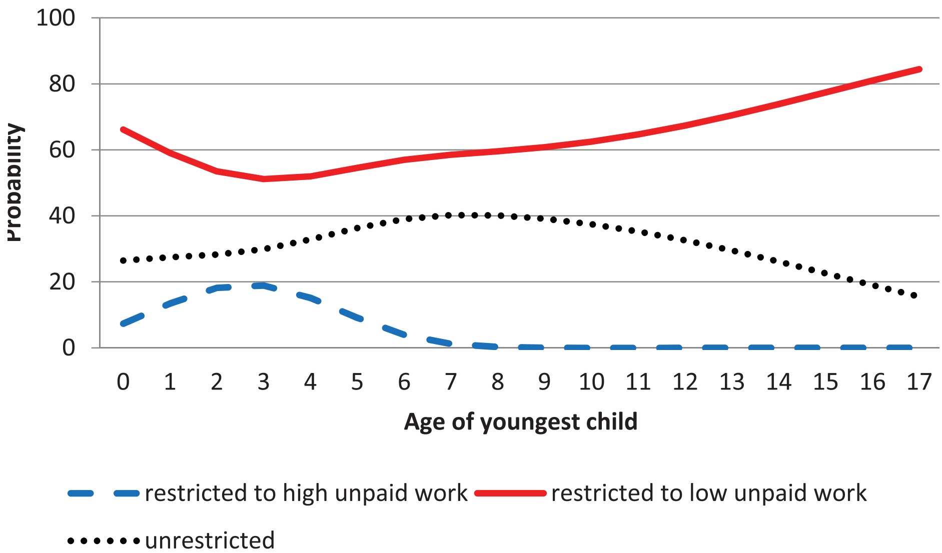

Figure 3. Probability of being constrained to high or low levels of unpaid work.

Note: This is calculated for a person not living in the South, with no computer at home and with a partner with average schooling (10 years).
Source: MTUS Spain 2002–2003.

prefer full employment to low employment). This can be because men with higher education are better able to utilise a low employment situation.

The probability of being constrained in care work depends on institutional and family characteristics. We include a regional dummy for living in the South of Spain, a quadratic term in child age, a dummy on whether the couple has a computer at home and a variable on female education.

Focusing first on the age of the youngest child, in Table 5 one can find the coefficients for child age and child aged squared in the probability for unpaid work, r_h. To assess the total effect of child age, we have calculated how the probability r_h changes with the age of the youngest child.

Figure 3 shows how the probability of being constrained to high or low levels of unpaid work changes as the age of the youngest child increases. We see that at all times there is a high probability of the man being constrained in his ability to spend time with his children, being at its lowest when the youngest child is 3 years of age. When the youngest child is under 7, there is a possibility of the man having to spend time with child, even if he does not wish to. After the age of 3, it becomes increasingly more probable that the man will be constrained in the time he can spend with his children. So, in this sense, he cannot provide as much care as he might like to.

As for the other variables, our results suggest that living in the South increases the probability for men of being constrained to a low level of unpaid work. This can be connected to cultural aspects that restrict men to more traditional gender roles.

Having a computer at home, a proxy for cultural factors, decreases the probability of being constrained to low levels of unpaid work while it is not statistically significant for being constrained to high levels of unpaid work.

Finally, years of schooling of the partner increase the probability of being limited to high levels of unpaid work and decrease the probability of being limited to low levels of unpaid work. This confirms that education increases women's bargaining power within the couple (Gimenez-Nadal and Molina 2013; Bloemen, Pasqua, and Stancanelli 2010; Mancini and Pasqua 2012). Supplemental material D also presents the marginal effects of the variables determining the probabilities regarding unpaid work on the probability of being in the four different states, and the marginal effects of all variables determining constraints in the capability set on the probabilities of being constrained in paid and unpaid work.

The probability of being constrained in employment depends on the unemployment rate in the region in which the man lives and the ratio between the women's and the man's years of schooling. In addition, we add a dummy to the low employment state if the man is unemployed. This ensures that the probability of being constrained to low employment is close to 1 if a man is unemployed.[8]

Table 5 indicates that high levels of regional unemployment decrease the probability of being constrained to high levels of paid work while they are not statistically significant for low levels of paid work. This is due to the dummy for unemployment taking out all the variability. The estimated parameters for the ratio between women's and men's years of education show that the more education the woman has in relation to the man, the less restricted the man is in employment.

Alternative specifications of our models have also been estimated for sensitivity analysis. This is presented in Supplemental material E.

The main focus of our paper is childcare. The model includes children in three ways. First, there is the man's direct utility from spending time with his children, then there is the utility he derives from household production (producing, among other things, care for his children), and finally there is the influence of children on the degree to which he is restricted in doing housework (due to cultural factors). We have concluded that both time with children and household production have positive utility; so, in this sense, men do care about care.

Predicting Capability Sets and Counterfactual Predictions

The estimated model is used to predict how many men are constrained in their possibility to choose among the nine possible capability sets found in Equation (19). The predictions are based on inserting the estimated parameter values into Equations (13a)–(14c) giving us the predicted probabilities $\widehat{r_e^H}$, $\widehat{r_e^L}$, $\widehat{r_e^{NR}}$, $\widehat{r_h^H}$, $\widehat{r_h^L}$ and $\widehat{r_h^{NR}}$. These are then inserted into equations (15a)–(15i) to give us the predicted probabilities for the different capability sets $\widehat{C1}$–$\widehat{C9}$. The percentage

Table 6. Predicted capability sets: numbers of men and percentages in each capability set.

	Model with restricted capabilities Number of individuals	%
Men with children (2839 obs.)		
C1: High paid & high unpaid	95	*3%*
C2: High paid & low unpaid	901	*32%*
C3: low paid & high unpaid	34	*1%*
C4: low paid & low unpaid	323	*11%*
C5: high paid	577	*20%*
C6: high unpaid	44	*2%*
C7: low unpaid	410	*14%*
C8: low paid	201	*7%*
C9: not restricted	254	*9%*
Total	2839	*100%*
Men without children (1786 obs.)		
C5: high paid	1011	*57%*
C8: low paid	356	*20%*
C9: not restricted	419	*23%*
Total	1786	*100%*

Source: Authors' calculations on MTUS Spain 2002–2003.
Note: The percentages (absolute figures) show the probabilities (expected numbers) of each possible capability set ($r(C_1) - r(C_9)$) for men with children, $r(C_5)$, $r(C_8)$ and $r(C_9)$ for men without children, as shown in Equations (15a)–(15i).

given in the table is this predicted probability. The number of individuals is calculated by multiplying these probabilities by the number of individuals, 2839 men. In Table 6, we present the results of such predictions, distinguishing between fathers and men without children. These results are particularly interesting because they show that only 9% of fathers and 23% of men without children have the full capability set.

Focusing on men with children, we see that 55% are constrained to high levels of paid work i.e. their capability sets are either C1 or C2 or C5. 58% are constrained to low levels of unpaid work (their capability sets are either C2 or C4 or C7). As for men without children, we see that the majority of them (57%) are constrained into high levels of paid work. The measurement of the capability sets demonstrates that the use of random utility models allows us to measure not only the preferences but also the constraints that men face.

If all men were completely free to choose how much to work in the labour market and at home, we would observe men changing state according to their preferences. Table 7 reports the net changes in the number of men observed in each state if there were no constraints. In this case, we would expect to observe more men in states 1 and 3, i.e. providing high levels of unpaid work, and fewer men in states 2 and 4, i.e. providing low levels of unpaid work. About 20% more men with children would choose to provide a high level of childcare and household work, if there were no constraints (there would be a net movement of 6.12% to state 1 and 14.03% to state 3).

Table 7 illustrates a very important point about the nature of capability sets, namely that many individuals with reduced capability sets do not miss the capabilities they are without. These counterfactual calculations are done in the same

Table 7. Change in the number of men in each state if there are no constraints.

	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
Total sample (4625 obs.)				
Absolute change	+178	−130	+366	−414
Percent change	+3.84	−2.82	+7.92	−8.94
Men with children (2839 obs.)				
Absolute change	+174	−261	+398	−311
Percent change	+6.12	−9.19	+14.03	−10.96
Men without children (1786 obs.)				
Absolute change	+4	+131	−32	−102
Percent change	+0.22	+7.31	−1.79	−5.74

Source: Authors' calculations on MTUS Spain 2002–2003.
Notes: The table shows the change in the probability of observing a man in state 1–4 as per Equations (16a)–(16d), if there were no restrictions, i.e. if $r(C_9) = 1$, while $r(C_1) - r(C_8) = 0$.

manner as the predictions in Table 6, by inserting the estimated parameters into the equations for the different probabilities. In the case of no limitations on the capability set, the probability of being in state j is the same as the probability that the person wishes to be in that state, P_j (with no restrictions they get what they want). The predicted probability $\hat{P}_j$ is calculated by inserting the estimated parameters into Equation (10) and inserting the result into Equation (8). In the case when capability sets are limited, we insert the predicted probabilities for the different capability sets $\widehat{C1}$–$\widehat{C9}$ and the predicted probability $\hat{P}_j$ into equations (16a)–(16d) to get the predicted probability of being in different states when the probabilities of being constrained apply, $\widehat{Q}_j$. Table 7 shows the difference between these probabilities, $\hat{P}_j - \widehat{Q}_j$, multiplied by the total number of individuals. Table 7 shows that the net number of individuals changing their state is much lower than the (expected) number who we find are restricted. Table 7 only shows net changes, so gross changes are larger, but we would not expect them to be as large as the number experiencing restrictions.

Conclusion

The main challenge of empirically implementing Sen's theory is that the capabilities are unobservable. The modelling approach we have used has managed to quantify the possible states available to men and to make inferences about whether they face limitations in choosing these states. This paper estimates the capability of men to provide care work utilising a random utility model. We find that, despite observing that men spend very little time in caring for their children, childcare matters to them. So, men do care to care. Nevertheless, they face many constraints both at the individual, household and regional level and therefore are constrained in the amount of time they can provide in caring for their children. We find that only 9% of fathers and 23% of men without children have the full capability set, while about 58% of fathers are constrained to a low level of unpaid work. Many of these would not change behaviour if they had a full capability set, but about 20% more fathers would choose to provide more childcare and housework if they did.

Men married to low educated women are more likely to be constrained to low levels of unpaid work. On the contrary, highly educated men prefer to spend more time in childcare and housework.

Our modelling approach consists of using a random utility model to distinguish preferences and restrictions. Our theoretical model posits a relationship between what we can observe, the choices made by couples, and what we cannot observe, the constraints they face. At present, there are not many competing ways of achieving this, and our approach is, therefore, a valuable tool in understanding situations in which (unobservable) constraints play an important role. Our paper also shows that it is possible to estimate quite complicated behavioural models using time use surveys of limited size, indicating that the level of childcare provided by men is not only a reflection of their wishes but also a result of the prevailing norms and restrictions in society.

Notes

1. A Time Use Survey for Spain was collected also in 2009, but with a much smaller sample size than the 2002 survey (approximately 23,000 vs. 47,000 observations). Given the complexity of the model estimated in this paper, we have preferred to use the data for 2002.
2. The original data are challenging in that they only have one observation per household and include only household income divided into eight different categories. We describe in detail in Appendix A and the supplemental material how we have transformed the data using different estimation techniques.
3. Our discussion here falls within the collective model of the household, where each person in the family will act to maximize their welfare, given the predicted behaviour of others. There is a large literature on bargaining in the family. A useful introduction is given in Ermisch (2003).
4. Appendix A gives a more detailed description of how we interpret the household dynamics and how the men's and women's time use in different states are calculated. Supplemental Material A gives a simple example of this type of household dynamics. This implies predicting the time use and income they could have in the states that they have not chosen. We do this based on estimated equations for how each activity is shared between couple in different states. Supplemental Material B describes these estimations.
5. We shall later see that in our chosen econometric specification (a random utility model with a log linear utility function) these economy of scale parameters are not identified, but we include them here for completeness.

6. We also explored the possibility of including time spent on job search activities as an additional time category for people in low level of paid work. Unfortunately, only 12 men in states 3 and 4 in our sample reported any time dedicated to this activity. There is therefore not enough variability in the variable to include it in the model.
7. These shares were defined in Equations A2 to A4 in Appendix A.
8. Not all men that declare themselves as unemployed in our survey are observed to work 0 h, and some unemployed men are actually observed in a high level of paid work (i.e. 6 out of the 90 unemployed men observed in our sample).

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Notes on contributors

Leif Andreassen has a Ph.D. in Economics from the University of Oslo. He has been mainly employed at Statistics Norway since 1986. From 1996 to 1999, he held a part-time position as Associate Professor II at the University of Oslo. During the academic year 1999–2000, he was a visiting scholar at New York University and from 2008 to 2013 he was a visiting scholar at the University of Turin. He led the development of the first version of the MOSART microsimulation model from 1988 to 1990 and headed the project until 1998. His research interests are mainly in demographics, labour economics, Sen's capability approach and econometrics, including work on microsimulation models, overlapping generation models and econometric analysis of income and labour supply.

Maria Laura Di Tommaso is Full Professor of Economics at Department of Economics and Statistics "Cognetti de Martiis" of the University of Turin in Italy, Fellow of Collegio Carlo Alberto and Associate Researcher of the Frisch Center for Economic Research in Oslo.

Previous positions include: College Lecturer in Economics and Fellow at Robinson College, University of Cambridge and Research Associate in the Department of Applied Economics, University of Cambridge. She has extensively published in international journals and her research interests are in the field of microeconomics applied to gender and feminist issues. She was Associate Editor of the journal Feminist Economics from 2012 to 2016, she is the Director of the PhD program in Economics Vilfredo Pareto and she was a member of the National Scientific Qualification committee (ASN 2018-2021) in econometrics.

Anna Maccagnan holds a Ph.D. in Labour Economics from the University of Modena and Reggio Emilia. This work has been carried out while working as a Research Fellow at the University of Turin. Anna has previously held research posts at the University of Modena and Reggio Emilia, at the University of Bologna and at the University of Exeter, working in the fields of happiness and wellbeing, measurement of capabilities, economics of education, household economics and labour economics.

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Appendix A. The Strategic Interaction within the Couple

Individuals face choices among four states categorised by high and low levels of paid employment and of unpaid work. An illustration of the choices this implies for the man and the woman in a household is given in Figure A.1. Each quadrant in the figure represents a possible choice that realises an outcome (a payoff). Since each individual can make four choices, there will be $4 \times 4 = 16$ possibilities that we assume the couple negotiates over. We assume that some of these possibilities might not be available due to social norms or to restrictions in the labour market.

If the male chooses a high level of both unpaid work and paid employment, then the female can choose between the outcomes $\{\psi_{A1}, \psi_{B1}, \psi_{C1}, \psi_{D1}\}$. We assume that the female chooses the outcome that maximises her utility, $\tilde{\psi}_1$, which can be written as

$$\tilde{\psi}_1 = \underset{\psi_{A1},\psi_{B1},\psi_{C1},\psi_{D1}}{\operatorname{argmax}} \left(U_f(\psi_{A1}), U_f(\psi_{B1}), U_f(\psi_{C1}), U_f(\psi_{D1})\right) \qquad (A.1a)$$

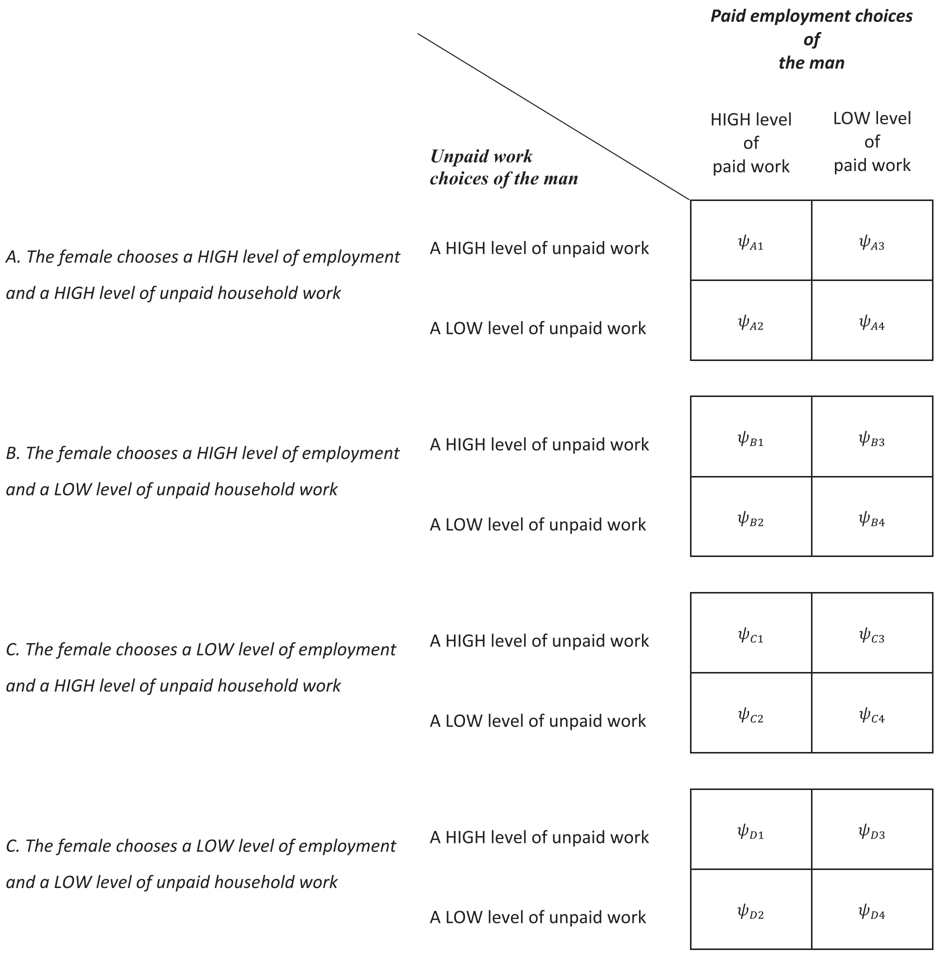

Figure A.1. The available choices of the male and the female.

If the male chooses a low level of unpaid household work and a high level of paid employment the women's choice becomes

$$\tilde{\psi}_2 = \underset{\psi_{A2},\psi_{B2},\psi_{C2},\psi_{D2}}{\text{argmax}} \left(U_f(\psi_{A2}), U_f(\psi_{B2}), U_f(\psi_{C2}), U_f(\psi_{D2})\right), \tag{A.1b}$$

and so on with the other two options the man has

$$\tilde{\psi}_3 = \underset{\psi_{A3},\psi_{B3},\psi_{C3},\psi_{D3}}{\text{argmax}} \left(U_f(\psi_{A3}), U_f(\psi_{B3}), U_f(\psi_{C3}), U_f(\psi_{D3})\right) \tag{A1.c}$$

$$\tilde{\psi}_4 = \underset{\psi_{A4},\psi_{B4},\psi_{C4},\psi_{D4}}{\text{argmax}} \left(U_f(\psi_{A4}), U_f(\psi_{B4}), U_f(\psi_{C4}), U_f(\psi_{D4})\right) \tag{A1.d}$$

In this way, the male knows how the female will react to his choices so that we can view his choices in the simplified Figure 1 in the main part of the paper, which is also the starting point for our modelling of the male's choices regarding paid and unpaid work.

Figure 1 in the main part of the paper summarises the possible outcomes between the male and female given a set of already determined outcomes, negotiated for each state j,

$\tilde{\psi}_j = \{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$, but we have not said anything about how they are determined. We do not make any particular assumptions about this, only assuming that what we observe has been the outcome of such negotiation, including the possibility that some choices might not be available, $\tilde{\psi}_j = \emptyset$.

The amount of time used by a couple on paid employment and unpaid work can thereby be interpreted as the result of unobserved strategic interaction. Each individual is assumed to face a choice set that incorporates the response of the partner. For example, if a husband decides to do less paid work and contribute more at home, he might, for example, expect his wife to increase her paid employment while contributing less at home. Supplemental material A presents a very simple example in which the outcomes can be explicitly calculated.

Assuming the time use we observe has been the result of an (unobservable) household bargaining process, our starting point is the choice set of the male given a payoff matrix of the type shown in Figure 1 in the main part of the paper. We do not observe the opportunities (the state space and the corresponding outcomes) that the individuals face, only their chosen functioning. In an empirical analysis, we, therefore, need to predict the choices available to the male. To model the choices of the male based on an opportunity set as described in Figure 1, we infer his unrealised (unobserved) outcomes from our data on similar men who have made a different choice. We have shaped our data so that they are consistent with a negotiation framework of the type discussed above. When distinguishing between high and low levels of paid and unpaid work we use the median across all individuals (men and women), ensuring that the state space can be defined in the same manner for both sexes (even if in this paper we are studying only men's choices).

We calculate the amount of time used on different activities in two steps. Initially, we let the time used on the activities a couple share (which we assume are paid work, housework and childcare) be given by the average time used by couples differentiated by the number of children. These do not vary by state. This can seem simplistic, but these time activities enter our econometric model as state-specific variables in multinomial logit framework, so that only differences in time use between states are important, while the levels of the variables are not.

Then we estimate equations for how each of these activities is shared between the couple in different states. This is analogous to using wage equations to infer the wages of those not working (as we do in predicting wages in our model using the Heckman procedure, described in Supplemental Material C). This implies reformulating the time variables so that each is the product of total time spent by the couple on an activity and a share variable indicating how this total is shared between the husband and wife:

$$e_{jm} = e_{jT} \cdot \alpha_{ej}, \quad e_{jf} = e_{jT} \cdot (1 - \alpha_{ej}), \quad j \in S \tag{A.2}$$

$$h_{jm} = h_{jT} \cdot \alpha_{hj}, \quad h_{jf} = h_{jT} \cdot (1 - \alpha_{hj}), \quad j \in S \tag{A.3}$$

$$c_{jm} = c_{jT} \cdot \alpha_{cj}, \quad c_{jf} = c_{jT} \cdot (1 - \alpha_{cj}), \quad j \in S, \tag{A.4}$$

where α_{ej}, α_{hj}, and α_{cj} are respectively the share of employment, housework and childcare contributed by the male in state j. The shares of the female will thereby be $(1 - \alpha_{ej})$, $(1 - \alpha_{hj})$ and $(1 - \alpha_{cj})$. S is the universal set of all possible states and it was defined in Section 3.1.

Leisure, travel and sleep are considered as individual activities. Leisure for males in each state is quantified as the average leisure among males differentiated by state and number of children, travel is the observed time for each individual and sleep is residually determined. Each state j, characterised by the time variables set

$\tilde{\psi}_j = \{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$, can thereby equivalently be characterised by the set $\tilde{\psi}_j^* = \{e_{jT}, h_{jT}, c_{jT}, \alpha_{ej}, \alpha_{hj}, \alpha_{cj}, l_{jm}, l_{jf}, t_m, t_f\}$, where we interpret the variables α_{ej}, α_{hj} and α_{cj} as being the result of (an unknown) strategic interaction within the couple. Our empirical specification assumes that the characteristics of the couple influencing their choices are the couple's average age and wage, the number of children and the ratio of the man's age to the female's and the ratio of the man's wage to female's.