Imperfect Commitment, Social Constraints and Household Time Allocation[*]

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Abstract

Economic theories of the household predict that increases in relative female human capital should lead to decreases in female housework time. However, empirical findings seem to contradict this prediction. Cross-section and longitudinal evidence seem to suggest that women's share of home time fails to decrease despite increases in women's relative earnings and hours of market work. We present a simple theory of social constraints upon the division of labor that prevent household members to specialize beyond what is prescribed by social norms. We argue that social constraints are more likely to bind

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for those household activities, such as caring, that are subject to commitment failures. Empirical results using the 2002-03 Spanish Time Use data further support the notion of social constraints upon the division of housework. We observe that the relative share of housework decreases at a lower rate for higher earnings women than for lower earnings women. We compare housework and childcare activities to see whether imperfect commitment problems might lead to binding social constraints. We use detailed description of childcare activities to make some distinction between childcare that might be conceptualized as housework (for example, picking children up from school) and childcare conceptually closer to leisure. Results suggest that whereas a woman's housework share decreases as her relative wage increases, childcare time remains constant over the entire earnings distribution.

JEL classification: D13, J0, J1, J2, Z13

1   Introduction

Comparative advantage or bargaining theories of the household predict a more egalitarian allocation of time within the household as female human capital increases. In the comparative advantage framework specialization is efficient and the spouse with the lowest opportunity cost (i.e. the lowest human capital or the highest home productivity) contributes the most to household production and the least to market work (Becker, 1991). Bargaining theories reach the same conclusion but are based on the concept of threat

points determined by either the cost of falling out of marriage (McElroy and Horney, 1981) or of a non-cooperative marriage (Lundberg and Pollak, 1993).[1]

However, empirical findings seem to contradict this prediction. Cross-section and longitudinal evidence seem to suggest that women's share of home time fails to decrease despite increases in women's earnings. At the cross-sectional level Hochshild first showed some qualitative evidence pointing to the fact that when a wife works more hours than her husband outside the home, she still undertakes a larger share of housework (Hochschild, 1989).[2] Akerlof and Kranton (2000) corroborate Hochshild's findings using PSID data. These authors suggest an economic model of identity to explain why women undertake a greater share of housework than their husbands even when they work more hours and have higher earnings than them.[3] There is also some evidence in the sociological literature that a woman's relative share of housework decreases as her relative earnings go up but only up to the point

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[1]Chiappori (Chiappori, 1992) and (Browning and Chiappori, 1997) unified both set of theories into a "collective" approach to the household, where efficiency in the household maximization problem is secured due to spousal transfers of private consumption.

[2]Traditional theories of the household would be able to explain this pattern under the assumption that either women have a higher comparative advantage in household production or that women derive a higher utility from housework.

[3]In their model a husband looses identity when his wife earns more than him because of the prescription held by most men that men should earn more than their wives. Equality in utility is restored when the wife undertakes more housework than her husband given the prescription that men should not do women's work at home.

when she contributes the same as her husband to the family income. When she contributes more than fifty percent of household income her housework share increases as her earnings go up (Brines, 1994), (Bittman et al., 2001), (Greenstein, 2000), (Gupta, 1999). Thus women with higher earnings than their husbands would not only do relatively more housework than them (as in Akerlof and Kranton), but also would do relatively more housework than women whose earnings are lower than their husbands.[4] Finally, at the longitudinal level there is also vast evidence that time devoted to housework by men has changed very little in the last decades, despite the increase in female labor force participation (Aguiar and Hurst, 2006).

Consistent with the above empirical evidence we present a simple theory of social constraints upon the division of household labor that prevent household members to specialize beyond what is prescribed by social norms. We argue that social constraints are more likely to bind for those household activities, such as caring, that are subject to commitment failures. The literature has long recognized a couple's inability to reach binding, legally-enforceable agreements about future behavior because of the non-observability by third parties (see (Basu, 2001) and (Rasul, 2002)) or the inability to fulfill informal contracts because the lack of credible threats (Folbre and Bittman, 2004). Whereas imperfect commitment is usually characterized as the inability of

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[4]The explanation offered by the literature is that when men earn less than their wives a gender norm violation occurs, thus either the wife, the husband or both move to more traditional behavior in the realm of housework in order to neutralize this deviance. This neutralization effect has been called *doing gender.*

one spouse to make transfers of private consumption to compensate the other partner for utility losses (Lundberg and Pollak, 2001), in this paper we focus on the inability of partners to credibly commit to make transfers of time.

We use the 2002-03 Spanish Time Use data to explore the presence of social constraints associated to the housework division of labor. Spain is an ideal example to use in this context as it is a country where gender roles are deeply entrenched. [5]The Spanish TUS has two main advantages over other time use data sets. First it is diary data, i.e individuals record each activity during the 144 ten-minute interval of the day. A vast amount of evidence support the reliability of diary information over ex-post stylized questions on total time spent in any given activity (Juster and Stafford, 1991). Second, the Spanish TUS is advantageous over recent American and European Time use diary surveys because it not only contains diary information on the respondent but also on the spouse. This piece of information is crucial for the construction of a measure of specialization within the household.

Empirical results further support previous evidence and the notion of social constraints upon the division of housework of the way characterized in the model. First, similar to Akerlof and Kranton, we observe a high level of specialization within the household, with women undertaking more than

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[5]In fact, data from the International Social Survey Program shows that Spaniards hold less egalitarian views on the division of housework labor than their American and Australian counterparts. Similarly Alvarez and Miles show that the unequal allocation of household time persists after observable characteristics are taken into account (Alvarez and Miles, 2003)

70% of all housework. We also find that although a woman's relative share of housework decreases as her relative earnings increase, it does so at a lower rate for women with higher relative earnings. I.e. Whereas the share of housework decreases by 5 percentage points when women move from earning less to earning the same as their husbands, it only decreases by 3 percentage points when they move from earning the same to earning more than their husbands.

We then compare different housework activities to see whether imperfect commitment problems might lead to binding social constraints. We first look at housework done during the week as oppose to during the weekend. The underlying hypothesis is that, although credible threats are more plausible during the week when time is scarce, it is less so during the weekend. Thus we would expect a woman's housework share to decline as her relative wages go up during the week, but not during the weekend. This prediction is supported by the data. Women whose earnings are higher than their husbands fail to decrease their housework share during the weekend.

Finally we compare housework with childcare. Credible threats are more difficult to use when it comes to caring activities (Folbre and Bittman, 2004). We thus expect social constraints to bind for lower relative female wages for the case of childcare than housework. Using childcare is problematic however. First, childcare reported as a primary activity seriously underestimate total childcare time. We thus look at childcare reported also as a secondary activity and use information on whether a certain activity was done in the

presence of children as in Bianchi (2000). All three definitions of childcare fail to decrease as a woman's relative earnings go up, which suggest the presence of social constraints due to imperfect commitment problems. A second potential problem with childcare is that some childcare might be conceptually closer to leisure than housework. If as female relative earnings increase the leisure component of childcare increases whereas the housework component of childcare decreases, it might result in the flat pattern observed in the data. We use detailed description of childcare activities to make some distinction between childcare that might be conceptualized as housework because it can be easily outsourced or no direct utility is derived (for example, picking children up from school or washing dishes with a child) and childcare conceptually closer to leisure (for example, playing with a child or watching TV with a child). We find that, consistent with the presence of imperfect commitment and independent of the definition used for childcare, the relative time devoted to childcare seems to be invariant to relative earnings.

The paper is organized as follows. Section 2 presents a simple model of social constraints and imperfect commitment. Section 3 describes the data set used in the analysis. Section 4 specifies the empirical methodology. Section 5 presents the empirical results and section 6 concludes.

2 Theory

We use a simple model to demonstrate how the inability of partners to commit to the efficient division of labor might result in binding social constraints. We first assume that for any household production activity there are social constrains such that the amount of time a man (woman) devotes to a given household production of activity is no higher (lower) than the value dictated by what is *socially acceptable*. This assumption implies that social constraints are more likely to bind for women with higher relative wages. We then argue that for those activities subject to imperfect commitment problems social constraints bind for lower relative female wages.

Suppose that the joint household utility depends on the consumption of two types of public goods: household maintenance (which is privately produced by household members) and a composite consumption good (which is purchased in the market). The composite consumption good includes market consumption goods that are jointly consumed by the household C (such as groceries, housing, child care, etc.) and can be acquired in the market at a normalized price $p = 1$. For the remainder of the paper we will refer to C as the *market public good*. The household joint utility also depends on the production (and consumption) of the output that results from time devoted to household chores. We denominate the output that results from home time such as a cleaned house or a nurtured child the *household public good* Z (a concept similar to the "commodities" in Becker's language (Becker, 1965)). Consider Z a lower bound for the amount of household production

that needs to be done in the household. Z differs from C in that it cannot be purchased in the market and is produced according to the production function z using both partners' time H_i for $i = m, f$ such that

$$Z = z(H_f + H_m) \tag{1}$$

Thus, although the output Z is consumed jointly by both partners, each partner privately contributes to its production. In this simple model we normalize total time to 1 and any time not spent doing housework is spent in the market.

The budget constraint is given by the usual

$$C = \sum (1 - H_i)w_i \text{ for } i = m, f \tag{2}$$

Assuming a disutility $f(H_i)$ associated to the time devoted to household production H_i for $i = m, w$, where $f(.)$ is an increasing and convex cost function, the household's utility can be defined as the sum of individual utilities such that:

$$V = U(C) + U(Z) - f(H_m) - f(H_f) \tag{3}$$

Suppose that there are social norms that constrain a man's (woman's) time in household activities to be lower (greater) than what is prescribed by society. This imposes new constraints in the household maximization problem of the form

$$H_{j,f} > \bar{H}_{j,f} \text{ and } H_{j,m} < \bar{H}_{j,m} \text{ for any } j = 1...J \tag{4}$$

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The household maximizes 3 subject to the budget, technological, time and social constraints 4 and 1, and 2. As long as the optimum amount of housework by each partner is lower than the prescribed value the household consumes all the joint disposable income and produces the needed amount of household production. The amount of time that each partner devotes to household production H_i is given by the first order conditions:[6]

$$H_i : -U'(C)w_i + U'(Z)z'(H_i) - f'(H_i) = 0 \text{ for } i = m, f \tag{5}$$

Assuming equal productivity in housework by both partners, the standard prediction follows that $H_f^U > H_m^U$ as long as $w_m > w_f$, i.e. the amount of time devoted by the woman to household production is greater than that of the man as long as her wage is lower than his. Furthermore the relative amount of time devoted to the production of any activity j $\frac{H_{j,f}}{H_{j,f}+H_{j,m}}$ is decreasing on the relative female wage w_f/w_m.

However, once the optimal values of housework are greater than the constrained value, partners will devote $\bar{H}_f$ and $\bar{H}_m$ respectively to household production. It is easy to show that because of the way they are defined, social constraints are more likely to become binding for higher relative female wages (i.e. for lower degrees of household specialization).

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[6]Under the assumption of interior solution, the second order conditions are satisfied such that:

$$H_i : 2U''(C^U)w_i^2 + 2a_i U''(Z^U) - f''(H_i^U) \leq 0$$

for $i = m, f$.

We argue that given social constraints the way characterized above, imperfect commitment increases the likelihood that social constraints become binding. In the context of the model, imperfect commitment decreases the relative female wage $\overline{w}$ at which the constraint becomes binding. Consider two types of household production activities, activity k and activity j. If activity k is more prone to suffer from imperfect commitment processes due, for example, to the inexistence of credible threats (such is the case for caring activities) then we would expect that the social constraint binds for lower relative female wages for activity k than what it does for activity j, i.e. $\overline{w}_k < \overline{w}_j$ for any household i.

3   2002-03 Spanish Time Use Survey

The data used for the empirical analysis is drawn from the 2002-03 Spanish Time Use Survey. The Spanish Time Use Survey is part of the Harmonized European Time Use Surveys (HETUS) launched by the EU Statistics Office (Eurostat). This is a representative data set directed at a sample of 20,603 households, which obtains information on daily activities by means of the completion of a personal diary and household and individual questionnaires. The sample is evenly distributed over the year in order to represent all days of the week.

The instrument of the survey is an activities diary, which all members of the household 10 years old and over complete on a selected day (the same

day for all members of the household). The diaries time frame occupies 24 consecutive hours (from 6:00 in the morning until 6:00 the following day) and is divided into 10 minute intervals. In each of the intervals, the respondent records the main activity, the secondary activity carried out simultaneously, with whom and where they are at the time. These activities are coded according to a harmonized list of activities from Eurostat, which considers 10 large groups: personal care, work, studies, household and family, volunteer work and meetings, social life and recreation, sports and open air activities, hobbies and games, means of communication, and non-specified travel and use of time.

An extensive literature confirms the reliability and validity of diary data and its superiority over other time-use surveys based on stylized questions (Juster and Stafford, 1991). The Spanish Time Use survey proves particularly useful for our study since, unlike other recent diary-based time use surveys like the American Time Use Survey (ATUS), the Spanish Time Use Survey contains information on time devoted to household production by both spouses. This information is crucial when the variable of interest is specialization within the household. Due to the novelty of this data set, Table 1 presents a comparison between the Spanish Time Use Survey and the Spanish Labor Force Survey (EPA), a well-known representative panel data set of the Spanish labor market. We observe that the main demographic and economic variables in both data sets resemble each other. The education distribution is somewhat different between the two surveys. This is likely to

be due to a different classification method rather than inherent differences in educational achievement. Labor force participation confirms this hypothesis, as both data sets coincide in the percentage of men and women in the labor force and unemployed.

	EPA			Time Use		
	Age Distribution					
	Both	**Men**	**Women**	**Both**	**Men**	**Women**
from 16 to 19	5.43	5.73	5.14	5.55	5.68	5.42
from 20 to 24	8.43	8.86	8.02	8.46	8.91	8.03
from 25 to 29	10.08	10.58	9.62	10.58	11.12	10.08
from 30 to 34	10.13	10.63	9.66	9.75	10.26	9.27
from 35 to 39	9.75	10.15	9.37	9.94	10.23	9.66
from 40 to 44	8.94	9.22	8.68	8.95	9.18	8.74
from 45 to 49	7.85	8.04	7.67	7.95	8.23	7.7
from 50 to 54	7.09	7.22	6.97	7.13	7.2	7.07
from 55 to 59	6.65	6.68	6.61	6.54	6.62	6.46
from 60 to 64	5.56	5.49	5.63	5.59	5.43	5.74
from 65 to 69	5.86	5.44	6.25	6.43	6.09	6.76
more than 70	14.22	11.95	16.37	13.12	11.05	15.07
Total	100	48.56	51.44	100	48.66	51.34
	Marital Status Distribution					
	Both	**Men**	**Women**	**Both**	**Men**	**Women**
Single	31.05	35.19	27.15	30.27	33.76	26.96
Married	58.61	60.32	57.00	59.55	61.39	57.8
Widow	7.58	2.54	12.33	7.28	2.54	11.77
Divorced	2.76	1.96	3.52	2.91	2.32	3.47
Total	100	100	100	100	100	100
	Education Distribution					
	Both	**Men**	**Women**	**Both**	**Men**	**Women**
No Education	2.94	1.88	3.93	2.69	1.61	3.72
Primary Education	35.61	33.31	37.79	28.61	26.53	30.57
Secondary Education (1st. stage)	25.04	27.10	23.09	30.37	31.56	29.25
Secondary Education (2nd. stage)	16.86	17.25	16.50	17.04	17.95	16.17
Secondary Education (2nd. stage)	0.11	0.12	0.10	6.53	7.51	5.61
College	19.19	20.01	18.43	14.29	14.18	14.41
PhD	0.24	0.32	0.17	0.46	0.65	0.27
Total	100	100	100	100	100	100
Employment	**Employment Status Distribution**					
	Both	**Men**	**Women**	**Both**	**Men**	**Women**
Labor Force Participation	54.87	67.28	43.15	56.19	68.53	44.49
Unemployment	11.12	7.95	15.79	10.43	7.48	14.73

Table 1: Comparison of EPA and Spanish TUS

3.1   Sample and Descriptive Statistics

The survey contains information on 60,493 respondents and 20,603 households, of which 22.68% are children under 10 years old. For the empirical

analysis in Section 5 we restrict the sample to those individuals between 20 and 65 who are married (8,876 couples). In order to get a clear representation of time use, we restrict the sample to those households where both spouses report a *usual day* as in Bonke (Bonke et al., 2005). This leaves us with 6,874 households. we only keep those households where both spouses report positive earnings and work full-time.[7] This leaves a sample of 2,181 households. In those regressions where a form of childcare is the dependent variable we restrict the sample to those households with a child under 15 present (a total of 1,135 households).

Table 2 presents the summary statistics for the socioeconomic variables that are used in the empirical analysis. The average age difference between spouses is 2 years, with males being 42 years old and females 40 years old on average. Following the standard practice in the literature we compute years of completed education from ten different categories provided in the survey.[8] Although education is distributed almost evenly between men and

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[7]Including one-earner couples is problematic because the procsess governing household decisions is understandably different in the two samples. This suggests that we should not combine one and two-earner households in the same regressions. Furthermore we can offer no useful exclusion restrictions to impute missing earnigns for those women out of the labor force, since everything that might be used to impute wages already appears in our time use regressions. Results are robust to including all two earner couples.

[8]Five years of education if the respondent reports primary studies or lower, eight years of education if the respondent reports a *EGB* degree, ten years of education if the respondent reports a *FPI* degree, twelve years of eduation if the respondent reports a *BUP* degree, 13 years of education if the respondent reports a *FPII* degree, 15 years of educa-

women, with women slightly more educated, men tend to work about five hours more than women per week. The Spanish Time Use data does not contain information on hourly wage, but rather net monthly earnings. Net monthly earnings, as well as family income, are reported as a scale rather than as a continuous variable. We see that almost 60% of women have net monthly earnings under 1000 euros, whereas the distribution is more disperse for men. Although women are slightly more educated than men only 4.5% of women versus 10% of men report net monthly earnings above 2000 euros. Family income measures total household income per month. It includes labor as well as non-labor income such as dividends or transfers. We divide it in three categories: below 1500 euros, between 1500 and 3000 and higher than 3000 euros. We observe that the majority of households (about 60%) fall in the intermediate category, with about 20% falling in the other two categories. The average number of children living in the household is around 1.35, which is very similar to the Spanish total fertility rate.[9] About 40% of our sample have children between 5 and 14 years old and about 25% of households report having children less or equal than 4 years of age (this is almost 50% of the sample when only households with children are considered).

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tion if the respondent reports a *Diplomatura* or a 3-year university degree and 17 years of education if the respondent reports a *Licenciatura* or a 5-year university degree.

[9]Although we only have information on children living in the household, the fact that children leave the parental home at a late age in Spain makes this variable a closer approximation to the actual number of children.

Demographic and Economic Variables	ALL SAMPLE		SAMPLE OF PARENTS	
	Mean	Std. Dev.	Mean	Std. Dev.
Wife's age	39.66	8.37	37.48	5.43
Husband's age	41.88	8.85	39.63	6.10
Wife's years of study	11.06		11.49	3.80
Husband's years of study	10.69		11.07	3.79
Wife's usual weekly hours of work	35.74	7.85	34.86	8.32
Husband's usual weekly hours of work	39.03	4.43	39.00	3.94
No. of children	1.36	0.98	1.78	0.74
No. of children 0-2	9.12%		17.96%	
No. of children 2-4	14.37%		28.32%	
No. of children 5-14	38.49%		75.82%	
No. of children +15 (men)	23.91%		12.09%	
No. of children +15 (women)	23.48%		12.88%	
Household members	3.45	1.02	3.84	0.79
No. Rooms	4.43	1.21	4.49	1.21
Wife's earnings less than 500 €	16.93%		16.89%	
Wife's earnings between 500 and 999.99 €	43.41%		43.24%	
Wife's earnings between 1000 and 1499.99 €	25.71%		24.93%	
Wife's earnings between 1500 and 1999.99 €	9.48%		10.68%	
Wife's earnings between 2000 and 2499.99 €	3.03%		2.50%	
Wife's earnings between 2500 and 2999.99 €	0.59%		92.08%	
Wife's earnings above 3000 €	0.85%		85.42%	
Husband's earnings less than 500 €	2.97%		2.62%	
Husband's earnings between 500 and 999.99 €	29.60%		28.43%	
Husband's earnings between 1000 and 1499.99 €	42.64%		43.43%	
Husband's earnings between 1500 and 1999.99 €	14.67		14.65	
Husband's earnings between 2000 and 2499.99 €	5.42%		5.68%	
Husband's earnings between 2500 and 2999.99 €	1.97%		2.15%	
Husband's earnings above 3000 €	2.71%		3.04%	
Family income under 1500 €	17.62%		18.38%	
Family income between 1500 and 3000 €	60.26%		60.98%	
Family income above 3000 €	22.13%		20.65%	
Number of observations	2,008		1044	

Table 2: Summary statistics. Socioeconomic Variables

Table 3 shows the time devoted to different housework activities. We follow the Spanish TUS classification when defining housework. Our housework variable is reported in daily minutes and includes time devoted to cooking, cleaning, mending and maintenance of clothes, gardening and pets, household maintenance and repairs, shopping, and household management. We also include any transport time needed to undertake any of these activities

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(for example, we record as shopping any time spent driving to the supermarket). Appendix A presents a full description of activities in each category. The majority of women (99.17%) undertake some housework activity and spend an average of 217 minutes per day on household chores. The percentage of men that report engaging in any type of housework drops down to 77.63%, with an average time of 112 minutes per day. Thus, women spend double the time in household chores than men. The specialization within the household is not only with respect to total time, but also with respect to the type of activity. Consistent with other studies, women concentrate on routine housework, such as cooking and cleaning, whereas men are more active in sporadic tasks such as gardening, maintenance and repairs (Hersch and Stratton, 2000). These latter tasks are also the ones that require less time.

Housework time (minutes per day)	ALL SAMPLE			SAMPLE OF PARENTS		
	%	Mean	Std. Dev.	%	Mean	Std. Dev.
Wife:						
Total Housework	99.17%	217.01	124.04	98.90%	216.87	120.58
Cooking	94.34%	94.60	55.93	94.55%	94.43	54.01
Cleaning	83.00%	72.21	55.88	83.19%	73.61	55.35
Clothes	46.34%	53.08	41.83	49.00%	51.15	39.38
Gardening and Pets	7.73%	48.89	51.13	5.01%	45.47	69.28
Maintenance and Repairs	2.30%	58.27	71.27	2.60%	42.19	42.60
Shopping	49.74%	72.21	56.19	49.64%	71.05	59.51
Household Management	0.96%	41.24	44.05	0.90%	28.37	19.79
Husband:						
Total Housework	77.63%	111.72	98.91	78.87%	110.66	101.03
Cooking	61.57%	46.50	37.15	64.85%	47.01	36.95
Cleaning	37.16%	49.68	52.81	36.66%	52.59	60.51
Clothes	4.79%	33.67	42.32	6.28%	34.02	48.53
Gardening and Pets	11.77%	81.33	82.00	9.70%	80.12	91.54
Maintenance and Repairs	7.29%	67.23	72.34	7.86%	66.51	76.33
Shopping	29.88%	76.48	61.89	30.14%	72.26	61.65
Household Management	1.90%	36.31	34.03	1.74%	34.47	28.24
Childcare (minutes per day)						
Wife:						
Childcare1				78.20%	130.94	99.32
Childcare2				79.66%	143.84	111.48
Childcare_routine				83.98%	261.42	179.90
Husband:						
Childcare1				60.58%	95.07	78.49
Childcare2				62.33%	104.88	91.34
Childcare_routine				75.48%	161.89	135.39
Household Technology						
Microwave	84.59%			85.99%		
Dishwasher	52.87%			56.29%		
Washing machine	99.35%			99.85%		
Dryer	26.71%			30.07%		
Fridge	99.31%			99.68%		
Independent freezer	26.65%			27.71%		
Outside Help						
Meal preparation	6.59%			8.55%		
Household Mainteinance	18.70%			22.26%		
Clothes	4.26%			5.33%		
Gardening and pets	95.00%			1.14%		
Repairs	1.73%			1.93%		
Household shopping	2.67%			2.92%		
Household management	1.33%			1.46%		
Childcare	22.72%			43.99%		
Paid housekeeper	19.97%			26.25%		
Number of observations		2,008			1044	

Table 3: Summary Statistics. The Division of Housework and Childcare Time.

Childcare time is separately reported for those households where a child is present. We first define *childcare1* as all childcare reported as a primary activity. The variable *childcare1* measures the time devoted to childcare

activities during the designated day (dressing them up, helping them to eat, playing with them, riding them to school, etc.) as long as it is reported as a primary activity. The Spanish TUS collects information on primary as well as secondary activities. I.e individuals may report whether they are doing two activities at the same time and which activity is the primary or the secondary one. It is well known that childcare reported as primary activity is significantly biased downwards (Bianchi, 2000) and (Folbre et al., 2004). In order to get a more accurate representation of childcare we look at both, primary and secondary activities reported as childcare, and construct *childcare2*. Evidence from comparing childcare measures in the ATUS to previous American time use surveys show that childcare as both primary and secondary activities continues to underestimate total amount devoted to childcare (Bianchi et al., 2006). We use information on whether a child was present or not to construct a third measure of childcare *childcare3*.

Table 3 also presents some indicators of household technology as well as of incidence of housework outsourcing. We see that almost all households have a microwave, a washing machine and a fridge. However only about half have a dishwasher and about 25% have a dryer or an independent freezer. The commonly outsourced household activities are cooking and cleaning, with a percentage of 7% and 19% respectively.[10] Also 23% of households outsource

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[10] The question is whether the person being interviewed received any outside help in the last four weeks, where outside help is defined as help from a person, and not from a company or the public administration. This might explain low reported outsourcing levels for some activities such as repairs or maintenance.

some type of childcare. Other activities that are outsourced are shopping and clothes repair, with about 4% of households outsourcing these services. In turn, household outsourcing levels are relatively low, which stresses the importance of substitution of time among household members rather than between the household and the market.

Table 4 shows daily minutes devoted to housework activities by men and women in our sample when a wife's relative earnings are higher, equal and lower than her husband's. The majority of women have lower earnings than their husbands with a relatively small fraction of women having higher earnings than their husbands. Women devote less time to housework activities as her relative earnings increase: 228 minutes when they earn less, 205 when they earn the same and 188 when they earn more. Men's housework time increases from 82 to 92 minutes as women's earnings increase but decrease again to 86 minutes when women earnings increase beyond men's earnings. When looking at women's share of housework time over total housework time in the household (defined as a sum of both spouses housework time) we observe that it decreases as relative earnings increase. On average, a woman's share of total housework time is .75 when she earns less than her husbands, .71 when she earns the same and .68 when she earns more. Thus, similar to PSID evidence, even women contributing to more than 50% of the household income engage in more than 50% of household production. Another interesting point is that the rate at which a woman's relative share of housework decreases is lower as her relative earnings increase. Childcare1 seems

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to slightly decrease for women and increase for men as relative earnings go up, whereas childcare2 slightly increases. A possible explanation for the fact that relative time in childcare2 increases as female relative earnings increase might be that childcare reported as secondary activity is conceptually closer to leisure rather than housework. In turn, the fact that a woman's relative share of housework decreases at a lower pace for high earning women and that childcare vary little with relative earnings suggest the presence of social constraints associated to the division of household labor due to imperfect commitment processes.

	Minutes of housework per day			
Net monthly earnings	Wife	Husband	ratio	observations
Wife earns less than husband	228.38	82.36	0.7596	1017
	(126.43)	(98.97)	(.2226)	
Wife earns the same as husband	205.07	92.30	0.7153	792
	(124.44)	(101.86)	(.2447)	
Wife earns more than husband	188.78	86.90	0.6831	199
	(112.81)	(84.11)	(.2442)	
	Minutes of childcare1			
Wife earns less than husband	97.92	51.59	0.6777	515
	(99.96)	(72.48)	(.3101)	
Wife earns the same as husband	107.93	62.44	0.6531	423
	(107.80)	(78.98)	(.2977)	
Wife earns more than husband	103.1147	69.5	0.6359	106
	(99.70)	(86.82)	(.2912)	
	Minutes of childcare2			
Wife earns less than husband	109.55	58.16	0.6765	515
	(109.49)	(81.88)	(.3132)	
Wife earns the same as husband	118.65	72.32	0.6409	423
	(120.19)	(94.32)	(.3009)	
Wife earns more than husband	124.47	74.84	0.6659	106
	(122.46)	(92.06)	(.2820)	
	Minutes of childcare_routine			
Wife earns less than husband	218.96	115.54	0.6603	515
	(199.89)	(134.91)	(.2612)	
Wife earns the same as husband	224.56	130.78	0.6521	423
	(181.24)	(137.15)	(.2360)	
Wife earns more than husband	201.57	121.92	0.6339	106
	(179.46)	(143.54)	(.2506)	

Table 4: Relative Earnings and Relative Housework

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4 Empirical Specification

We use the following linear regression equation to test the presence of imperfect commitment associated to the household division of labor.

$$h_i = w_{i0}\beta_0 + w_{i1}\beta_1 + X_i\gamma + \varepsilon_i \tag{6}$$

where the dependent variable of interest is the share of female housework in a given household i as $h_i = \frac{H_{i,f}}{H_{i,f}+H_{i,m}}$, for $H_{i,f}$ and $H_{i,m}$ the wife and the husband's housework time in household i. We report weighted Tobit estimators. A Tobit specification is preferable given that there are a lot of men that report zero time in housework and thus this ratio is truncated at value 1.

The Spanish Time Use data does not contain information on hourly wages. We use net monthly earnings and create two indicator variables for when the wife has the same earnings as the husband and when she earns more than the husband. Using earnings in the right hand side is problematic since hours of work are jointly determined with hours of housework. We account for this potential bias by reducing the sample to those couples where both partners work full time.[11] The coefficients of interests are β_0 and β_1, where w_{i0} is an indicator variable that takes value 1 if spouses have the same monthly earnings and 0 otherwise and w_{i0} is an indicator variable that takes value 1 if the wife's earnings are greater than the husband's and 0 otherwise.

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[11]Results are robust to especifications that include all dual earner couples and control for the number of hours work.

Variables in X_i include household income, spouses age and education, household composition (number of people in the household, age and number of children), the number of rooms in the house and regional dummies. We also control for household production technology by controlling for the presence of a microwave and other devices that might affect spouses' productivity in household goods. Finally we also include whether the household receives any external help (paid or unpaid) in the provision of household services.

If imperfect commitment is the underlying cause for binding social constraints in the division of household labor, and different household activities are subject to different imperfect commitment problems, we would expect the constraint to be different for different types of household production activities. Consider two types of household production activities, activity k and activity j. If activity k is more prone to suffer from imperfect commitment processes due, for example, to the inexistence of credible threats (such is the case for caring activities) then we would expect that the social constraint binds for lower relative female wages for activity k than what it does for activity j, i.e. $\overline{w}_k < \overline{w}_j$ for any household i. We test this hypothesis by running equation (6) for different household activities:

$$h_{ik,f} = w_{ikf}^{low}\beta_{kf}^{low} + w_{ikf}^{high}\beta_{kf}^{high} + w_{ikm}\beta_{km} + X_{ik}\gamma_k + \varepsilon_{ik} \qquad (7a)$$

$$h_{ij,f} = w_{ij,f}^{low}\beta_f^{low} + w_{ijf}^{high}\beta_f^{high} + w_{ijm}\beta_m + X_{ij}\gamma_j + \varepsilon_{jk} \qquad (7b)$$

where k and j stand for two different household activities and w_{if}^{low} and w_{if}^{high} are two indicator variables that takes the value 1 when a wife's earnings are

equal or higher than her husband's.

5   Empirical Results

Table 5 presents the results for the ratio of total daily minutes that the wife spends on housework over the total time that both spouses spend on housework. Consistent with the summary statistics presented above, we observe that this ratio decreases as female relative earnings increase. A wife that earns the same than her husband has a housework share of 5 percentage points lower than for a wife that earns less than her husband. Although 7 percentage points might come across as a very small number, summary statistics show that it might represent as much as 40 minutes of housework per day. Similarly, for a wife that earns more than her husband the ratio is 7 percentage points lower than for a wife that earns less than her husband. Thus, we observe a decrease in the wife's housework share as her relative earnings go up. The results are robust to different specifications that aim to control for household preferences and household production technology. These results seem to be consistent with competitive or bargaining theories of the household. However, results also show that higher earning women are not able to reduce their participation in housework activities at the same rate of lower earning women and that her share of housework is greater than 50%. We interpret these facts as evidence of social constraints on women behavior regarding housework.

Wife's share of housework time	(1)	(2)	(3)	(4)	(5)	(6)
wife earns same as husband	-0.05	-0.06	-0.06	-0.05	-0.05	-0.05
	(3.69)***	(3.94)***	(3.98)***	(3.41)***	(3.39)***	(3.37)***
wife earns more than husband	-0.10	-0.10	-0.09	-0.07	-0.07	-0.07
	(4.47)***	(4.28)***	(3.97)***	(3.18)***	(3.26)***	(3.21)***
family rent between 1500 and 3000 €		-0.06	-0.07	-0.05	-0.04	-0.04
		(3.24)***	(4.01)***	(2.66)***	(2.00)**	(2.00)**
family rent higher than 3000 €		-0.03	-0.07	-0.01	0.00	0.00
		(1.24)	(3.39)***	(0.43)	(0.19)	(0.19)
wife's age			0.00	0.00	0.00	0.00
			(1.83)*	(1.80)*	(2.00)**	(1.71)*
husband's age			0.00	0.00	0.00	0.00
			(1.59)	(0.92)	(0.63)	(0.38)
wife's years of education				-0.01	-0.01	0.00
				(2.60)***	(2.51)**	(1.93)*
husband's years of education				-0.01	-0.01	-0.01
				(3.15)***	(3.22)***	(3.15)***
paid housekeeper						-0.04
						(1.33)
region dummies					yes	yes
number of memebers in the household						0.04
						(5.25)***
househod technology dummies						yes
housework outsourcing dummies						yes
week-day observation	0.10	0.10	0.10	0.10	0.11	0.11
	(6.54)***	(6.49)***	(6.88)***	(7.17)***	(7.37)***	(7.72)***
constant	0.74	0.78	0.51	0.68	0.70	0.64
	(52.31)***	(37.60)***	(13.56)***	(14.45)***	(14.12)***	(11.01)***
Observations	2008	2008	2008	2008	2008	2008
R-squared	0.0351	0.0414	0.0793	0.0981	0.118	0.1406

Table 5: Tobit Estimates. The Division of Housework

We have argued that social constrains upon the division of labor are more likely to arise in situations and activities where it is harder to credibly commit over time allocation. We run the same regression over two separate subsamples: the subsample of couples who filled out the diary on a week-day and the subsample of couples who filled out the diary on a weekend-day. We expect that wives and husbands can credible commit during the week, as the tighter schedules imposed by the labor market can be used as a credible threat. However, this is not possible during the weekend when there is more "free" time. We see that whereas the prediction of traditional theories persists during the week, high earning women are constrained during the

weekend. That is, although females earning more than their male partners do reduce the relative share of housework during week-days ($\beta_0 = -0.4$ and $\beta_1 = -0.8$), they fail to decrease it further over the weekend (β_1 is no longer statistically significant). Thus, the social constraint upon the division of housework seems to become binding for women with high relative earnings during the weekend.

Wife's share of housework time	Weekday	Weekend
wife earns same as husband	-0.04	-0.07128
	(2.06)**	(2.98)***
wife earns more than husband	-0.08	-0.02589
	(2.90)***	(0.60)
family rent between 1500 and 3000 €	-0.02	-0.08493
	(1.00)	(2.58)**
family rent higher than 3000 €	0.01	-0.05048
	(0.25)	(1.18)
wife's age	0.00	0.00377
	(1.17)	(1.00)
husband's age	0.00	0.00329
	(0.04)	(0.92)
wife's years of education	0.00	-0.00509
	(1.54)	(1.29)
husband's years of education	-0.01	-0.00150
	(2.98)***	(0.40)
paid housekeeper	-0.04	-0.04907
	(1.14)	(1.00)
region dummies	yes	yes
number of memebers in the household	0.05	0.01518
	(5.56)***	(1.27)
househod technology dummies	yes	yes
housework outsourcing dummies	yes	yes
constant	0.76	0.60950
	(10.73)***	(6.47)***
Observations	1420	588
R-squared	0.1256	0.2149

Table 6: Social Constraints and the Division of Housework. Week and Weekend.

We now focus our analysis on childcare. We expect imperfect commitment problems to be more relevant in the case of childcare, since no credible threats exists. In this case, our theory predicts that social constraints become binding for women with lower relative wages. Childcare conceptualization is

difficult, because unlike housework, time devoted to childcare might produce direct utility, being conceptually closer to leisure. Diary data allows us to make some distinction between childcare that might be conceptualized as housework because it can be easily outsourced or no direct utility is derived (for example, picking children up from school) and which childcare entails leisure (for example, playing with a child). We construct different measures of childcare *childcare_routine* and *childcare_leisure*. The variable *childcare_leisure* is constructed as any time devoted to playing with children reported as a primary activity. We also include any other primary activity that is reported as a leisure activities (watching TV, playing sports, etc.) as long as they are performed in the company of a child under 10 years old. We construct *childcare_routine* as any time devoted to childcare reported as primary or secondary activity (except playing with a child) and any other primary activity that is considered to be non-leisure activities (cleaning, shopping, eating, etc.) as long as they are performed in the company of a child under 10 years old. We also include time devoted to taking care of kids and recorded either as primary (excluding playing with children) or secondary activity. We observe that women's time devoted to childcare is greater than men's when considering *childcare1* and *childcare_routine* (both more likely to be characterized as housework), but the differences are significantly reduced for *childcare2* and *childcare_leisure* (more likely to be characterized as leisure). Table 6 show the results for the different measures of childcare for households with children under 15 years old. As expected, wife's participation on childcare seems to be invariant to her relative relative earnings,

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which supports our theory of social constraints and imperfect commitment.

Wife's share of housework time (parents)	Housework	Childcare1	Childcare2	Childcare_routine
wife earns same as husband	-0.07	-0.02615	-0.03834	-0.00983
	(3.94)***	(0.81)	(1.20)	(0.46)
wife earns more than husband	-0.09	-0.01778	0.00106	-0.01677
	(2.97)***	(0.32)	(0.02)	(0.45)
family rent between 1500 and 3000 €	-0.04	-0.06176	-0.02039	-0.03377
	(1.52)	(1.42)	(0.47)	(1.19)
family rent higher than 3000 €	0.01	-0.07276	-0.03002	-0.04557
	(0.22)	(1.21)	(0.50)	(1.15)
wife's age	-0.01	0.00278	0.00242	-0.00048
	(1.98)**	(0.52)	(0.45)	(0.13)
husband's age	0.00	-0.00105	-0.00188	-0.00052
	(0.15)	(0.24)	(0.42)	(0.18)
wife's years of education	0.00	-0.00960	-0.00582	-0.00223
	(0.65)	(1.72)*	(1.05)	(0.61)
husband's years of education	0.00	-0.00679	-0.00699	-0.00332
	(0.58)	(1.31)	(1.35)	(0.94)
paid housekeeper	-0.03	-0.00227	-0.02549	-0.00397
	(0.84)	(0.04)	(0.50)	(0.11)
region dummies	yes	yes	yes	yes
number of memebers in the household	0.08	0.11246	0.11796	0.03871
	(5.01)***	(3.49)***	(3.67)***	(1.98)**
househod technology dummies	yes	yes	yes	
housework outsourcing dummies	yes	yes	yes	
Number of children under 15	-0.02	-0.07342	-0.06654	-0.01759
	(1.10)	(1.97)**	(1.79)*	(0.74)
children under 4 years-old dummy	-0.07	-0.00194	-0.02273	-0.00223
	(3.43)***	(0.06)	(0.65)	(0.10)
week-day observation	0.12	0.16407	0.13809	0.12493
	(6.61)***	(4.85)***	(4.12)***	(5.62)***
constant	0.85	0.63259	0.61327	0.68624
	(8.69)***	(3.66)***	(3.57)***	(5.97)***
Observations	1044	847	863	897
R-squared	0.1774	0.0799	0.0692	0.1043

Table 7: Social Constraints and Childcare Time

6 Conclusion

The results presented here have provided some evidence of the imperfect commitment processes associated to the household division of labor. Economic theories of the household predict that increases in female human capital lead to increases in female labor force participation and, symmetrically, to de-

creases in the female time devoted to household production. We use the Spanish Time Use data 2002 to explore the nonlinearities associated to the division of housework. We observe that the relative share of housework decreases at a lower rate for higher earnings women than for lower earnings women and interpret this as social constraints associated to the division of housework. We further argue that social constraints become binding in the presence of imperfect commitment processes associated to household decisions over time allocation. Imperfect commitment problems are stronger the less credible threats available. Consistent with social constraints on the division of household labor we find that although a woman's relative home time decreases as her relative earnings go up, this effect is less pronounced as her relative earnings are higher. Furthermore, the time devoted to those household activities where no credible threats exist (such as those involving care or performed during the weekend) are less elastic to an increase in the relative female wage.

The possibility of imperfect commitment processes associated to the household division of labor suggests that work-family policies should also encourage men's participation in household work. In order to design such policies further research is needed. The analysis of new time-use surveys based on diary information that are being released in most developed countries create a unique opportunity to understand how the division of household labor affects these socioeconomic outputs in order to design such policies.

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A   Description of Housework Categories

Non specified housework

    Cooking

        Non specified cooking

        Cooking preparation

        Baking

        Dishwashing

        Food storage

        Other cooking

    Housekeeping

        Non specified house upkeep

        Cleaning (interior)

        Cleaning (exterior)

        Heating and Water Supply

        Organization

        Other House Upkeep

    Clothes Care

        Non specified clothes care

        Laundry washing

Ironing

Clothes repair

Other clothes caring related activity

Gardening and Pet Care

Care of Domestic Animals

Dog walking

Other gardening and pet activities

Construction and Repair

Non specific construction and repair activities

House renovation and construction

House repairs

Appliances repairs and maintenance

Other

Shopping and Household Services

Non specified shopping

Shopping

Commercial and administrative services

Personal services

Household Management

Household management

Non specified household management

Internet household management

Other

Childcare

Non specified childcare

Physical care

Educational care

Reading, playing, talking to children

Accompany children

Travel related childcare

Other

Care of other household members