INVESTIGACIONES ECONÓMICAS. vol. XXX (1), 2006, 5-31

HUSBANDS' HOUSEWORK TIME: DOES WIVES' PAID EMPLOYMENT MAKE A DIFFERENCE?

BEGOÑA ÁLVAREZ
DANIEL MILES
Universidad de Vigo

In this paper, we investigate the effect of a woman's decision to enter paid employment on her husband's contribution to domestic work. To explore this issue, we analyze cross-sectional data on Spanish couples. Our results suggest that female decision to participate in the labor market increases husbands' housework time. However, these estimates may be subject to an omitted variable bias due to both the joint nature of time allocation decisions within the household and the correlation between unobservables. Once we take into account this endogeneity problem, we find a larger impact of the wife's labor status.

Keywords: Time allocation, female labour supply, endogeneity, count data models.

(*JEL* J16, J22, C35)

1. Introduction

During the recent decades, the family system in most industrialized countries has moved from the traditional breadwinner-housewife type toward a system characterized by dual-earner households. While in the seventies more than sixty percent of married couples were breadwinner-housewife households, at the beginning of the twenty-first century, more than sixty percent of European and American married couples are dual-earners (Eurostat, 2002; US Department of Labor, 2004).

Theoretical models predict that a woman who works outside the household would have a higher bargaining power and, hence, there would

We thank the editor and two anonymous referees for helpful comments and the Spanish Instituto de la Mujer for providing us with the data. Financial support from the Spanish Dirección General de Enseñanza Superior, grant number SEJ2004-04583/ECON, is also gratefully acknowledged.

be a more egalitarian distribution of household work within the couple. Housework aggregate data are consistent with this prediction. As female labor force rates increase, women reduce time on housework while men slightly increase time on routine housework (Bianchi et al., 2000; Gershuny and Robinson 1988). Although this evidence suggests some reallocation process of domestic work within couples, time-use surveys reveal that, in most developed countries, working wives do about two thirds of total housework (Juster and Stafford, 1991; Hersch and Stratton,1994; Gershuny et al. 1997; Blau et. al 1998; Folbre and Nelson, 2000; Alvarez and Miles, 2003). Most puzzling about these data is that this unbalanced distribution of housework holds even when women work more hours outside the home and have higher labor incomes than their husbands (Brines, 1994; Akerlof and Kranton, 2000).

The asymmetric distribution of domestic housework between spouses is of particular concern because it may have negative consequences on the well-being of working married women. On the one hand, women may enjoy less amount of leisure time than their male partners[1]. On the other hand, women's greater responsibility for domestic work may adversely affect their labor market outcomes (e.g., work schedules, wages or occupational choices) because it imposes higher time constraints and leads to lower levels of effective effort per hour (Blau et al., 1998 p. 54; Hersch and Stratton, 1997).

Most of the research on this issue points to men's resistance to change housework times in response to women's entry into the labor force as the main explanation for the observed uneven distribution of nonmarket work. Nonetheless, existing empirical studies do not establish a consistent link between wives' employment and husbands' housework time. For instance, Nickols and Metzen (1982) and Shelton (1990) find that American women's participation in the labor force was not significantly associated with men's total housework time. Coverman (1985) shows that wives' employment status affected husbands' housework time, but the effect was relatively small. Using data from repeated cross-sectional samples of time diaries from 1965 to 1995, Bianchi *et al.* (2000) supply evidence that men, regardless of marital status, increased their propensity to do housework over this period of time.

[1] The Human Development Report (UNDP, 1995) reviews time use patterns in 31 countries and documents the fact that women consistently enjoy less leisure time than men, with women working longer hours (paid and unpaid) than men in nearly every country.

Regarding dual-earner couples, Hersch and Stratton (1994) find an inverse relationship between American husbands' share of housework time and workplace hours. All these studies assume that the wife's employment and/or her market hours are an exogenous determinant of housework time. Anxo and Carlin (2004) analyze the robustness of these findings to endogeneity of market hours by using data from France. They find that the greater the wife's market hours, the lower the husband's housework time, but the larger his share of housework, regardless of his working status.

In this paper, we use Spanish data to revisit the issue of the relationship between wives' employment status and husbands' contribution to housework. The case of Spain is interesting because, as in other southern European countries, women's social role has undergone a dramatic change during the last three decades. This has been the result of a sizable increase in women's access to education and employment: between 1978 and 2002, the female participation rate increased from 20.7% to 41.1%. However, family life has lagged behind the changes in labor market composition. According to the 1996 Eurobarometer, Spanish women were the worst off in terms of distribution of household tasks. Only 12% claimed a 50-50 distribution with their male partners, while the European Union average was 25%. In Alvarez and Miles (2003) we show that the asymmetric distribution of housework within two-earner couples is mainly explained by gender-specific effects rather than by differences in spouses' observable characteristics. Indeed Spanish citizens are conscious about the relevance of this issue given that 35% of women (the highest percentage jointly with Ireland) and 28% of men pointed to *sharing household tasks* as the most important area where action should be taken to achieve equal opportunities for women and men (European Commission, 1998).

In this paper, the analysis is restricted to couples in which at least the husband has a paid job. Our goal is to measure the impact of the wife's employment on her husband's share of housework and the number of hours he devotes to these domestic tasks. Two measures of the wife's employment are used. The first one is a binary variable indicating whether the wife has a paid job. The second measure is a latent variable that proxies for the wife's propensity to work for pay. In contrast to previous literature, the wife's employment decision is allowed to be endogenous. There are two potential reasons for endogeneity of female employment. First, the joint nature of market and

non-market time allocation decisions within the household may lead to biased estimates if we assume the wife's labor market work is exogenous (see, for instance, Kooreman and Kapteyn, 1987). Second, the existence of unobserved variables may obscure the response of the husband's housework time to the wife's employment. In particular, there is a good deal of literature that emphasizes the relevance of social norms on the allocation of work between spouses (e.g. van der Lippe and Siegers, 1994; Kevane and Wydick, 2001; De Laat and Sevilla, 2005). Furthermore, the sorting mechanism that initially formed the couples might match spouses with similar tastes and individual attitudes towards gender roles at home. These variables (social norms, tastes, attitudes, etc.) may simultaneously affect the wife's decision to participate in the labor force and the husband's housework contribution. Therefore, if they are not fully captured, they may cause a potential for omitted variables bias when estimating the changing patterns of housework allocation caused by women's entry into paid labor. In general, it is not possible to theoretically indicate the sign of the bias that arises when one ignores the endogeneity in this context; therefore, it is an empirical issue.

Analyzing Spanish data for 1991, we find a positive and significant effect of wives' employment on both husbands' share of housework and the number of hours they devote to these tasks. Additionally, our estimates reveal that this effect is significantly downward biased when endogeneity of female employment is ignored. This result could explain why previous work that has not taken endogeneity into account found that the effect of women's employment decision on husband's housework was relatively unimportant. Finally, our analysis of the whole reallocation process occurring within the couple shows that the estimated increase in the male share is mainly due to the sizable reduction of female housework time, which is consistent with previous findings in literature.

The layout of the paper is as follows. In the next section, we revise some theoretical issues on housework allocation. Section 3 details the data and provides an overview of housework allocation within Spanish couples. In Section 4, we discuss the econometric methodology and present the main results. In the last section, we conclude.

2. Theoretical considerations

For many years, time allocation within the household was assumed to be exogenously determined by how the couple was socially perceived: a male breadwinner and a housewife. An economic justification to this traditional way of structuring a family was given by Becker (1991). Based on the idea that the household was a unitary decision maker, Becker showed that an optimal way to allocate time is to assign work according to relative efficiency. With men being more productive than women in paid work (due to higher wages) and women being more productive in household production (due to their reproductive role), the model predicts full specialization.

Nowadays, there is increasing consensus in the literature on household behavior that intra-household decisions cannot be modelled through a unitary model. Cooperative bargaining models have become a standard tool to model intra-family allocation (Manser and Brown, 1980; McElroy and Horney, 1981). The bargaining approach recognizes that household decisions are made in a kind of negotiation process where spouses have certain power, as represented by a threat point which corresponds to the utility of divorce. An alternative Nash bargaining model with non-cooperative marriage was proposed by Lundberg and Pollak (1993). Their separate-spheres model presents a more plausible framework to model household decisions that seem unlikely to be resolved by divorce threat bargaining, such as, for example, the allocation of certain domestic tasks. According to this model, when cooperation fails, spouses may remain within the marriage but withdraw into separate spheres defined by a division of labor based on socially recognized gender roles. This withdrawal option would constitute an *internal* threat point. That is, a non-cooperative solution is used as a threat point in a cooperative game.

The need to consider the potential conflicting utility of spouses has also motivated the so-called *collective* approach to explain household decision-making (Chiappori, 1988, 1992). The key idea behind these models is that the household has a welfare function which is a weighted sum of the individuals' private utility functions and every household decision produces a Pareto efficient sharing rule. This sharing rule can be regarded as the reduced form of an unspecified bargaining model.

However, collective models have two important limitations. First, they do not reveal how the sharing rule emerges and hence how decisions

are processed within the household. Secondly, the assumption that bargaining outcomes are efficient is implausible for major decisions that affect future bargaining power (Lundberg and Pollak, 2003). For instance, it is generally accepted that a woman's access to income influences her power in the decision-making process. This power depends in turn on the labor supply of the woman. Since the woman's labor supply is a choice variable for the household, the bargaining power is influenced by the household's decision. If this occurs, efficiency cannot be guaranteed (Basu, 2004).

At present there is no agreement on which model is appropriate in order to predict household behavior. Regarding housework allocation, it seems unlikely that we can attain a complete understanding of this issue through standard microeconomic models. There is empirical evidence that women in the labor force do more and their husbands do less housework than what should be expected under either the efficiency or the bargaining perspective (Juster and Stafford, 1991; Akerlof and Kranton, 2000; Bittman et al. 2001; Alvarez and Miles, 2003). Sociologists and, increasingly, economists argue that the main reason behind the failure of standard economic models is that an important part of the division of housework still depends on structuring identities, social norms and attitudes that support traditional gender roles. For instance, Sen (1990) explains that the outcome of bargaining may be less favorable to a person the less value s/he attaches to her/his own well-being relative to the well-being of others, and this tends to be the situation of women in traditional societies. Similarly, Agarwal (1997) claims that social norms can restrict a woman's bargaining power in relation to housework allocation by providing a justification for maintaining a gender-unequal situation at home. In line with these ideas, a small but growing body of literature is presenting a number of promising economic approaches to understanding the role of these variables in time allocation decisions. For example, Akerlof and Kranton (2000) show that the incorporation of gender identity into the partners' utility functions enables the prediction of asymmetrical sharing of domestic work between otherwise identical spouses. According to their model, the asymmetry is explained by the disutility that a man receives from the loss of masculine identity when either his wife works more than half the couple's total labor market hours or when he undertakes housework. Social constraints are considered in De Laat and Sevilla (2005). They present a model in which the asymmetry in the division of housework is explained by means of social externalities. In

particular, men's disutility from housework decreases with the average share of housework done by husbands in the country.

This paper tries to add empirical evidence to the relationship between women's employment decision and housework allocation within the household. Behind our analysis is the assumption that female labor market supply is both a matter of household decision and a determinant of the household balance of power that the woman may use to insist on an egalitarian allocation of housework within the couple. Our approach also recognizes the existence of unmeasured factors such as social norms, attitudes or tastes that may condition the woman's access to employment and simultaneously determine husbands' participation in housework.

3. Data

The data used for this analysis come from the Work Situation and Time Use Survey (WSTUS), carried out by the Spanish *Instituto de la Mujer* (a section of the Ministry of Labor and Social Affairs) in 1991. The original aim of this survey was to compare male and female performances in paid and unpaid activities. To reduce unobserved heterogeneity as much as possible, the sample was restricted to wage-earners working in sectors and occupations in which men and women had similar participation rates. Individuals were interviewed at their workplaces in six regions: Andalusia, Catalonia, Galicia, Madrid, the Basque Country and Valencia. The total sample size of the survey was 2,054 employees (1,049 women and 1,005 men).

The WSTUS offers information on the personal situation and job conditions of the interviewed workers, as well as on the distribution of time between market and non-market activities. For those who were married/living together, we observe the educational level, work status and time use patterns of the partner. When the research for this paper was carried out, this was the only Spanish survey which offered information on the housework time allocation of both members of the couple[2]. To examine the impact of wives' employment on their hus-

[2]Every four years, the Spanish *Instituto de la Mujer* publishes official statistics on time use patterns of Spanish people. Although these data come from surveys which are representative of the entire population, their main disadvantage is that they provide no information on either the employment status of interviewees' partners or their allocation of time. These deficiencies are overcome by the recent *Encuesta de empleo del tiempo* released by the Spanish *Instituto Nacional de Estadística* in

bands' domestic work, only married men were included. Respondent women were excluded to avoid overrepresenting excessively working women in the sample. Finally, we dropped individuals with missing values in the variables of interest. This leaves us with a sample of 416 couples in which at least the male partner is employed. In spite of having excluded interviewed women from our sample, the percentage of dual-earner couples in our sample (53%) is considerably higher than in the total population (30%) (see Eurostat, 1992).

Housework times were computed from married men's answers to the question: "*About how many hours do you (your wife) spend on housework in an average day?*" It was made clear to the interviewee that this question did not refer to time spent on child care. Therefore, we are focusing on routine housework activities which, in principle, do not have emotional rewards. In Table 1, we summarize the means and standard deviations of the number of housework hours performed by the interviewed men and their wives, as well as the male share of total housework, controlling for the wife's employment status. Consistent with evidence for other countries, we observe a clearly uneven distribution of housework hours between spouses and for all employment statuses of women.

TABLE 1
Time devoted to housework by husbands: mean hours per day and share over total housework, by wives employment status (standard deviations in brackets)

	Average hours of housework		Husband's share	Sample
Wife's working status	Husband	Wife		
Not working	0.868	7.903	0.110	197
	(1.486)	(4.022)	(0.182)	
Working	1.712	3.570	0.314	219
	(1.752)	(2.225)	(0.205)	
Working full-time	1.783	3.555	0.320	180
	(1.832)	(2.210)	(0.197)	
Working part-time	1.385	3.641	0.282	39
	(1.289)	(2.322)	(0.242)	

Source: Work Situation and Time Use Survey 1991

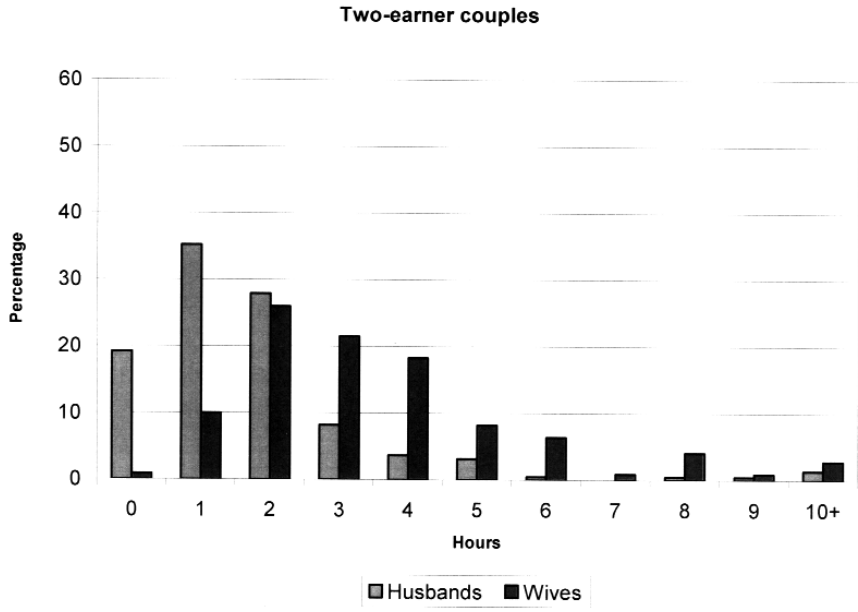
On average, husbands married to non-working women perform about 0.87 hours of housework per day, while their wives average 7.9 hours. Controlling for the wife's employment status mitigates these differ-

October 2004. This survey provides information on time allocation of all members of the interviewed households and it is representative of the entire Spanish population.

ences, but does not eliminate them completely. In two-earner couples, men average around 1.71 hours per day, while their wives average 3.57 hours[3]. These times lead husbands to share 11% of total domestic work in breadwinner-housewife couples and 31.4% in dual-earner couples. Male/female differences in housework times are also evident when we compare the actual relative frequency distributions of hours (see Figure 1). Roughly 57% of husbands married to non-working women perform zero hours of domestic work, whereas this percentage falls to 19% for those married to working women. The percentage of women performing zero hours of housework in any of these types of couples is insignificant. In contrast, about 41 % of working women in our sample perform 4 or more hours of housework per day, while only 10% of their husbands complete this number of hours.

FIGURE 1
Housework time (hours per day)

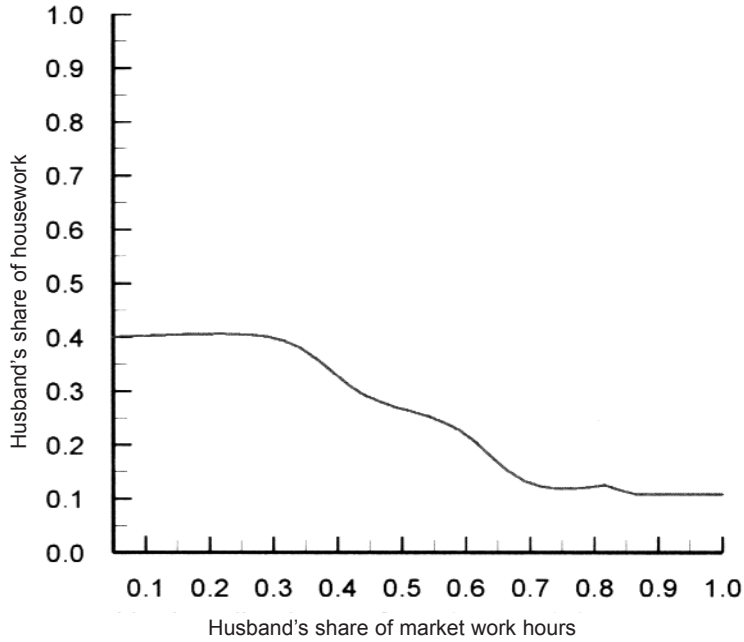
[3]The average times for two-earner couples are similar to those observed in other countries. For example, in France men married to working women devote, on average, 2 hours per day to domestic work as opposed to wives' 4 hours (Anxo and Carlin, 2004); in the USA husbands spend 1 hour per day on housework and wives 3 hours (Blau et al., 1998); in Australia, husbands average 1.8 hours per day and wives 3.3 hours (Hewitson, 2002).



As a first inspection of the relationship between wives' employment and men's contribution to domestic tasks, in Figure 2 we show the results of a non-parametric regression of men's share of housework against their share of market work. This figure illustrates the asymmetry in men's and women's behaviors. When men do all the market work (right extreme of the graph), they contribute on average about 10% of total housework. However, as their share of market work falls, their share of housework rises to no more than 40% (left extreme of graph). Note that while the right hand of the graph seems consistent with economic theories, the left hand does not support their predictions. The shape of this graph is surprisingly similar to that presented in Akerlof and Kranton[4] (2000) based on a parametric specification and estimated with American data for the years 1983 to 1992. Such consistency in behavior suggests a stable ceiling in the proportion of men's time contribution to housework.

[4]The authors note that similar results are obtained when the independent variable is shares of income rather than shares of outside work.

FIGURE 2
Nonparametric regression of husbands' share of housework against market work share



In addition to wife's employment status, we have selected a set of variables following what is usual in the theoretical and empirical literature to explain husbands' contribution to housework. A brief summary of these variables is provided in Table 2.

TABLE 2
Description of variables

Variable	Mean	Std
Husband's age	37.92	10.02
Presence of children at home	0.745	0.43
Husband's educational level		
primary	0.406	0.491
secondary	0.281	0.450
universitary	0.312	0.464
Wife's educational level		
primary	0.505	0.500
secondary	0.257	0.437
university	0.238	0.426
Working wife	0.526	0.485
Husband's hourly wage (in hundreds of pesetas)	0.699	3.061
Husband's schedule with split shift	0.485	0.500

Education and age are expected to affect the marginal productivity in both paid and unpaid activities. These variables are also linked to attitudes towards gender roles (Hersch and Stratton, 1994). One would expect young and highly-educated men to be more likely to exhibit egalitarian gender-role orientations at home and, consequently, be more likely to increase their housework contribution in response to women's entry into paid labor. To control for these effects, we include the wife's and the husband's education levels. The WSTUS does not provide information on the age of the respondents' partners therefore, in our sample, we can only include the husband's age (as a proxy for the couple's age), measured in years and the husband's age-squared to capture possible non-linear effects.

About 74% of couples in our sample have children. Although the WSTUS question on housework explicitly excluded time spent on child care, it is unlikely that respondents' reported housework times are the result of deducting the time spent on work created by children, such as extra laundering, cooking and cleaning from their total housework time. To capture this effect, a binary variable for the presence of children at home is included.

Both efficiency and bargaining theories of household time allocation predict an inverse relation between own or relative wage and time on home production. In this paper, we have opted for a specification in terms of the husband's hourly wage to explain his housework contribution[5]. This variable is calculated from reported labor earnings, weeks worked and usual hours worked per day. We assume that the wife's wage rate is implicit in her decision to enter the labor market.

[5] Empirical studies typically control for the spouses' relative wage as a measure of the household balance of power. To construct this variable, we need observations of potential wage rates for women who did not have a paid job at the time of the survey. This could be obtained by estimating a wage equation for women on the basis of the households for which we observe the female wage rate. However, for more than 90% of working women in our sample, the wage rate information was missing. This is possibly due to the fact that it is the husband who declared this information. Then, to estimate the potential wage rate for all the women in our sample, we should use the information corresponding to the interviewed working women that had been excluded from our sample. The problem is that, given the sample design of the WSTUS, these women are not representative of the total female working population. Therefore, predictions obtained from these observations are likely to be biased. To avoid misleading conclusions, we have opted for a more conservative strategy and we only include the male wage rate as explanatory variable.

Some studies show that there are aspects of the structure of employment that appear to have effects on non-market work (e.g. Presser, 1994). In our sample, 50% of men have a split shift at work. We control for the effect of this time restriction on the performance of household work.

4. Empirical analysis

In this section, we present the empirical results of estimating the effect of the women's employment on their husbands' housework allocation. The male housework contribution is measured through two variables: the share of total housework and the number of housework hours per day. The empirical strategy begins by considering the wife's participation decision as exogenous, as has been common in the previous empirical literature. Next, we propose two alternative simultaneous equation models that control for endogeneity of wife's employment[6].

It is important to remark that our main interest is to determine whether a change in the wife's labor market status affects her husband's housework allocation. This effect is captured through a single variable indicating the wife's employment status. We are not interested in distinguishing among the different mechanisms that may be driving this relationship, e.g., the effect of time constraints, the efficiency component and/or the bargaining power behind women's employment status. There are two main reasons that justify this strategy. On the one hand, there is a lack of agreement on how to model household time allocation decisions, as we have seen in the previous section. On the other hand, the limitation of our dataset makes us renounce more complex specifications.

4.1 Baseline models

Let S_i be the proportion of total hours of housework contributed by the husband i in an average day. We assume that this variable is explained by the following model

$$S_i = \alpha P_i + X_i'\beta + \varepsilon_i, \qquad [1]$$

where P_i is a binary variable indicating whether the wife has a paid job or not; the vector X_i contains individual and family characteristics

[6] Recent papers dealing with collective household models and labour participation, such as Blundell et al. (2001), assume that the husband's labor supply is inelastic, i.e., men work full-time. We follow this assumption in our paper.

(see Table 2) including a constant term; and ε_i is a random error that represents the unobservable determinants of S_i.

Note that a positive effect of female employment on the husband's share of housework may be due to either an increase in his housework time or a decrease in his wife's. Therefore, to understand the time reallocation process behind this change, we need to estimate a second equation for the number of hours performed by the husband in an average day (H_i). As we have seen in Figure 2, this variable shows typical features of count data processes, i.e. it takes non-negative integer values, including zero. Following most empirical studies based on count data (see Cameron and Trivedi, 1998), we assume a linear exponential specification for the conditional mean of housework hours[7], i.e.

$$H_i = \exp(\delta P_i + X_i^{'}\gamma) + \nu_i, \qquad [2]$$

where ν_i is a random term such that $E(\nu_i) = 0$. Consistent estimates of parameters in this model can be obtained by Poisson pseudo-maximum likelihood (PML).

Table 3 presents the estimation results for models [1] and [2]. The OLS estimated effect of the wife's employment status on the husband's housework share is positive and significant. The husband's share of housework is about 18 percentage points higher when the wife is employed than when she is a full-time housewife. Complementing this result with the estimates of the equation for the number of hours (column (4)), we may conclude that the increase in the husband's share is due, to some extent, to an increase in the amount of time devoted to domestic tasks by the husband. In particular, once we control for other covariates, the husband's number of hours devoted to domestic work is about twice as high in dual-earner couples as in breadwinner-housewife couples[8].

[7] An alternative specification to model housework time would be a Tobit model. However, this specification seems more accurate when the dependent variable is continuous and takes a high amount of values. For instance, if housework times were collected in minutes or for a longer referral period (e.g., one week), it would be a suitable option.

[8] The linear exponential specification of the housework hours model leads us to interpret coefficients as the proportional change in the conditional mean when the corresponding explanatory variable changes by one unit. If the $k-th$ explanatory variable is an indicator variable, then the conditional mean is $\exp(\gamma_k)$ times larger if the indicator variable is unity rather than zero.

TABLE 3
Effect of wife's labor market participation on husband's housework time

	Husbands' housework					
	Share			Number hours per day		
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	2SLS*	2SLS*	PML Poisson	NLIV	PML Poisson* (two stages)
Const.	0.434	0.503	0.745	2.370	3.459	4.5858
	(0.152)	(0.198)	(0.197)	(0.961)	(1.044)	(1.889)
Age	-0.011	-0.028	-0.033	-0.113	-0.234	-0.264
	(0.008)	(0.013)	(0.014)	(0.057)	(0.086)	(0.123)
Age^2	0.010	0.033	0.043	0.117	0.271	0.332
	(0.010)	(0.017)	(0.019)	(0.071)	(0.110)	(0.162)
Children	-0.008	0.036	0.055	0.308	0.516	0.652
	(0.025)	(0.041)	(0.040)	(0.132)	(0.173)	(0.323)
Husband's educational level						
primary	-0.030	0.002	-0.006	-0.031	0.013	0.194
	(0.029)	(0.035)	(0.028)	(0.181)	(0.208)	(0.253)
universitary	-0.047	-0.016	-0.047	-0.096	-0.028	0.111
	(0.027)	(0.034)	(0.030)	(0.172)	(0.174)	(0.280)
Wife's educational level						
primary	-0.021	0.043	0.055	-0.132	0.099	0.366
	(0.027)	(0.052)	(0.052)	(0.182)	(0.249)	(0.384)
universitary	0.053	-0.015	-0.050	-0.025	-0.152	-0.660
	(0.029)	(0.049)	(0.053)	(0.161)	(0.191)	(0.448)
Husband's hourly wage	-0.004	-0.005	-0.006	-0.043	-0.029	-0.053
	(0.009)	(0.004)	(0.005)	(0.022)	(0.027)	(0.047)
Split-shift (husband)	-0.056	-0.071	-0.059	-0.338	-0.417	-0.358
	(0.019)	(0.025)	(0.021)	(0.130)	(0.147)	(0.124)
Wife's labor market participation latent variable P_i^*			0.039			0.697
			(0.018)			(0.321)
observed binary variable P_i	0.180	0.503		0.654	1.854	
	(0.025)	(0.167)		(0.184)	(1.07)	

Reference couple: no children, both spouses having secondary education and the husband with no split shift at work. (*) Robust standard errors corrected for estimation in stages.

Regarding the effect of the other explanatory variables, the age coefficients reveal that both the husband's share and his housework time fall significantly with age, but at a decreasing rate. Although the bulk of research indicates a positive association between spouses' educational level and time spent on housework by the husband (e.g., Bianchi et

al., 2000; South and Spitze, 1994; Hersch and Stratton, 1994), in our sample, neither the husband's hours of domestic work nor his share are significantly related to changes in his educational level or his wife's. The indicator for wife's employment is possibly capturing part of the effect of women's education on housework allocation.

Moving on to the effect of children, we find that the number of hours devoted to housework by the husband is 1.36 times higher in a couple with children than without them (see footnote 8). Interestingly, the presence of children is not significant in the share equation. Together, these estimates indicate that the wife's housework time in couples with children increases at the same rate as her husband's. Bearing in mind that female housework times are, on average, much higher than male times, these results suggest that the presence of children helps to widen the gap between male and female time devoted to domestic work (similar results are found in Bittman et al., 2001 and Hersh and Stratton, 1994).

Our estimates show a negative and significant effect of the husband's wage rate on the number of hours spent on housework. This result is consistent with predictions from both the bargaining and the efficiency perspectives. Finally, husbands with a split shift at work and, therefore, more restraints when designating their leisure time, perform significantly fewer hours of housework than other men and also devote a lower proportion of time to these tasks.

4.2 Endogeneity of wife's employment

The results in the previous section suggest, but do not prove, that there is a relationship between female employment and male housework contribution. The problem is that the single-equation models assume that the wife's employment decision is exogenous. But if a woman's propensity to work is correlated with her husband's contribution to domestic work, single-equation estimates will be biased. As we noted in Section 2, there are reasons to be concerned with this possibility. On the one hand, the wife's employment and the husband's housework time may be jointly endogenous (e.g. Kooreman and Kapteyn, 1987). Couples with both partners in paid labor may be more likely to purchase market substitutes for their housework time. Therefore, husbands' housework time will be lower for those couples. In this case, assuming exogeneity, the estimated effect of the wife's employment on the husband's housework will be biased downward.

On the other hand, the wife's employment decision is in part the result of a constrained optimizing decision made within the household. As such, the decision of employment depends on market conditions, preferences and resources constraints within the household. To the extent that there are unmeasured (or unobservable) factors that influence both the wife's employment decision and the husband's housework time, our estimates will be biased. Possible confounding variables include tastes for leisure, attitudes toward gender roles, social norms, male/female identity consideration, etc. (see, for instance, van der Lippe and Siegers, 1994; Akerlof and Kranton, 2000; Kevane and Wydick, 2001; De Laat and Sevilla, 2005). These characteristics may be correlated between the spouses. For example, if we assume that couples reach an agreement before marriage regarding the division of paid and unpaid work, for couples with egalitarian (conservative) views toward gender roles one would expect the woman to be more (less) likely to participate in the labor market and the husband to be more (less) willing to afford more domestic work to compensate. In this case, not controlling for the existence of those unobserved variables may overstate the effect of female labor force participation on the husband's housework contribution. But the empirical evidence for most developed countries shows that current social values and attitudes toward female labor participation in the labor market are more positive than those related to an egalitarian division of housework between the spouses. In these societies, social norms stating that *untidy houses reflect a slovenly wife* or those classifying certain domestic tasks as *feminine* may limit a husband's adaptation to the new demands imposed by a wife's transition to paid employment. In such a scenario, not controlling for the existence of social constraints that favor female labor force participation but limit husbands' participation in domestic work may understate the increase in the husband's housework time due to the wife's entry into paid labor.

To more clearly understand the source of wives' employment endogeneity, it is helpful to posit a simple structural model of the wife's employment decision and the husband's domestic work. In addition

to equation [1], suppose that observed wives' employment is described by the following model[9]

$$P_i^* = Z_i^{'}\theta + \zeta_i, \qquad [3]$$

where P_i^* denotes the wife's propensity to work; Z_i is a vector of explanatory variables including a woman's personal characteristics (age, education), household composition, and non-labor income (typically, the husband's income). Finally, ζ_i is a random term denoting unobservable determinants of participation. An employment decision occurs according to the binary indicator $P_i = 1(P_i^* > 0)$.

Ordinary least squares estimation of equation [1] and PML Poisson estimates of equation [2] are consistent provided the error terms are uncorrelated, i.e., provided that $cov(\varepsilon_i, \zeta_i) = 0$ and $cov(\varepsilon_i, \nu_i) = 0$. But, at we explained before, there are several reasons why these necessary conditions might fail in practice. If this is the case, consistent estimates of parameters in the share equation [1] can be obtained by two-stage least squares (2SLS), by replacing P_i with its estimated conditional mean $F(Z_i'\hat{\theta})$, where $F(.)$ is the logistic cumulative distribution function. As for the equation of housework hours, the exercise is complicated by the fact that maximum likelihood estimation of equation [2] in two stages does not give consistent estimates of parameters (Windmeijer and Santos Silva, 1997). A consistent estimator for (δ, γ) in this model may be obtained with non-linear instrumental variables, and a natural choice of instrument for P_i is $F(Z_i'\hat{\theta})$. In order to implement these estimation methods, we need at least one variable in Z_i not to be contained in X_i. In this application, we use the regional female unemployment rates as an instrument. This variable has proved not to be significantly correlated with either the husband's share of housework or the number of housework hours, with p-values 0.130 and 0.240, respectively. Table A1 in the appendix shows the logit estimates of the wife's employment equation [3].

[9] Note that we may assume a fully simultaneous specification, i.e., $P_i^* = \varphi S_i + Z_i^{'}\theta + \zeta_i$. However, the estimation of parameters in this simultaneous equation system requires imposing coherency conditions to obtain a unique solution for the endogenous variables in terms of the exogenous variables of the system (Windmeijer and Santos Silva, 1997). The model is coherent if $\alpha = 0$ in the share equation [1] ($\delta = 0$ in the equation for the number of hours [2]) or $\varphi = 0$ in the wife's employment equation. That is, we need to remove the direct feedback between the wife's employment and the husband's housework. In equation [3] we are implicitly assuming that $\varphi = 0$.

The 2SLS estimates for the share of housework and the NLIV estimates for the number of hours model are reported in columns (2) and (5) of Table 3, respectively. The standard errors for the two-stage estimation are corrected for estimation in stages. As it is evident from these estimates, the impact of adjusting for endogeneity is quite important. The effect of the wife's employment is now considerably larger in magnitude and significant. In particular, 2SLS estimates indicate that wife's employment increases the husband's share of housework by 50 percentage points[10]. This coefficient almost triplicates OLS estimation. As for the number of housework hours, the NLIV estimate is also about three times as high as that found when the wife's decision is considered exogenous. The rest of the coefficients are quite similar to those in columns (1) and (4). Only the coefficient for the husband's wage rate becomes statistically insignificant when we control for the wife's employment endogeneity[11].

Why does controlling for endogeneity increase the wife's employment effect? This finding is consistent with the hypothesis of simultaneity of time allocation decisions presented above. A second explanation would be related to the existence of unobservable variables that have a positive effect on the wife's decision to enter the labor market and a simultaneous negative effect on the husband's willingness to increase housework time. For example, social norms, individual attitudes or tastes which are favorable to women working in the labor market but still consider housework as "women's work" may have a positive effect on the wife's employment decision but a negative effect on husband's

[10] It is important to remark that the only effect that IV in this context is the average effect to housework for a husband who changed his contribution to housework only because of higher or lower female employment rates, but would not have changed otherwise (Angrist *et al.,* 1996). An implication of this interpretation is that different instruments should provide different estimates.

[11] Following a referee's suggestion, we analyzed the possibility that the husband's wage was endogenously determined in this model (see Hersh, 1991 for motivation). For that reason, we performed a Hausman test by comparing the coefficient and standard errors of the wage variable in column (6) with those obtained from including predicted wages in that specification. The null hypothesis of exogeneity was not rejected in our sample, with a p-value of 0.47. The F-statistic of the auxiliary regression used to predict husbands' hourly wages was equal to 14.7. In this regression the dependent variable was the hourly wage in logarithms and the covariates were age, age square, occupation category, type of contract (permanent, temporary, no contract), education level (university, secondary and primary) and tenure. Results are available upon request.

housework contribution[12]. Therefore, when we control for the presence of such unobserved variables, the impact of the wife's employment on the husband's behavior will increase.

4.3 The wife's market opportunities as a latent variable

According to bargaining theories, the increasing market opportunities for a woman (regardless of her current employment status) strengthens her fall-back position towards negotiation in a bargaining game with her husband (McElroy and Horney, 1981; Lundberg and Pollak, 1993). A proxy for the wife's labor market opportunities may be her propensity to participate in the labor market which is represented by the latent variable P_i^*. This idea suggests a second specification for the housework share equation in terms of the latent variable, i.e.

$$S_i = \alpha P_i^* + X_i^{'}\beta + \varepsilon_i. \qquad [4]$$

The parameters in this model can be consistently estimated by two-stage methods. In the first stage, we obtain the maximum likelihood estimate of θ in the equation for female labor market participation [3] by assuming the error term ζ_i has a logistic distribution. The variables we use as instruments at this stage of estimation are the same as before. In the second stage, we replace P_i^* in equation [4] with its predicted value $Z_i^{'}\hat{\theta}$, and estimate α and β by least squares.

As regards the equation for the number of hours, it can be written as

$$H_i = \exp(\alpha P_i^* + X_i^{'}\beta) + \nu_i. \qquad [5]$$

Following Windmeijer and Santos Silva (1997), estimation of this model is carried out in two stages. In the first stage, we obtain logit estimates of parameters in equation [3]. In the second stage, we replace P_i^* with its estimated value, $Z_i^{'}\hat{\delta}$, in the housework hours model and estimate δ and γ by Poisson pseudo maximum likelihood. Corrected standard errors are also computed in this case.

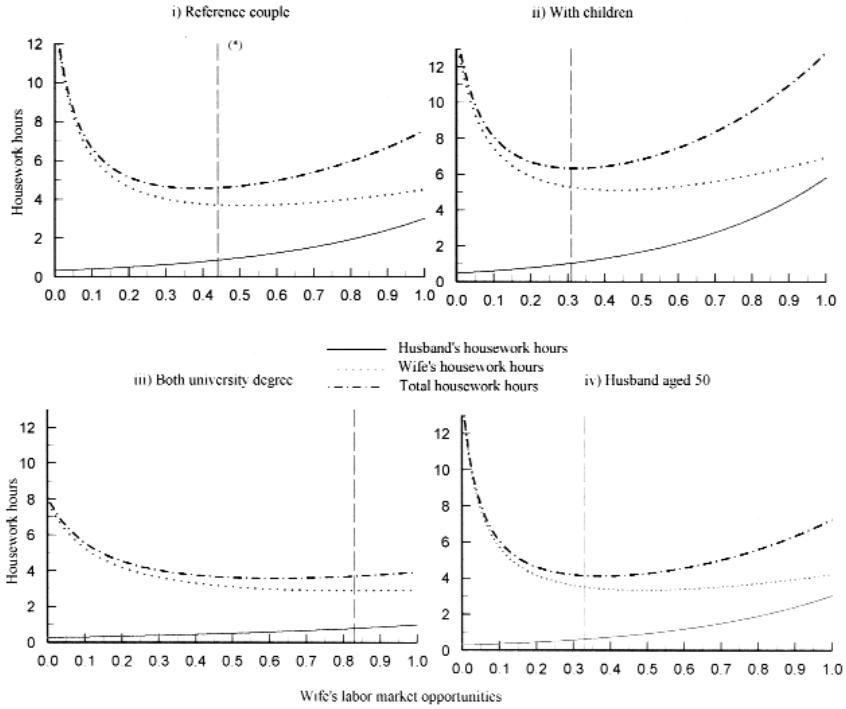
The estimation results for the share equation and the number of hours equation are presented in columns (3) and (6) of Table 3, respectively. The coefficient of P_i^* in the share equation is positive and statistically significant. Although it is difficult to interpret the meaning of marginal changes in P_i^*, these estimates suggest the existence of an anticipation

[12] Some opinion polls have illustrated this trend in attitudes (Badgett et al., 2000).

in the husband's behavior in view of the possibility that his wife accepts a job offer because of an increase in her labor market opportunities. The results for other covariates are quite similar to those in columns (2) and (5), where we control for endogeneity.

So far, we have focused mainly on the statistical significance of the coefficient estimates. Now we ask whether they imply economically interesting magnitudes. To answer this question, we tried to quantify how "identical" husbands married to wives with different propensities to work behave. In Figure 3, we represent the predicted number of housework hours performed by the husband and the wife[13], as well as the couple's total hours of housework for different values of the wife's propensity to participate in the labor market. To ease the interpreta-

FIGURE 3
Couples housework hours and wife's labor market opportunities



Reference couple: without children, both spouses with primary education, husband without split-shift; age and wage fixed at the means.
(*) Propensity to work in the labor market for a wife with the characteristics of the subsample represented in each graph; unemployment rate fixed at the sample mean.

[13]The wife's number of housework hours were computed from the expression $\hat{H}_{wife} = \hat{H}_{\text{husband}}(1/\hat{S}_{\text{husband}} - 1)$, where $\hat{H}_{\text{husband}}$ and $\hat{S}_{\text{husband}}$ are, respectively, the husband's number of hours and the husband's share of total housework predicted from the estimates shown in columns (3) and (6) of Table 3.

tion of the latent variable, it has been rescaled to take values between 0 and 1. The predicted housework times are computed for a reference couple and for three other couples in which some of these reference characteristics are modified. Specifically, we consider a reference couple i) without children, the husband having a primary education, no split shift at work and age and wage fixed at their sample mean values. These baseline characteristics are altered by ii) the couple's having children, iii) both spouses having university degree and, iv) the husband being 50 years old. The vertical lines in the figures are placed at the value of the wife's opportunities in the labor market in each of those couples.

In all the simulated scenarios, women are those who mostly adapt housework times to changes in their opportunities in the labor market. The increase in the husbands' housework time does not compensate for the reduction in the female contribution, which would explain the drop in the total number of hours of domestic work carried out by the couple. Nonetheless, there are differences in the magnitude of the reallocation process when we compare the four reference couples. In couples with children, the husband's reaction to the wife's increasing labor market opportunities becomes more important. In fact, the change in the husband's hours between the two extremes almost compensates the reduction in the wife's housework. This is consistent with Agarwal's (1997) view that even women who may be willing to sacrifice their own interest for that of family members out of altruism may strike a hard bargain with their husbands on behalf of their children's well-being. The economic relevance of the observed husband's adaptation process in other types of couples is not so remarkable. For example, in couples where the husband is 50 years old, the drop in female housework is by far the main cause for the total reduction in the time spent on these tasks by the couple. A similar but slighter reallocation process occurs when both partners have a university education. This suggests that, in these types of couples, the increasing wife's opportunities in the labor market are used to adapt the wife's contribution to housework but it seldom alters the husband's behavior.

Finally, an interesting feature to note from the predictions presented in Figure 3 is the nonlinearity in the adjustment process. While the woman's adaptation in reducing her hours of housework to labor market opportunities is immediate, the husband only modifies his housework time when the woman's opportunities in the labor market are

really high. This finding is in line with Gershuny's et al. (1997) argument that women have already had to confront the implications of transition for gender identity and break with established patterns before deciding to seek work outside the home. However, men only confront the demand for change when the wife's opportunities in the labor market are very high.

5. Concluding remarks

In this paper, we have tried to add evidence to the relationship between the women's employment status and housework allocation within Spanish couples. Overall, our results show a strongly statistically significant effect of wives' entry into the labor market on their husbands' contribution to household work. Our analysis, however, does not provide information on the mechanisms behind this effect. That is, our data do not allow us to determine whether the observed increase in husbands' contribution to housework in dual-earner couples is due to the higher women's bargaining power in those households or to an increase in women's relative efficiency.

In spite of this, we supply evidence on certain features that empirical literature has not addressed before. In particular, we find that assuming the wife's employment decision to be exogenous biases its effect downwards. Because of data limitations, we cannot determine to what extent this bias is due to the omission of certain unmeasured factors in our specification (e.g., social norms or individual attitudes) or simply to the simultaneity of time allocation decisions within the household. In addition, the results provide some support for the hypothesis that the housework contribution is determined not only by employment status but by women's intentions to participate in the labor market. It is remarkable that this empowerment of women leads to housework changes of different magnitudes depending on the type of couple. In particular, men in households with children are the ones who mostly increase housework contribution in response to wives' employment. But, in all couples, the housework reallocation process follows two main patterns. First, as wives' labor market opportunities increase, both wives' and husbands' daily hours of domestic work tend to converge. Second, though we observe a significant increase in husbands' housework time, the convergence may be characterized as one of women *doing it for themselves* by reducing the time spent on house-

work towards more male standards of domestic work. This is consistent with other findings in literature (Bittman and Matheson, 1996).

Unfortunately, we are precluded from studying the true dynamics behind the housework reallocation process due to the lack of longitudinal time use surveys in Spain. This would be a very interesting aspect for shedding light on the timing or couples' movement towards an egalitarian distribution of housework and for analyzing whether the change of social norms makes the adaptation process faster for new generations. Also, the nature of the sample calls for some caution in generalizing findings. Given the sample design of the sample, the couples in our data set are not representative at a national level. Furthermore, since the data are one decade old, it is natural to think that the dynamics of housework allocation might have changed over these years. The recently published *Encuesta de usos del tiempo* carried out by the Spanish *Instituto Nacional de Estadística* in 2004 offers the opportunity to test this hypothesis.

This paper has focused exclusively on the amount of domestic work provided by husbands, but there is some evidence that the increase in the husbands housework when his wife enters the labor market is concentrated in *masculine* tasks -yard and home maintenance activities- while women continue to perform the core housework -cleaning, laundry, etc.- (Akerlof and Kranton, 2000; Bianchi et al, 2000). Analyzing whether this gender segregation of domestic tasks still holds true is another interesting issue for future research.

Appendix

TABLE A1

Logit estimates of female labor participation equation

	Female participation	
	Coeff.	Std. Error
Const.	-2.323	1.918
Age	0.267	0.102
Age²×10?²	-0.386	0.123
Children at home	-0.549	0.308
Wife's educational level		
primary	-0.856	0.305
universitary	1.003	0.371
Husband's educational level		
primary	-0.388	0.322
universitary	-0.404	0.340
Husband's monthly wage	0.001	0.015
Region unemployment rate	-0.045	0.0176
Log-likelihood	-236.780	
McFadden R^2	0.225	
% of correct predictions	0.709	

Reference wife: without children, both she and her husband having secondary education.

References

Agarwal, B. (1997): "Bargaining and gender relations: within and beyond the household", *Feminist Economics* 3, pp. 1-51.

Akerlof, G.A. and R.E. Kranton (2000): "Economics and identity", *The Quarterly Journal of Economics* 140, pp. 715-753.

Alvarez, B. and D. Miles (2003): "Gender effect on housework allocation: Evidence from Spanish two-earner couples", *Journal of Population Economics* 16, pp. 227-242.

Angrist, J.D., G. Imbens and D. Rubin (1996): "Identification of causal effects using instrumental variables", *Journal of the American Statistical Association* 91, pp. 444-455.

Anxo, D. and P. Carlin (2004): "Intra-family time allocation to housework: French evidence", *Electronic International Journal of Time Use Research* 1, http://www.eijtur.org/.

Badgett, M., Davidson, P.,Folbre N., J. Lim (2000): "Breadwinner dad, homemaker mom: An interdisciplinary analysis of changing gender norms in the United States, 1977-1998", Departments of Economics and Sociology, University of Massachusetts.

Basu, K. (2004): "Gender and say: A model of household behavior with endogenously determined balance of power", Harvard University, DP 2054.

Becker, G.S. (1991), *A Treatise on the Family,* Cambridge, Mass: Harvard University Press.

Bianchi, S.M., M.A. Milkie, L.C. Sayer and J.P. Robinson (2000): "Is anyone doing the housework? Trends in the gender division of household labor", *Social Forces* 79, pp. 191-228.

Bittman M. and G. Matheson (1996): "All else confusion: What time use surveys show about changes in gender equity", Social Policy Research Centre Discussion Paper 72.

Bittman, M., P. England, N. Folbre and G. Matheson (2001): "When gender trumps money: Bargaining and time in household work", JCPR Working Paper 221, Northwestern University.

Blau, F.D., M.A. Ferber and A.E. Winkler (1998), *The Economics of Women, Men and Work,* Prentice Hall.

Blundell, R., P.A. Chiappori, T. Magnac and C. Meghir (2001): "Collective labour supply: Heterogeneity and non-participation", WP-01/19, The Institute for Fiscal Studies.

Brines, J. (1994): "Economic dependency, gender and the division of labor at home", *The American Journal of Sociology* 100, pp. 652-688.

Cameron, A.C. and P.K. Trivedi (1998), *Regression Analysis of Count Data,* Cambridge Econometric Society Monographs, 30. Cambridge, New York and Melbourne: Cambridge University Press.

Chiappori, P.A. (1988): "Rational household labor supply", *Econometrica* 56, pp. 63-89.

Chiappori, P.A. (1992): "Collective labor supply and welfare", *Journal of Political Economy* 100, pp. 437-467.

Coverman, S. (1985): "Explaining husbands' participation in domestic labor", *The Sociological Quarterly* 26, pp. 81-97.

De Laat, J. and A. Sevilla (2005): "Working women, husband's home time and lowest-low fertility in Europe", Brown University, manuscript.

Eurostat (2002): "Women and men reconciling work and family life,", Statistics in Focus, Population and Social Conditions, Theme 3-9/2002.

European Commission (1998), *Equal opportunities for women and men in Europe?* Eurobarometer 44.3-Results of an opinion survey, Luxembourg.

Folbre, N. and J.A. Nelson (2000): "For love or money-or both?", *Journal of Economic Perspectives* 14, pp. 123-140.

Gershuny J. and J. Robinson (1988): "Historical changes in household division of labor", *Demography* 25, pp. 537-552.

Gershuny J., M. Bittman and J. Brice (1997): "Exit, voice and suffering: Do couples adapt to changing employment patterns?", Working Papers of the ESRC Research Centre on Micro-Social Change, Paper 97-8, University of Essex.

Hersch, J. (1991): "The impact of nonmarket work on market wages", *American Economic Review, Papers and Proceeding* 81, pp. 157-160.

Hersch, J. and L. Stratton (1994): "Housework, wages, and the division of housework time for employed spouses", *American Economic Review, Papers and Proceedings* 84, pp. 120-125.

Hewitson, G. (2002): "Domestic labor, neoclassical economics and gender identity: an overview", Department of Economics, La Trobe University DP, A.02.01.

Juster, F.T. and F.P. Stafford (1991): "The allocation of time: Empirical findings, behavioral models, and problems of measurement", *Journal of Economic Literature* 29, pp. 471-522.

Kevane M. and B. Wydick (2001): "Social norms and the time allocation of women's labor in Burkina Faso", *Review of Development Economics* 5, pp. 119-129.

Kooreman, P. and A. Kapteyn (1987): "A disaggregated analysis of the allocation of time within the household", *Journal of Political Economy* 95, pp. 223-249.

Lundberg, S. and R.A. Pollak (1993): "Separate spheres bargaining and the marriage market", *Journal of Political Economy* 101, pp. 988-1010.

Lundberg, S. and R.A. Pollak (2003): "Efficiency in marriage", *Review of Economics of the Household* 22, pp. 153-168.

Manser, M. and M. Brown (1980): "Marriage and household decision-making: A bargaining analysis", *International Economic Review* 21, pp. 31-44.

McElroy M.B. and M.J. Horney (1981): "Nash bargained household decisions: Toward a generalization of the theory of demand", *International Economic Review* 22(2), pp. 333-349.

Nickols, S.Y. and E.J. Metzen (1982): "Impact of wife's employment upon husband's housework", *Journal of Family Issue* 3, pp. 199-216.

Presser, H. B. (1994): "Employment schedules, gender and household labor", *American Sociological Review* 59, pp. 348-364.

Sen, A.K. (1990): "Gender and cooperative conflicts", in *Persistent Inequatilities: Women and Work Development,* ed. I. Tinker. New York: Oxford University Press.

Shelton, B.A. (1990): "The distribution of housework tasks: Does wife's employment status make a difference?", *Journal of Family Issues* 11, pp. 115-135.

South and Spitze (1994): "Housework in marital and nonmarital households", *American Journal of Sociology* 93, pp. 659-687.

UNDP (1995), *Human Development Report,* Oxford University Press, New York.

US Departament of Labor (2004): "Trends and challenges for work in the 21st century", *web site:* http://www.dol.gov.

Van der Lippe, T. and J.J. Siegers (1994): "Division of household and paid labour between partners: Effects of rbelative wage rates and social norms", *Kyklos* 47, pp. 109-136.

Windmeijer, F.A.G. and J.M.C. Santos Silva (1997): "Endogeneity in count data models: An application to demand for health care", *Journal of Applied Econometrics* 12, pp. 281-294.

Resumen

En este artículo analizamos el efecto de la participación de la mujer en el mercado laboral sobre el tiempo de trabajo doméstico del marido. Para ello, utilizamos datos de sección cruzada correspondientes a parejas españolas. Los resultados sugieren que la decisión de participación femenina incrementa el tiempo de trabajo doméstico del marido. Sin embargo, las estimaciones pueden estar sesgadas debido a la simultaneidad de ambas decisiones y a la correlación de los factores inobservables. El efecto estimado aumenta una vez que controlamos por la presencia de endogeneidad.

Palabras clave: Trabajo doméstico, participación laboral femenina, datos de recuento, endogeneidad.

Recepción del original, marzo de 2004
Versión final, julio de 2005