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**Social Effects, Household Time Allocation, and the
Decline in Union Formation**

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Abstract

Economic theories of the household and the marriage market provide potential explanations for differences in household formation rates over time based in part on the evolution of female wages. However, cross-country differences in female market human capital are unlikely to account for the current differences in union formation rates across developed countries.

I develop a partial equilibrium model that formally incorporates social effects on a woman's decision to enter a household. Social effects are modeled as gender roles that constrain potential partners away from the efficient allocation of household labor and diminish the gains to forming a union. Thus, women living in less-egalitarian countries have, *ceteris paribus*, a lower union formation probability.

I test the model using a cross-country data set at the individual level (1994 and 2002 ISSP), which contains information on attitudes toward gender roles and the allocation of time to household production. The time and cross-country variation in the data, as well as individual reported attitudes toward gender roles, allow for the identification of the effect of gender roles. The empirical findings are consistent with the proposed model of social constraints upon the allocation of household time.

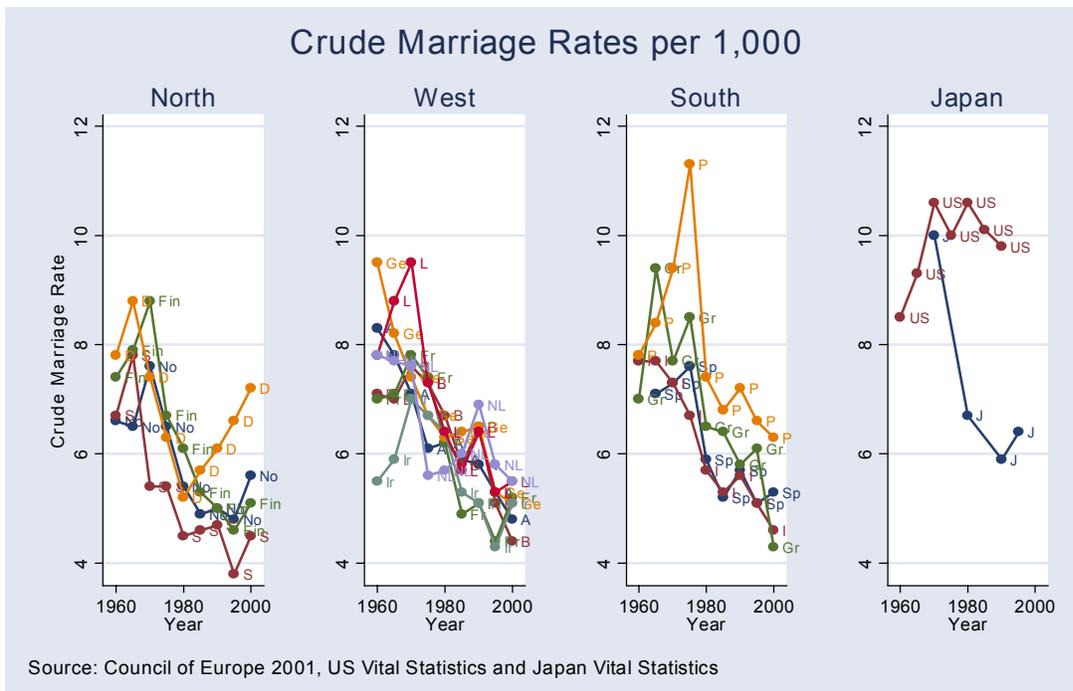
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1 Introduction¹

During the past decade, low fertility in most developed countries has drawn the attention of researchers in a variety of social science disciplines. Special focus has been given to the so called lowest-low fertility countries, i.e., those countries, with fertility persisting well below replacement levels (Kohler, 2002). Among these countries, Spain, Italy and Japan are the leading examples with average total fertility rates of 1.2. Below replacement fertility presents new economic challenges for a society, as it changes the age structure of the population and may require structural adaptations with important implications for welfare (Weil, 1999). These factors have become of special concern for lowest-low fertility countries, in which the sharp decline in fertility together with a slow increase in female labor force participation have raised questions about the viability of pay-as-you-go pension systems (Morgan, 2003).

Figure 1: Cross-Country Comparison of Crude Marriage Rates per 1,000



¹ I would like to thank the participants at the European Econometric Society Meeting in Madrid 2004 and at the Annual Meeting of the Population Association of America in Philadelphia 2005.

Most of the research on lowest-low fertility has focused on the number of children in married households.² Figure 1 shows that in the past decades marriage rates have substantially declined in all developed countries. While the decline in marriage has been followed by an increase in cohabitation and out-of-wedlock fertility in most developed countries, this situation has not occurred for lowest-low fertility countries.³ Table 1 shows that union formation rates (either marriage or cohabitation) for women between 30 and 34 years old in Canada, Sweden and Norway (around 90 percent) are higher than in Italy or Spain (86 and 78 percent respectively). These cross-country differences widen for younger cohorts (those aged 25-29), who are entering a union at much smaller rates in Italy and Spain (40.7 and 53.3 percent respectively) versus 75 percent in Canada and Sweden. Moreover, the declines in marriage rates have been compensated by increases in cohabitation in Canada, Sweden and Norway, where cohabitation rates account for 40 percent of all unions. This circumstance has not happened in Spain and Italy, where only 9 percent of all unions are in the form of cohabitation. Finally, out-of-wedlock fertility is only about 5 percent for Italy and Spain, whereas it amounts to 9.7 and 13.2 for Sweden and Norway. In sum, substantial declines in marriage in lowest-low fertility countries, together with the fact that these countries have not experienced the increase in out-of-wedlock fertility and cohabitation characteristic of other developed countries, call into question previous fertility studies based solely on marital fertility and draw new attention to household formation decisions as a contributor to fertility phenomena.

²This approach has been justified by the lack of out-of-wedlock fertility, the high percentage of marriages and the empirical observation that the drop in fertility was mainly due to declines in third and higher order births within marriage (Bettio and Villa, 1998).

³See Retherford (2001) for a detailed description of the Japanese case and Frabioni and Rosina (2004) for the Italian case.

Table 1: Cross-Country Comparisons of Union Formation and Out-of_wedlock Fertility

Country	Cohort	Union Formation Indicators*		
		Out-of-Wedlock Fertility****	Percentage in a Partnership	Percent of First Marriages***
Canada	25-29	--	74.2	31.9
	30-34	1.5	90	53.5
	40-44	2.9	91.1	65
Sweden	25-29	--	75.9	7.4
	30-34	9.7	90	7.1
	40-44	13.7	90.4	9.4
Norway**	25-29	--	63.4	23.1
	30-34	13.2	88.4	39.5
	40-44	9.8	88.3	60.7
Spain	25-29	--	53.3	43.3
	30-34	5	86.2	75.2
	40-44	2.5	88.1	87.4
Italy	25-29	--	40.7	35.5
	30-34	5.1	78.3	70.1
	40-44	4.8	89.6	82.2

Source: UN Family and Fertility Surveys (1994-95)

(*) Union Formation Indicators are at age 30 for the rest (except 25 for cohort 25-29)

(**) For Norway, reference ages are 23 and 28

(***) Percentage of first unions that are marriages with no cohabitation

(****) Out-of-wedlock fertility: Percent not living in a partnership at first live birth

Economic models of the household and the marriage market offer potential explanations for the differences in household formation rates over time based on the evolution of relative female market human capital (Becker, 1973) and (Becker, 1974). However, as shown in section 5, differences in female education are unlikely to account for the observed differences in union formation rates across countries. Moreover, comparative advantage or bargaining theories of the household have also failed to explain the current patterns of household time allocation observed in the data. In particular, the increase in female human capital that led to an increase in female labor force participation has not, contrary to the predictions of both theories, led to a more egalitarian division of housework within the household.

Although women continue to provide most of household production, cross-country differences

in the division of household work are significant. For example, based on EUROSTAT's reports on HETUS (the Harmonized European Time Use Surveys project), the average daily time spent in domestic work by Swedish women is about 3 hours 42 minutes. Swedish men spend an average of 2 hours 29 minutes. However, in the case of Spain these figures are respectively 4 hours 45 minutes and 2 hours 8 minutes. While the average man's contribution to household production only differs 21 minutes between the two countries, only 70 percent of Spanish men versus 92 percent of Swedish men engage in household activities. This translates into Spanish women doing 1 more hour of domestic work than Swedish per day.

This paper theoretically develops a stylized partial equilibrium model of union formation in which social effects influence individual decisions to enter a union. Social effects are modeled as gender roles that constrain how potential partners divide the household surplus generated through household production. The inability of potential partners to credibly commit to make transfers of time, rather than private consumption, before the union is formed is at the root of the argument.⁴ In this setting, both the non-observability by third parties of spouse's time devoted to household production and the absence of credible threats for certain household production activities (especially those related to caring activities (Folbre and Bittman, 2004)) constrain potential partners to rely on gender roles when making a decision on how to divide the household surplus. The model predicts that gender roles result in inefficient household time allocations, which diminish a woman's gains to entering a union. Accordingly, women in less egalitarian countries have, everything else being equal, a lower probability of entering a union.⁵

⁴Time-use studies show that a substantial amount of non-market work is devoted to household production (Apps, 2003) and (EUROSTAT, 2004). Similarly, Hersch and Stratton (Hersch and Stratton, 2002) show that the allocation of time to household production can account for a substantial part of the wage gender gap.

⁵De Laat and Sevilla-Sanz (De Laat and Sevilla-Sanz, 2004) also show that there exists a negative cross-country relationship between fertility and non-egalitarian attitudes toward gender roles.

Social interactions or social norms are to a large extent enforced through nonmarket interactions and usually difficult to isolate empirically. I provide evidence for the existence of social constraints upon the allocation of household time by showing that, after controlling for employment status and other relevant variables, household time allocation patterns have not substantially changed over time and closely resemble established gender roles. In the empirical analysis, I first provide an identification strategy of social effects that relies on the time and cross-country variation in the data, which allows for the isolation of gender roles from other social interaction effects. A second identification strategy comes from using individual reported attitudes toward gender roles, which allows for the identification of gender roles net of individual preferences. Empirical results using the 1994 and 2002 International Social Survey Program (ISSP), a cross-country data set with individual level information on demographic and economic variables, as well as attitudes toward gender roles and the allocation of time to household production activities, support the predictions of a household formation model with social constraints upon the allocation of household time: Whereas, everything else being equal, more egalitarian women have lower probability of entering a union, women living in more egalitarian countries have, everything else equal, a higher probability of entering a union.

The paper is organized as follows. Section 2 presents a brief literature review of the different areas in economics to which the present paper contributes. Section 3 presents a stylized model that illustrates the role of social effects on individual union formation decisions. Section 4 describes the data used in the empirical analysis and provides evidence of rigidities associated to the allocation of time to household production. Section 5 offers identification strategies of the effect of gender roles on individual union formation probabilities. Section 6 concludes.

2 Literature Review

Economic models of the household and the marriage market can provide an explanation for the differences in household formation rates over time based on the evolution of relative female market human capital. Unitary models of the household (Becker, 1973) predict a decline in marriage rates after an increase in women’s labor supply (due to, for example, an increase in female education), which reduces the gains from specialization and exchange from a union (Bryant, 1995). Bargaining models of the household also predict declines in marriage due to an increase in female education, which raises a woman’s reservation utility and declines net gains to marriage (McElroy and Horney, 1981). Each theory perceives the household in an entirely different way.⁶ Nevertheless, they share a focus on female market opportunity cost that does not seem to offer a good explanation to the observed cross-country differences in household formation rates.

Moreover, contrary to the predictions of comparative advantage or bargaining theories of the household, a higher female human capital has not led to a more egalitarian allocation of time within the household.⁷ The determinants of how spouses allocate time to household production are based on the predictions of either the unitary household production models (Becker, 1991) or bargaining models (McElroy and Horney, 1981). In the unitary framework, family members cooperate to produce utility for all, either through the purchase of market goods and services with earnings from market work or through household production. Specializa-

⁶On the one hand, unitary models rely on altruism in the family and do not consider conflicts of interest between partners, which leads to the maximization of a single family utility function. On the other hand, bargaining models focus on self-interested actors that are not entirely altruistic and, when conflict arises, resources affect whose interests prevail.

⁷Time spent producing goods and services within the household has been recognized as important since Becker (Becker, 1965). However, the time devoted to household production continues to be overlooked in most household economic models (Juster and Stafford, 1991).

tion is thus 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.

Bargaining theories reach the same conclusion, that relative wages will affect relative contribution to housework, but the logic behind it is based on the concept of bargaining power and threat points.⁸ Empirical findings contradict the prediction of both theories. For example, when a wife works more hours outside the home, she still undertakes a larger share of housework (Akerlof and Kranton, 2000). Similarly, men's unpaid work increases with his wife's wage but only up to the point where the wife contributes as much as the husband to the household income (Bittman et al., 2001). Furthermore, this unequal division of housework persists after observable characteristics are taken into account (Alvarez and Miles, 2003). The literature has taken this residual as evidence for the presence of a *gender effect* underlying household decisions on the allocation of time.

This paper, this gender effect is traced to an imperfect commitment process within the household, long recognized in the household economics literature (Becker, 1991) and (Lundberg and Pollak, 1993). Recent discussions in the literature point at the inefficient allocation of household resources that may emerge upon a couple's inability to reach binding, legally-enforceable agreements about future behavior (Basu, 2001), (Rasul, 2002). Imperfect commitment is usually characterized as the inability of one spouse to make transfers of private consumption to compensate the other partner for utility losses such as in Lundberg (Lundberg and Pollak, 2001) and Mazzocco (Mazzocco, 2003), and inefficiencies arise in a dynamic

⁸Chiappori (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. However, incorporating household production into the collective framework requires further restrictions on preferences and technology in order to identify the sharing rule and raises questions on the dichotomization of time into leisure and market work in household economic models (Apps and Rees, 1996) and (Apps and Rees, 1997).

setting once the union has taken place. The present paper differs from previous research in that it focuses on the inability of potential spouses to credibly commit to make transfers of *time* rather than *money* and on how the inefficiencies that may arise after the union has been formed affect the decision to enter a union in the first place.

Finally, incorporating gender roles into an economic model of household formation contributes to the growing literature of social interactions in economics interested in how attitudes, social norms or culture influence individual economic decisions. In the last decade, economists have investigated such interpersonal effects in a multitude of applications, including crime (Sah, 1991), unemployment (Stutzer and Lalive, 2004), investment decisions (Duflo and Saez, 2000), welfare participation (Bertrand et al., 2000) and numerous decisions made by teenagers on matters such as education, childbearing, gang membership and drug use (Becker and Murphy, 2000). More recently, in the case of union formations, Loughram (Loughram, 2002) analyzes the effect of male wage inequality on female's marriage probabilities and Drewianka (Drewianka, 2003) exploits variations in a two-sided mate matching market to identify the externalities associated with spousal search. This paper presents a potential channel of how social effects (gender roles) might affect individual union formation decisions by imposing a social constraint on the allocation of household time. Furthermore, the use of the ISSP data provides a unique opportunity for a direct measure of these social effects, allowing for the identification of gender roles net of individual attitudes and other social interaction effects.

3 A Model of Union Formation and Gender Roles

This section presents a partial equilibrium model of union formation that focuses on the social effects associated to the allocation of household time. Although omitting the male side of the market might seem unsatisfactory from a theoretical perspective, this partial equilibrium analysis does not invalidate the empirical results, which can be understood as the general

equilibrium outcome of changes in social norms and union formation probabilities.

To begin a baseline model of spousal search is presented. A union is understood as a partnership for the purpose of joint production and joint consumption. I focus on two specific aspects of the gains to entering a union: efficiency gains from specialization in household production and the consumption of market public goods.⁹ Once the surplus from the union is defined, prospective mates need to form some notion as to whether families realize the potential gains and how those gains are divided. Whereas this negotiation is done efficiently under the baseline model, inefficient allocations arise in the presence of gender roles that diminish a woman's gains to entering a union. Thus, the model predicts that women living in countries with less egalitarian gender roles have, with all things equal, a lower probability of entering a union.

3.1 Baseline Model: Efficient Allocation of Household Formation Gains

Utility after the union is formed A household is denoted by the superscript U (union) and is assumed to be formed by two individuals a man m and a woman f . The joint household utility depends on the consumption of two public goods: household maintenance (which is privately produced by the household members) and a composite consumption good (which is purchased in the market). This distinction, which bares the substitutability assumption between time spent at household production and money, is important on theoretical and empirical grounds. Empirically, time-use survey data shows low levels of household services outsourcing, suggesting low substitution between time spent in household production and

⁹Other dimensions to marriage, such as risk pooling or consumption smoothing, are left out of the analysis for exposition purposes.

money spent in market goods.¹⁰ On the theoretical front, Apps and Rees (Apps and Rees, 1997) discuss the theoretical limitations of the perfect substitutability assumption necessary to identify the sharing rule in Chiappori's collective approach (Browning and Chiappori, 1997).

The composite consumption good includes market consumption goods that are jointly consumed by the household C^U (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, I will refer to C^U as the *market public good*. The household joint utility also depends on the production (and consumption) of a particular public good, household chores or *household public good*, Z^U (these are the "commodities" in Becker's language (Becker, 1965) such as a cleaned house or home-made meals). It differs from C^U in that it cannot be purchased in the market. Z^U is produced using both partners' time in household production H_i for $i = m, f$ such that:¹¹

$$Z^U = H_f^U + H_m^U$$

with man's and woman's time being perfect substitutes in the production of household services.¹² Whereas the output Z^U is consumed jointly by both partners, each partner

¹⁰Using Australian time-use data, Bittman shows that during the period 1984-1994 real expenditure in outsourcing for cleaning, for instance, did not increase (Folbre and Bittman, 2004) (p.229-230). Moreover, only 4 percent of the households bought any cleaning services during the two-week period of the survey. Similar evidence exists for the case of Britain and the United States, where despite increases in income inequality the demand for paid domestic services has not increased. Such low levels of outsourcing are also found in the 1994 and 2002 ISSP in this paper.

¹¹Consider Z^U as a lower bound for the amount of household production that needs to be done in the household, which is equal for all households. Although this assumption might seem to strong, the longitudinal dimension of the data allows to account for permanent differences across countries with respect to the level of household production.

¹²Perfect substitutability assumption is made for exposition purposes. The results are robust to general

privately contributes to its production. I assume that each partner derives disutility $f(H_i)$ from the time devoted to household production H_i for $i = m, w$, where $f(\cdot)$ is an increasing and convex cost function. I normalize $0 \leq H_i \leq 1$.

The household's utility is defined as the sum of individual utilities such that:

$$V^U = 2U(C^U) + 2U(Z^U) - f(H_m^U) - f(H_f^U)$$

and the household's maximization problem is:

$$\begin{aligned} & \max_{C_i, H_i} 2U(C^U) + 2U(Z^U) - f(H_m^U) - f(H_f^U) \\ & \text{st.} \\ & Z^U \geq H_m^U + H_f^U \\ & C^U = \sum (1 - H_i^U)w_i \end{aligned}$$

at the optimum $C^{*U} = w_f(1 - H_f^*) + w_m(1 - H_m^*)$ and $Z^{*U} = H_f^* + H_m^*$, where w_i $i = m, w$ are the wages. That is, 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:

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

and for the case where $w_m > w_f$ it is the case that $H_f^U > H_m^U$.¹³

specifications of the production function.

¹³Under the assumption of interior solution, the second order conditions are satisfied such that:

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

for $i = m, f$.

Given the household's utility and the contracted provision of household labor, each partner's utility in a union is given by:

$$\begin{aligned} V_m^U &= U(C^U) + U(Z^U) - f(H_m^U) \\ V_f^U &= U(C^U) + U(Z^U) - f(H_f^U) \end{aligned}$$

and $V^U = V_f^U + V_m^U$.

It is important to note that in this unitary household, there is a unique distribution of individual utilities. This derives from the assumption that the only private goods are essentially the disutility of time devoted to household production. Unlike collective (Browning and Chiappori, 1997) or non-cooperative models of the household (Lundberg and Pollak, 1993), transfers of private consumption between partners cannot compensate for time devoted to household production.¹⁴

Utility if single The utility for a given individual i if single is given by the following maximization problem:

$$\begin{aligned} \max_{C_i, H_i} & U(C_i^S) + U(Z^S) - f(H_i^S) \\ \text{st.} & \\ Z^S & \geq H_i^S \\ C_i^S & = (1 - H_i^S)w_i \end{aligned}$$

where agent's i utility depends on market consumption goods C_i^S , which can be acquired

¹⁴Apps and Rees (Apps and Rees, 1997) point out that most of the goods consumed within the household are public goods (except for leisure) and show that the range of goods where consumption differs significantly across individuals in the household is relatively small. Similarly, Fella et al. (Fella et al., 2004) use the non-divisibility of public consumption goods within marriage to explain the relevance of divorce laws on the probability of divorce. In this setting, the allocation of private allocation of time, rather than private consumption, becomes the variable of interest.

in the market at a normalized price $p = 1$. It also depends on the amount of household production, Z^S . Without loss of generality, let's assume that $Z_S = \alpha Z_U$, for $0 < \alpha < 1$. This assumption implies that the amount of household work that needs to be done in the single household is less than that in the married household.

The solution to this problem is straight forward and given by:

$$\begin{aligned} H_i^S &= Z^S \\ C_i^S &= (1 - Z^S)w_i \end{aligned}$$

and the utility in the single state is denoted by:

$$V_i^S = U(C_i^S) + U(Z^S) - f(Z^S)$$

for $i = m, f$.

Decision to form a household In this partial equilibrium setting, a woman enters a union if V^U is greater or equal than the individual utility in the single state such that:

$$V_f^U \geq V_f^S$$

This condition states that the decision to enter a union will follow if the utility each individual gets within a joint household V_i^U is enough to compensate for the loss of utility if single V_i^S .

3.2 Social Effects, the Allocation of Household Time and the Probability of Union Formation

This section builds on the baseline model of section 3.1 by explicitly analyzing the role of social effects characterized as the prevailing gender roles in a given country. Gender roles act as a social constraint that effectively prevents potential partners to perfectly contract upon

the efficient division of household labor before the union is formed.¹⁵ Thus, the amount of time each partner devotes to household production H_m and H_f is the value dictated by the existing gender roles.

The household maximization problem becomes:

$$\begin{aligned} & \max_{C_i, H_i} 2U(C^U) + 2U(Z^U) - f(H_m^U) - f(H_f^U) \\ & st. \\ & \bar{Z}^U \geq H_m^U + H_f^U \\ & C^U = \sum (1 - H_i^U)w_i \\ & H_m^U \leq \bar{H}_m^U \end{aligned}$$

where the constraint is characterized by the fact that the male partner cannot increase his time to household production above what is imperative by gender roles \bar{H}_m^U (or symmetrically, that a woman cannot decrease the amount of time devoted to household production below what is prescribed by the existing social norms \bar{H}_f^U).¹⁶ Under this scenario the solution is straightforward. Given that Z^U is fixed and $Z^U = \bar{H}_m^U + H_f^U$, $H_f^U = \bar{H}_f^U$ and $C^U = \sum (1 - \bar{H}_i^U)w_i$.

Gender roles affect the probability of entering a union in two ways: First, they diminish the household utility and second, it alters the distribution of household surplus. On the one hand household utility is lower under gender roles because partners are constrained from reaching

¹⁵The model specification, where the only private goods are the disutility from time devoted to household production, implies that it is not possible to compensate a woman for having a "socially constrained" partner.

¹⁶In a context of high relative female wages as the one analyzed here, it is reasonable to assume that the social norm is always binding. For the remainder of the paper I consider $H_m^U \geq \bar{H}$, i.e. the efficient amount of a man's time to household production is above the value that is prescribed by the social norm. Intertemporal cross-country differences in union formation probabilities can also be explained in light of this model, assuming that the constraint becomes effective for higher female wages.

optimal time allocations. This situation is true despite increases in the consumption of the *market public good*.¹⁷

$$\bar{C}_{Gender\ Roles}^U = (1 - \bar{H}_m^U)w_m + (1 - \bar{H}_f^U)w_f > C_{Baseline}^U = (1 - H_m^U)w_m + (1 - H_f^U)w_f$$

On the other hand, social constraints also alter the distribution of the surplus. In particular, under strong gender norms in the way characterized above, a man has no incentive to deviate from what is prescribed by gender roles once the union is formed. He not only enjoys a higher level of market consumption good but also a lower disutility from household labor.

$$\bar{V}_m^U = U(\bar{C}^U) + U(Z^U) - f(\bar{H}_m^U) < V_m^U = U(C^U) + U(Z^U) - f(H_m^U)$$

Proposition 1 *Under gender roles that constrain the household allocation of time, a man's utility from entering a union rises.*

A woman is, however, worse off as a higher consumption of the market public good is not enough to compensate her for a higher amount of time devoted to household production.¹⁸

On the one hand, she gets higher consumption, but on the other hand she has to allocate more time to household production, which leads to lower utility within marriage.

$$\bar{V}_f^U = U(\bar{C}^U) + U(Z^U) - f(\bar{H}_f^U) < V_f^U = U(C^U) + U(Z^U) - f(H_f^U)$$

Proposition 2 *Under gender roles that constrain the household allocation of time, a woman's utility from entering a union falls.*

¹⁷Under social constraints, the man devotes less time to household production and more to market labor. Given that the man's wage is higher, the consumption of market public good increases.

¹⁸Given that the household utility decreases in the presence of gender roles, and that man's utility increases, woman's utility must necessarily decrease.

Finally, the probability of a woman entering a union under gender roles goes down:

$$p(V_f^U \geq V_f^S) > p(\bar{V}_f^U \geq V_f^S) \iff p(V_f^U) > p(\bar{V}_f^U)$$

Also, gender roles that prescribe lower (higher) levels of \bar{H}_m^U (\bar{H}_f^U) lower (increase) a woman's probability of entering a union:

$$p(\bar{V}_{1,f}^U \geq V_f^S) > p(\bar{V}_{2,f}^U \geq V_f^S) \iff p(\bar{V}_{1,f}^U) > p(\bar{V}_{2,f}^U)$$

for $\bar{V}_{i,f}^U = U(\bar{C}_i^U) + U(Z_i^U) - f(\bar{H}_{i,f}^U)$ for $i = 1, 2$ and $\bar{H}_{1,f}^U > \bar{H}_{2,f}^U$.

Proposition 3 *Stronger gender roles, which constrain household time allocation to lower (higher) levels of \bar{H}_m^U (\bar{H}_f^U), lower a woman's probability of entering a union*

From Proposition 3, some women (those with a lower taste for household production or with lower taste toward forming a union) might be better off not entering a union altogether. Everything else equal, the probability of entering a union diminishes with the probability of facing a stronger constraint. That is, women living in less egalitarian countries where gender norms are well entrenched would have, with all things equal, a lower probability of entering a union.

4 The Data: International Social Survey Program: Family and Changing Gender Roles (ISSP 1994 & 2002)

The data used for the empirical analysis is drawn from the International Social Survey Program (ISSP), which is an annual program of cross-national collaboration on surveys between several social science institutes dating to 1983.¹⁹ These data sets offer a unique

¹⁹The ISSP is a cross-country effort in which each member state individually collects data and (1) jointly develops topical modules dealing with important areas of social science, (2) carries a module of a 15-minute

opportunity for cross-country analyses in topics such as social inequality, social networks , and the role of government, as they coordinate national social science surveys to produce a common set of questions asked in identical form in the participating nations.²⁰

This analysis is based on a pooled cross-section of the 1994 and 2002 surveys analyzing "Family and Changing Gender Roles." In each of the participating countries, a male or female adult older than 16 or 18 years (depending on the country) from the selected household was administered (almost) the same questionnaire across all countries. Although the same individuals are not surveyed in both years, the data allows the researcher to take into account country and survey-year fixed effects, which are useful for the identification of social effects. This survey is particularly useful for the purpose of this analysis because it collected general demographic information, employment and wages, the actual division of labor within the household and several attitudinal variables toward gender roles.

I restrict the sample to those countries who undertook the survey in both years.²¹ Table 2 reports the list of countries used in this analysis for both, men and women between the ages of 18 and 70. It includes households from Australia, Austria, Germany (West), Great Britain and Northern Ireland, Ireland, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, and the United States.

A main contribution of this survey is that it asks questions about gender roles. I construct self-completion supplement to their regular national surveys, (3) includes a common core of background variables, and (4) makes the data available to the social science community as soon as possible. The number of member states is currently 39 (although not all members have participated since 1983).

²⁰Examples of the use of the ISSP are Blau and Kahn (Blau and Kahn, 1992) and Albrecht et al. (Albrecht et al., 2000).

²¹Some Eastern European and developing countries were also part of the ISSP survey. However, due to the differences in economic systems and demographic processes, this analysis concentrates on western developed countries.

an *egalitarian index* from a series of eight responses that report the level of agreement with statements designed to capture attitudes towards the gender division of household labor.²² The responses are coded on a 1 to 5 scale, from "strongly agree" to "strongly disagree." Table 2 shows the average value of the principal component index in each country by survey year. Countries are ordered from higher to lower values of this index according to 1994 values, with a higher index meaning more *egalitarian*. Respondents from Austria, Italy, Japan and Spain seem to hold attitudes toward the gender division of household labor that are less egalitarian than those of respondents in countries such as Norway, Sweden, and Canada. There is not a substantial change with respect to the ranking of countries according to this index in the two survey periods. There is, however, a clear trend toward more egalitarian attitudes across countries, as the value of the egalitarian index is higher in 2002 than in 1994. It is also noticeable that among the countries with less egalitarian gender norms are those with lowest-low fertility and union formation rates, such as Japan, Italy and Spain.

Given that the object of interest is household formation and not marriage per se, I define an ever-married woman as a woman who is either married or has ever been married (i.e., divorced or widowed). I also include all women who are currently living with a partner in a long lasting relationship. I construct this variable using the answers to the questions on marital status

²²The *egalitarian index* consists of a standardized principal component index that is calculated using a principal component factor analysis. This analysis finds a number of common factors that linearly predicts the covariance matrix of the responses to the following statements:

"A working mother can establish just as warm and secure a relationship with her children as a mother who does not work."

"A pre-school child is likely to suffer if his or her mother works."

"All in all, family life suffers when the woman has a full-time job."

"A job is alright, but what most women really want is a home and children."

"Being a housewife is just as fulfilling as working for pay."

"Having a job is the best way for a woman to be an independent person."

"Both the man and woman should contribute to the household income."

"A man's job is to earn money; a woman's job is to look after the home and family."

and steady life partnership (i.e., whether living as married with a partner). Table 2 reports summary statistics for these two variables. The first thing to observe is that the percentage of women ever to cohabit is much higher for those countries with more egalitarian attitudes. This difference is also more pronounced in 2002 than in 1994. Secondly, partnership rates seem to increase as we move toward countries with more egalitarian attitudes.

Table 2: Summary Statistics by Country and Survey Year

Country (From more to less egalitarian)	Year	Gender Roles					Obs.
		% Ever Married	% Ever in Partnership	Principal Component Index	Yrs. Of Schooling (males)	Yrs. Of Schooling (female)	
Sweden	1994	0.76	0.76	0.33	11.51	11.50	1177
	2002	0.54	0.80	0.54	11.93	12.50	974
Norway	1994	0.66	0.79	0.12	13.22	12.60	1,910
	2002	0.70	0.85	0.41	13.50	13.22	1,368
Great Britain	1994	0.81	0.81	0.08	11.46	11.38	867
	2002	0.76	0.76	0.08	12.28	12.21	1,672
US	1994	0.77	0.77	0.03	13.46	13.38	1,270
	2002	0.74	0.78	0.13	13.59	13.51	1,063
Northern Ireland	1994	0.75	0.75	0.02	11.50	11.33	545
	2002	0.72	0.72	0.02	---	---	845
Netherlands	1994	0.72	0.72	-0.03	12.95	12.10	1,743
	2002	0.67	0.78	0.06	14.30	13.19	1,110
New Zealand	1994	0.84	0.84	-0.11	12.03	11.90	932
	2002	0.80	0.87	-0.10	13.31	13.19	888
Ireland	1994	0.71	0.71	-0.16	11.09	11.58	866
	2002	0.68	0.71	0.08	12.34	12.58	1094
Spain	1994	0.68	0.68	-0.18	---	---	2,259
	2002	0.66	0.71	0.02	11.90	11.50	2,170
Japan	1994	0.79	0.79	-0.18	12.21	11.67	1,143
	2002	0.81	0.81	-0.01	13.05	12.34	948
Australia	1994	0.86	0.86	-0.22	11.52	11.30	1,560
	2002	0.81	0.86	-0.08	12.22	12.17	1,239
Germany	1994	0.75	0.85	-0.23	---	---	2,129
	2002	0.71	0.86	0.14	11.38	11.00	835
Austria	1994	0.82	0.82	-0.37	12.45	11.18	852
	2002	0.71	0.79	-0.05	---	---	1770.00
Overall	1994	0.75	0.77	0.09	12.18	11.80	19,549
	2002	0.72	0.79	0.11	12.57	12.42	21,948

Female education is used as a measure of market female human capital and potential outside opportunities. Education is given in years and levels, but data on levels applies different

criteria among different countries and it is hard to interpret. Instead, I use completed years of schooling. I lose information on Austria, Germany, Northern Ireland, and Spain, for one survey year because these countries have no information on this variable.²³ As mentioned in the introduction, differences in education across countries are not significant. Especially the woman-to-man education ratio is small for all countries in the two survey years.

4.1 The Allocation of Time to Household Production

The data also contains information on the share of household production that each partner undertakes. Questions on household production include who does the laundry, who shops for groceries, who prepares meals, and who cares for the sick. Answers to the question "who does what" are tabulated in 6 different categories: The first two is *always* and *usually* the woman, the third is *both* and the fourth and fifth are *usually* and *always the man*. A sixth category is *a third person*. I drop these observations, which amount to less than 2% of the sample.²⁴ Table 3 shows the share of housework performed by each partner in each country during the two years the survey was implemented.²⁵ Countries are ordered from more to less egalitarian according to their 1994 egalitarian index. Table 3 shows that, first, more egalitarian countries tend to have a higher participation of men in household activities and second, that the spousal distribution of housework share has not changed much over the two survey years.

²³A dummy is included in all regressions in order to control for missing education in these countries, which allows to use the remainder relevant information for these countries.

²⁴Low levels of housework outsourcing are consistent with more detailed time-use surveys.

²⁵Section 5 provides further evidence that the division of housework has changed little both, across countries and over time.

Table 3: The Division of Household Production

Country Survey Year	Laundry					Sick Caring				
	Usually/ Always woman	Both	Usually/ Always man	Out- sourcing	Obs.	Usually/ Always woman	Both	Usually/ Always man	Out- sourcing	Obs.
SW										
1994	0.80	0.17	0.03	0.00	831	0.41	0.57	0.02	0.01	773
2002	0.73	0.21	0.07	0.00	731	0.40	0.56	0.04	0.00	649
NO										
1994	0.82	0.16	0.02	0.00	1,365	0.44	0.55	0.01	0.01	1,232
2002	0.80	0.16	0.04	0.00	1,033	0.43	0.55	0.02	0.02	918
GB										
1994	0.81	0.18	0.01	0.01	547	0.50	0.49	0.01	0.01	520
2002	0.79	0.16	0.05	0.01	998	0.55	0.42	0.03	0.01	885
US										
1994	0.68	0.27	0.05	0.02	718	0.48	0.50	0.02	0.01	708
2002	0.62	0.28	0.10	0.02	629	0.49	0.45	0.06	0.01	608
NI										
1994	0.90	0.09	0.01	0.02	310	0.53	0.46	0.01	0.01	299
2002	0.87	0.10	0.03	0.02	437	0.60	0.36	0.04	0.01	421
NL										
1994	0.88	0.10	0.01	0.00	1,162	0.49	0.50	0.02	0.00	1,132
2002	0.85	0.11	0.04	0.00	748	0.50	0.47	0.02	0.00	721
NZ										
1994	0.75	0.22	0.04	0.00	705	0.59	0.40	0.01	0.00	682
2002	0.77	0.19	0.04	0.00	647	0.59	0.38	0.03	0.00	602
IR										
1994	0.88	0.12	0.00	0.00	555	0.52	0.47	0.01	0.00	550
2002	0.87	0.10	0.03	0.01	679	0.56	0.40	0.03	0.01	646
SP										
1994	0.91	0.08	0.01	0.02	1,416	0.61	0.38	0.01	0.00	1,402
2002	0.83	0.14	0.03	0.01	1,332	0.53	0.43	0.04	0.01	1,271
JA										
1994	0.96	0.04	0.01	0.02	827	0.79	0.20	0.01	0.02	790
2002	0.91	0.07	0.02	0.03	689	0.73	0.23	0.04	0.02	630
AUS										
1994	0.79	0.16	0.05	0.01	1,415	0.62	0.35	0.03	0.01	1,336
2002	0.75	0.14	0.11	0.03	1,128	0.63	0.31	0.06	0.04	1,065
GE										
1994	0.91	0.08	0.01	0.02	1,472	0.57	0.42	0.01	0.01	1,341
2002	0.89	0.09	0.03	0.02	568	0.57	0.40	0.03	0.01	499
OS										
1994	0.94	0.04	0.02	0.01	590	0.62	0.37	0.02	0.01	556
2002	0.90	0.07	0.03	0.02	1,082	0.58	0.39	0.03	0.02	937

Table 3 (cont): The Division of Household Production

Country Survey Year	Grocery Shopping					Meal Preparation				
	Usually/ Always woman	Both	Usually/ Always man	Out- sourcing	Obs.	Usually/ Always woman	Both	Usually/ Always man	Out- sourcing	Obs.
SW										
1994	0.42	0.49	0.09	0.00	830	0.56	0.42	0.03	0.00	829
2002	0.38	0.49	0.13	0.00	732	0.60	0.29	0.11	0.00	732
NO										
1994	0.40	0.50	0.10	0.00	1,366	0.53	0.42	0.05	0.00	1,366
2002	0.43	0.48	0.10	0.00	1,035	0.59	0.31	0.09	0.00	1,034
GB										
1994	0.43	0.53	0.05	0.00	554	0.59	0.36	0.05	0.00	553
2002	0.46	0.46	0.08	0.00	997	0.59	0.31	0.11	0.01	1,000
US										
1994	0.49	0.45	0.06	0.00	729	0.54	0.40	0.06	0.00	726
2002	0.48	0.42	0.10	0.00	642	0.55	0.31	0.13	0.00	639
NI										
1994	0.59	0.38	0.03	0.00	315	0.65	0.33	0.02	0.01	314
2002	0.62	0.34	0.04	0.00	442	0.64	0.31	0.05	0.01	442
NL										
1994	0.58	0.34	0.08	0.00	1,163	0.66	0.31	0.03	0.00	1,163
2002	0.58	0.30	0.10	0.00	748	0.66	0.24	0.09	0.00	747
NZ										
1994	0.60	0.36	0.04	0.00	707	0.70	0.26	0.04	0.00	706
2002	0.58	0.35	0.07	0.00	647	0.65	0.27	0.08	0.00	648
IR										
1994	0.67	0.29	0.04	0.00	554	0.75	0.23	0.02	0.00	555
2002	0.63	0.29	0.08	0.01	681	0.71	0.23	0.06	0.01	682
SP										
1994	0.68	0.29	0.03	0.01	1,421	0.81	0.18	0.01	0.01	1,431
2002	0.51	0.42	0.07	0.00	1,346	0.75	0.19	0.06	0.01	1,337
JA										
1994	0.80	0.20	0.01	0.03	824	0.94	0.05	0.01	0.03	821
2002	0.76	0.22	0.02	0.01	700	0.91	0.08	0.02	0.03	691
AUS										
1994	0.60	0.31	0.09	0.00	1,391	0.71	0.23	0.06	0.00	1,412
2002	0.61	0.25	0.14	0.02	1,113	0.68	0.19	0.13	0.03	1,112
GE										
1994	0.49	0.44	0.06	0.01	1,489	0.55	0.43	0.02	0.01	1,485
2002	0.51	0.41	0.08	0.01	573	0.76	0.18	0.06	0.00	573
OS										
1994	0.52	0.39	0.09	0.01	592	0.58	0.40	0.03	0.00	589
2002	0.46	0.46	0.09	0.00	1,101	0.77	0.17	0.06	0.01	1,096

4.2 Household Time Allocation and the Persistence of Gender Roles

As mentioned in the introduction, despite the increase in relative female human capital (and labor force participation), men's time to household production remains low and has not substantially increased over time. This empirical regularity has been argued to be inconsistent with household models based on either specialization or bargaining theories and has suggested the existence of a *gender effect* associated to household production. Based on the 1994 and 2002 ISSP data sets, Table 4 provides further evidence for the existence of rigidities associated to the allocation of time to household production and thus, for the hypothesized *gender effect*. The data does not contain information on the time that each partner devotes to household production, but it does contain information on each partner's share of total time. Table 4 shows the predicted probabilities for the allocation of time to several household production activities for a representative cohort of women between 30 and 40 years old.²⁶

²⁶See Appendix A for estimates from the ordered logit regression. The predicted probabilities presented here are derived from the regressions in the second column of Table 6.

Table 4: Estimated Ordered Logit Probabilities of the Division of Household Labor

		Laundry		Cares for the sick		Grocery Shopping		Meal preparation	
		Woman's work status		Woman's work status		Woman's work status		Woman's work status	
		not working	working						
1994	Always woman	0.718	0.512	0.4	0.256	0.399	0.272	0.491	0.282
	Usually woman	0.207	0.316	0.313	0.308	0.293	0.288	0.319	0.35
	Both	0.06	0.134	0.273	0.411	0.267	0.369	0.161	0.3
	Usually man	0.008	0.021	0.007	0.014	0.028	0.049	0.019	0.045
	Always man	0.005	0.014	0.005	0.01	0.011	0.02	0.007	0.02
2002	Always woman	0.651	0.435	0.399	0.261	0.359	0.257	0.498	0.296
	Usually woman	0.251	0.354	0.318	0.315	0.302	0.292	0.322	0.364
	Both	0.078	0.164	0.27	0.4	0.292	0.379	0.153	0.281
	Usually man	0.011	0.026	0.007	0.013	0.032	0.05	0.017	0.04
	Always man	0.007	0.018	0.005	0.009	0.012	0.02	0.007	0.017

Sample: Women between 30 and 40 years old

In 2002: 2,940. In 1994: 2,297

Estimated probabilities from ordered logit regressions

Column 1 analyzes the case where a woman is not working (and only the male partner is), and column 2 analyzes the case where both partners work. Several interesting results are worth mentioning. First, working women are less likely than non-working women to do most of the household production and are more likely to share this activities with her partner. Similarly, men are more likely to contribute when the woman is working. Second, differences between genders are significantly apart with women contributing most of the time to household production. Third, although the probability that a man contributes to household production activities has increased from 1994 to 2002, it remains significantly small at around 4 percent if the woman works, and 2 percent if she does not. In conclusion, women have gone from *always* doing household activities to *usually*. For example, for the case of doing laundry the probability that *both* partners contribute has increased only 3 percent if the woman works and close to nothing if she does not (although the probability that a woman contributes *always* to this activity has gone from .71 to .65 in the case that she works and from .51 to .43 if she does not). Finally, the probability that a woman *always* or *usually* does household production activities remains very high at about 40 percent (compared to 4 percent and 2 percent for men). In conclusion, all these findings suggest a social constraint

upon the allocation of family time characterized in this paper as the imperative gender roles.

5 Empirical Analysis

The empirical analysis in this section tests the implications for individual behavior that follow from the partial equilibrium model and evaluates the effect of gender roles on a woman's probability of entering a union. Gender roles are captured by the *egalitarian index* reported in Table 3 by the principal component index.²⁷ Higher (more egalitarian) values of this index represent a lower constraint upon the division of household production.

5.1 Empirical Specification of Social Constraints and Household Formation Decisions

The theoretical model predicts that the mechanism through which gender roles affect a woman's probability of entering a union is by constraining the allocation of household time, which reduces the gains from forming a union. In particular, proposition 3 showed that a woman who lives in a country with more egalitarian gender roles has, everything else equal, a higher probability of entering a union than a woman in a less egalitarian country.²⁸ Formally, the model states that the decision rule to form a union for woman i in country k is given by:

$$\text{form a union } if \ V_{i,k}^U \geq V_{i,k}^S + \varepsilon_{i,k} \text{ for } i = m, f$$

²⁷The estimates are robust to different specifications of gender roles. A sensitivity analysis is presented in Table 7 of Appendix B.

²⁸Throughout the analysis, it is assumed that the country's attitudes toward gender roles are the implicit reference group that affects the ability of potential partners to efficiently divide the marital surplus. This assumption avoids self-selection problems given that mobility across countries does not take place.

where $\varepsilon_{i,k}$ is an individual taste parameter toward remaining single. This normally distributed error is independently distributed across countries but correlated within countries for $i = m, f$ (male or female) and $k = 1 \dots 13$.²⁹

In effect, the probability of a union may be written as a function of observable individual and "marriage market" characteristics, which include gender roles:

$$\begin{aligned} p_{i,k} &= p(V_{i,k}^U - V_{i,k}^S \geq \varepsilon_{i,k}) = \\ &= p[f(\text{EDU}_{i,k}, \text{AGE}_{i,k}, \text{GR}_k) \geq \varepsilon_i] \end{aligned}$$

the reduced form econometric specification is:

$$p_{i,t,k} = X_{i,t,k}\beta_1 + E_{t,k}\beta_2 + \theta_t + \omega_k + \varepsilon_{i,k}$$

where $p_{i,t,k}$ is the probability of entering a union for woman i in survey year t , and country k . $X_{i,t,k}$ is a set of individual observable characteristics (education, age and labor force participation) and θ_t and ω_k are the year and country fixed effects respectively. The error term captures the taste for marriage that is assume to follow a normal distribution with variance σ_k the same for all women in country k .

5.2 Identification of Gender Roles (I)

The identification of social effects on individual union formation probabilities comes from the differential changes over the survey period and across countries of the variable $E_{t,k}$, which is the principal component index that captures the level of *gender roles* (or social constraint) at survey year t in country k . Higher values of this variable are associated with more egalitarian gender roles, and therefore with a lower constraint upon the division of household production between partners.

²⁹I choose a relatively large cell size, the woman's country in a particular survey year, to minimize measurement error in my estimates of marriage-market specific social constraints.

Notice that ω_k , the country fixed effect, accounts for permanent differences across countries over the survey period that may systematically affect the probability of women entering a union in some countries. For example, permanent differences in preferences toward forming a union, so that everything else equal, women living in some countries are more prone to enter a union than in others, would be captured by the country fixed effect. Similarly, systematic differences in preferences toward household production across countries, which would affect the probability of entering a union, are also captured by the country fixed effect.³⁰ By the same underlying principle, the survey year fixed effect θ_t accounts for any common change to all countries over the survey years. For example, a change in attitudes toward forming a union that would have similarly occurred in all countries during the survey period, would be captured by the survey year fixed effect.³¹ As a result, so long as the country fixed effect does not vary over the survey period and the survey year fixed effect does not vary across-countries, this approach yields an unbiased estimate of β_2 .³²

Column 1 in Table 5 shows the results for this regression, for a sample of women between 20

³⁰For example, if Spaniards preferred (on average) a cleaner household (and therefore had a higher preference for more household production), they would also have a lower probability of entering a union (as they would require, *ceteris paribus*, a higher union formation gain than say, Swedes). This effect would however be captured by the country fixed effect.

³¹The survey also contains information on attitudes toward marriage and cohabitation. Appendices C and D present the answers to these questions. In general, more egalitarian countries are more receptive to cohabitation whereas less egalitarian countries seem to place more value on marriage. This is captured in the regression by ω_k . Moreover, these attitudes change consistently in all countries over the two survey periods (in all countries cohabitation has become more acceptable and marriage has become less). This is captured in the regression by θ_t . Thus, β_2 is not likely to capture a differential change in attitudes toward union formations.

³²Notice that this approach is similar to a difference in difference approach, where the treatment is a continuous rather than a discrete variable (mainly, the degree of gender roles in a given country).

and 40 years old that are not currently studying.³³ The reported coefficients from the probit models presented here are the change in the probability for an infinitesimal change in each independent, continuous variable and, by default, the discrete change in the probability for dummy variables. The coefficients of the woman's individual variables have the usual sign. The higher the woman's education, the lower the probability of entering a union, which is consistent with the specialization theory of the household proposed in Section 3. A one-year increase in schooling decreases a woman's probability of entering a union by around 1.5 percentage points. The small magnitude of this coefficient, together with the fact that the cross-country educational differences are not significant, further supports the argument that relative female education is not the appropriate variable to explain cross-country differences in union formation. The coefficient on age is positive and significant as expected. There is also a significant change on the probability of entering a union in the survey-years. The coefficient of *survey year* is negative and significant, which shows a decreasing trend in the probability of entering the union over this period.

³³Regressions using a sample of women ages 20-65 produced qualitatively similar results (see B), although the magnitude of the correlation between gender roles and union formation probabilities is lower. This is not surprising because the vast majority of women aged 45-65 in my sample have been in a union for many years and so are no longer active participants in the marriage market.

Table 5: Gender Roles and a Woman's Union Formation Probability

Woman's Probability of Entering a Union (Maximum-likelihood Probit Estimation)	No individual Effects	With Individual Effects
Completed years of schooling	-0.016 [-8.31]***	-0.013 [-6.65]***
Age	0.025 [34.44]***	0.024 [32.19]***
Survey Year (=1 if 2002)	-0.037 [-1.91]*	-0.045 [-2.23]**
Gender Roles by country and survey year (higher values mean more "egalitarian")	0.203 [1.74]*	0.314 [2.55]**
Woman's individual attitudes toward gender roles (higher values mean more "egalitarian")		-0.039 [-7.65]***
Observations	8,914	7,887

(1) Robust z statistics in brackets

(2) * significant at 10%; ** significant at 5%; *** significant at 1%

(3) Sample: Women between 20 and 45 years old

(4) Coefficients report the change in the probability of entering a union for an infinitesimal change in each independent (continuous) variable and, by default, the discrete change in the probability for dummy variables.

The coefficient of interest β_2 is the coefficient corresponding to the country-year variable *gender roles by country and survey year* (0.203). This variable is the *egalitarian index* that measures average gender roles in a country in a given survey year. This coefficient is statistically significant and has the predicted positive sign, i.e., a woman living in a more egalitarian country has a higher probability of entering a union. In particular, a standard deviation (one unit) increase in the *egalitarian index* leads to a 0.2 increase in a woman's probability of entering a union. The average Spanish woman, with an index of 0.02 in 2002 had about 10 percentage points lower probability of entering a union than her Swedish counterpart, living in a country with an egalitarian index of .54. This value is just in between the 5 to 25 percentage points reported in Table 5 for the 30 to 34 cohort.

5.3 Identification of Gender Roles (II)

I have argued that more egalitarian attitudes toward gender roles in a country positively affect individual choices, in particular individual union formation probability by imposing a social constraint that prevents potential partners from dividing the marital surplus in an efficient manner. This results in a lower surplus for a woman, which diminishes her probability of entering a union.

A potential problem for the previous empirical results is that average attitudes in a country are, by definition, correlated to individual attitudes. If individual attitudes toward gender roles were associated with a higher probability of union formation (i.e., if being a more egalitarian woman was associated with a higher taste for forming a union) then omitting individual attitudes would result in a bias of the β_2 coefficient. The remainder of this section takes advantage of the specific features in the ISSP data set and use subjective data, as proposed in Manski (Manski, 1993) and (Manski, 2000), in order to identify the social effects from individual attitudes.

Column 2 of Table 5 shows that incorporating individual attitudes toward gender roles in the regression presented in column 1 of Table 5 does not change the sign of the coefficient on *gender roles by country and survey year*. Furthermore, individual and average country gender roles seem to go in opposite directions: Whereas, ceteris paribus, more egalitarian women have lower probability of entering a union, women living in more egalitarian countries have, everything else equal, a higher probability of entering a union. These two results further support the existence of social effects on woman's individual probability of entering a union.

The negative sign on the individual attitudes toward gender roles (-0.039) is consistent with the theoretical model presented in Section 3, as more egalitarian women can be thought of as having a higher disutility from the time allocated to household production. This negative sign means that a woman's individual attitudes toward gender roles significantly and negatively

affect the probability of entering a union.³⁴ The coefficient on the social effect (0.314) on the other hand continues to be significant and positive (with a slight increase in value as expected). This finding is also consistent with the model presented in Section 3, as women living in less egalitarian countries need, everything else equal, a higher share of the surplus when entering a union.

6 Conclusion

The study of below replacement fertility characteristic of developed economies has traditionally overlooked union formation processes. Nonetheless, cross-country differences in union formation rates are significant, especially among younger cohorts. Both declines in marriage rates and increases in cohabitation rates have followed very different trends across the developed world. In particular, the so-called lowest-low fertility countries, like Italy, Spain or Japan, have experienced a decline in marriage rates that have not been accompanied by increases in cohabitation (and out-of wedlock fertility) rates characteristic of the rest of the developed world. It becomes thus increasingly important to look at union formation processes for the study of fertility.

Economic theories of the household and the marriage market provide an explanation for the differences in household formation rates over time based on the evolution of female wages. However, cross-country differences in female market human capital are unlikely to account for the divergence in existing union formation rates across developed countries. This paper empirically and theoretically explores the social effects associated to household formation decisions in order to shed light onto the factors that contribute to differences in the probabilities of entering a union across countries.

³⁴The coefficient on individual attitudes must be interpreted with caution. Only under the assumption that individual attitudes toward gender roles are not just reflecting attitudes toward union formation can this coefficient be interpreted causally.

A stylized partial equilibrium model of union formation is developed that formally analyzes the channel through which social effects may affect a woman's decision to entering a union. Social effects are rationalized as gender roles that constrain how potential partners divide the gains from entering a union. The inability of potential partners to credibly commit to make transfers of time, rather than private consumption, before the union is formed is at the root of the argument. In this setting, both the non observability by third parties of spouse's time devoted to household production and the inexistence of credible threats for certain household production activities leads potential partners to rely on gender roles when making a decision on how to divide the household surplus. The model predicts that gender roles result in inefficient household time allocations, which diminishes a woman's gains to entering a union. Thus, women in less egalitarian countries have, with all things equal, a lower probability of entering a union.

Empirical results from individual level cross-country and longitudinal data support the predictions of a household formation model with social constraints upon the allocation of household time. I first provide evidence for the existence of social constraints upon the allocation of household time by showing that after controlling for employment status and other relevant variables household time allocation patterns have not substantially changed over time. I then provide an identification strategy of social effects which exploits the time and cross-country variation in the data as well as individual reported attitudes toward gender roles. This fact allows for the identification of gender roles net of individual attitudes and other social interactions. In conclusion, imperfect commitment processes within the household that constrain the allocation of household time to what is prescribed by gender roles and the empirical results presented in this paper might provide the theoretical and empirical foundations for the design of policies that encourage men's participation in family work.

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A Ordered Probit Model Results: Allocation of Time to Household Production

Table 6 shows the ordered logit used for constructing table 4. The sample is restricted to those who are married or living as married and have finished school. The dependent variables are "who does the laundry," "who takes care for the sick," "who does the grocery shopping" and "who prepares meals." The dependent variables go from 1 to 5, 1 meaning always woman, and 5 meaning always the man. I control for survey year, country, gender of the respondent, work status of the respondent and the spouse and an interaction term to control for whether the work status is related to the man or the woman.

We see that the variable "survey year" has a positive coefficient. This variable takes value 1 if the survey year is 2002, which means that there has been an increase in the probability for higher values of the dependent variable, i.e., men are more likely (or women less likely) to take on household production activities. When evaluating this probabilities at mean values as in 4, we see that this has only happened for low values of the dependent variable (i.e., the man partner continues to allocate very little time to household production).

Notice that there is also a disconnect between what men report and what women report. Men tend to report higher values of the dependent variables than women (i.e., the dummy that controls for the man being the respondent has a positive and significant coefficient).

Table 6: Ordered Logit Estimates of the Household Division of Labor

Ordered Logit	Allocation of Time To Household Production Activities							
	laundry		cares for sick		shop for groceries		meal preparation	
Survey Year	0.18 (5.99)***	0.16 (5.54)***	0.05 (1.81)*	0.04 1.3	0.096 (3.38)***	0.085 (2.97)***	0.065 (2.26)**	0.05 (1.75)**
Man respondent	0.58 (22.92)***	0.78 (16.19)***	0.73 (29.18)***	0.91 (19.26)***	0.58 (24.40)***	0.8 (17.54)***	0.56 (23.38)***	0.764 (17.01)***
Respondent Working		0.84 (21.00)***		0.62 (16.9)***		0.46 (12.72)***		0.827 (22.57)***
Spouse Working		-0.135 (3.13)***		-0.125 (3.08)***		-0.25 (6.52)***		-0.153 (3.85)***
Respondent Working (if man)		-0.84 (14.56)***		-0.69 (12.25)***		-0.8 (14.97)***		-0.877 (16.17)***
Spouse Working (if man)		0.73 (12.74)***		0.53 (9.42)***		0.65 (12.22)***		-0.877 (16.17)***
Observations	24,175	24,175	22,605	22,605	24,219	24,219	24,239	24,239

Absolute value of robust z statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Dependent variable is "Who does what"?

It takes values from 1 (always woman) to 5 (always man).

Controls:

Respondent's gender (=1 if man), survey year,
 respondent's and spouse's work status,
 interaction of man dummy with respondent's and spouse's work status,
 cohort and country dummies.

B Gender Roles and a Woman's Union Formation Probability

Table 7 presents three different specifications of the effect of gender roles on a woman's probability to enter a union. The second column in each specification takes into account a woman's attitudes toward gender roles on top of country average attitudes. Results are qualitatively the same as in table 5, with more egalitarian women having a lower probability of entering a union, but women living in more egalitarian countries having a higher probability.

Specification 1 measures attitudes toward gender roles using the country and woman's *egalitarian index* described in Section 4, but using a wider sample size (women between 20 and 65 years old). Specifications 2 and 3 use a different measure of attitudes toward gender roles. Average country attitudes are measure by the percentage of respondents that answered either *totally agree* or *agree* with the statement: "A job is alright, but what women really want is home and children." A woman's individual attitudes are measured by a dummy which takes the value 1 if a woman responded *totally agree* or *agree* with the statement above. Another difference between specification 2 and 3 is the sample size considered.

Table 7: Gender Roles and a Woman's Union Formation Probability

Woman's Probability of Entering a Union (Maximum-likelihood Probit Estimation)	Specification 1		Specification 2		Specification 3	
	No individual Effects	With Individual Effects	No individual Effects	With Individual Effects	No individual Effects	With Individual Effects
Completed years of schooling	-0.01 [-9.17]***	-0.01 [-8.58]***	-0.01 [-9.09]***	-0.009 [-8.50]***	-0.015 [-8.14]***	-0.015 [-7.64]***
Age	0.01 [32.83]***	0.01 [30.07]***	0.01 [32.86]***	0.01 [32.64]***	0.025 [34.51]***	0.025 [34.54]***
Survey Year (=1 if 2002)	-0.022 [-1.83]*	-0.02 [-1.65]*	-0.027 [-2.11]**	-0.028 [-2.22]**	-0.046 [2.21]**	-0.049 [-2.33]**
Gender Roles by country and survey year (higher values mean more "egalitarian")	0.129 [1.80]*	0.156 [2.12]**				
Percentage of people by country and survey year that agree with the statement			-0.377 [-1.92]*	-0.405 [-2.07]**	-0.516 [1.60]	-0.562 [-1.74]*
What women really want is home and children						
Woman's individual attitudes toward gender roles (higher values mean more "egalitarian")		-0.019 [-6.24]***				
Dummy=1 if woman agrees with the statement "What women really want is home and children"				0.022 [3.55]***		0.035 [3.36]***
Observations	15,165	13,325	15,165	15,165	8,914	8,914

(1) Robust z statistics in brackets

(2) * significant at 10%; ** significant at 5%; *** significant at 1%

(3) Coefficients report the change in the probability of entering a union for an infinitesimal change in each independent (continuous) variable and, by default, the discrete change in the probability for dummy variables.

Specification 1: The sample is women between 20 and 65 years old and gender roles are measured using the principal component index.

Specification 2: The sample is women between 20 and 65 years old and gender roles are measured using answers to the statement "A job is all right, but what women really want is a home and children".

Specification 3: The sample is women between 20 and 45 years old and gender roles are measured using answers to the statement "A job is all right, but what women really want is a home and children".

C Evolution of Cross-Country Attitudes toward Marriage

Table 8: Cross-Country Comparison of Attitudes Toward Marriage*

Country/ Survey Year	Agree	N/A	Disagree	Obs
CA 1994	0.31	0.37	0.32	1,313
CA 2002				
SW 1994	0.17	0.38	0.44	1,177
SW 2002	0.14	0.39	0.47	974
NO 1994	0.16	0.33	0.50	1,910
NO 2002	0.15	0.38	0.47	1,368
GB 1994	0.23	0.39	0.38	867
GB 2002	0.21	0.42	0.36	1,672
NI 1994	0.25	0.39	0.36	545
NI 2002	0.30	0.24	0.45	845
US 1994	0.43	0.32	0.24	1,270
US 2002	0.39	0.33	0.28	1,063
NL 1994	0.11	0.25	0.64	1,743
NL 2002	0.22	0.37	0.41	1,110
NZ 1994	0.22	0.20	0.39	932
NZ 2002	0.21	0.43	0.35	888
IR 1994	0.32	0.22	0.46	866
IR 2002	0.31	0.26	0.43	1,094
SP 1994	0.31	0.19	0.50	2,259
SP 2002	0.21	0.18	0.70	2,170
AUS 1994	0.41	0.35	0.23	1,560
AUS 2002	0.43	0.33	0.24	1,239
JA 1994	0.38	0.31	0.31	1,143
JA 2002	0.31	0.36	0.32	948
GE 1994	0.38	0.27	0.34	2,129
GE 2002	0.32	0.32	0.36	835
IT 1994	0.30	0.31	0.39	983
IT 2002				
OS 1994	0.44	0.27	0.29	852
OS 2002	0.33	0.32	0.35	1,770

Source: ISSP 1994 and 2002. Author's calculations

* Do you agree or disagree:

Married people are generally happier than unmarried people?

** Countries are ordered from more to less egalitarian according to the egalitarian index in 1994

D Evolution of Cross-Country Attitudes toward Co-habitation

Table 9: Cross-Country Comparison of Attitudes Toward Cohabitation

Country/ Survey Year	Agree	N/A	Disagree	Obs
CA 1994	0.69	0.13	0.18	1,313
CA 2002				
SW 1994	0.83	0.09	0.07	1,177
SW 2002	0.89	0.05	0.06	974
NO 1994	0.76	0.08	0.15	1,910
NO 2002	0.90	0.08	0.10	1,368
GB 1994	0.70	0.14	0.17	867
GB 2002	0.75	0.13	0.12	1,672
NI 1994	0.50	0.18	0.31	545
NI 2002	0.62	0.17	0.20	845
US 1994	0.46	0.18	0.31	1,270
US 2002	0.50	0.18	0.20	1,063
NL 1994	0.85	0.06	0.08	1,743
NL 2002	0.91	0.50	0.03	1,110
NZ 1994	0.61	0.16	0.23	932
NZ 2002	0.67	0.15	0.18	888
IR 1994	0.54	0.09	0.36	866
IR 2002	0.65	0.13	0.22	1,094
SP 1994	0.67	0.09	0.23	2,259
SP 2002	0.80	0.07	0.11	2,170
AUS 1994	0.6	0.15	0.25	1,560
AUS 2002	0.67	0.16	0.17	1,239
JA 1994	0.38	0.22	0.40	1,143
JA 2002	0.44	0.20	0.36	948
GE 1994	0.71	0.10	0.18	2,129
GE 2002	0.81	0.08	0.11	835
IT 1994	0.60	0.12	0.27	983
IT 2002				
OS 1994	0.64	0.10	0.25	852
OS 2002	0.80	0.10	0.09	1,770

Source: ISSP 1994 and 2002. Author's calculations

* Do you agree or disagree: "It is all right for a couple to live together without intending to get married"

** Countries are ordered from more to less egalitarian according to the egalitarian index in 1994