Is the Price of Marriage too High? Social Constraints, Division of Housework, and the Decline of Marriage*

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Abstract

In contrast to predictions of comparative advantage or bargaining theories of the household, a higher female wage has not led to a substantial increase in household time allocation by men. This is particularly apparent in traditional societies such as Spain, where gender roles are strongly entrenched. This paper attributes the current low age-specific marriage rates among young Spanish cohorts to the prevailing gender norms no longer compatible with higher female education levels. This hypothesis is formalized in a model that follows Gary Becker's specification of the marriage market. I show that when the perfect contractibility assumption is relaxed the probability of marriage decreases and the male's share of housework is less responsive to the female wage. I use a household level cross country data set (ISSP 94) that contains information on education and wages, marital status, attitudes and the division of housework. Countries are categorized based on attitudes toward gender roles. The empirical results are consistent with a model of imperfect contractibility and social constraints: Countries with more egalitarian views toward gender roles have higher marriage/cohabitation rates and the husband's share of housework is more responsive to female education. Also consistent with the predictions of the theoretical model, differences in marriage rates between egalitarian and non-egalitarian countries are particularly significant for women with high levels of education where the social constraints are more likely to bind.

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

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1 Introduction

During the last decade, below replacement fertility in most developed countries has drawn the attention of researches in a variety of social sciences disciplines. Special focus has been given to the lowest-low fertility countries i.e. countries with well below replacement fertility levels that do not seem to rebound (Kholer, 2002). Among these countries Spain, Italy and Japan are the leading examples with average total fertility rates of 1.2. Below replacement fertility is burdensome at the aggregate level because it endangers the pay as you go pension system that characterizes most OECD countries (Koegler 2001, Morgan 2003), which has become a considerable concern to policy makers in these countries.

Most of the research on lowest-low fertility has focused on the number of children within married couples. This approach can be justified by the near inexistence of out-of-wedlock fertility and the empirical observation that the drop in fertility was mainly due to declines in higher order births within marriage (Bettio and Villa, 1998). However, substantial declines in age specific marriage rates (or a substantial postponement of household formation) among younger cohorts in lowest low fertility countries are gaining importance in understanding the determinants of marital fertility. For instance, the mean age at marriage rose from 24.5 in 1975 to 27.7 in 1995 in Japan. During the same period, the proportion never married rose from 5 to 15 percent (Retherford et al., 2001). In the case of Spain, the marriage rate has declined since 1970 without the significant rise in cohabitation that has occurred in nearby countries. Female total first marriage rate has decreased from .98 in 1970 to .60 in 1995 and the percentage of women cohabitating only increased from 1.2 in 1980 to 3.3 in 1993 (Spanish FFS Report). This pattern is different from, for example, the US where marriage rates for younger cohorts are as high as their older counterparts (Mancunovich 2001. Figure 1 and 2 in Appendix 1). Further, figure 3 and 4 in Appendix 1 shows that, in Spain, the propensity to have a child within marriage has not significantly changed for different cohorts, which further justifies the study of the propensity to marry as a first order factor in the fertility equation.

Traditional economic models of the household are able to provide a natural explanation for the decline in age-specific marriage rates. Under the unitary framework an increase in female education would decrease the gains from specialization within the married household thus lowering the probability of marriage (Becker 1973 and 1975, Bryant 1995). In the context of bargaining models of the household, an increase in female education increases the woman's reservation utility yielding the same results (McElroy et al. 1981). Nonetheless, recognizing that increases in female levels of education can lead to declines in marriage rates raises a general question: Why are marriage rates for same education levels lower in Spain than, say Sweden?

The explanation proposed in this paper is that, in lowest-low fertility countries rising female education has interacted with a pre-existing cultural con-

straint, namely a limit on the amount of housework that men will do. Differences with respect to the division of household work are apparent across countries. According to the UN Human Development Report 1995, the male share of domestic labor in Italy for instance, was the lowest among industrialized countries. For all northern European countries mentioned in this report, women contributed between 64 and 67 percent of all domestic work, which is considerably lower than in southern European countries. For example, for couples with and without children, an average Italian working woman still spends 7.15 hours a day on domestic work, or 88 percent of all domestic work (Di Tommaso, 1999). Juster and Stafford (1991) report that in 1981 the average Japanese woman did 31 hours of housework per week, very close to the average American woman of 30.5 hours. However, the average Japanese man did only 3.5 hours of housework whereas the average American man did 13.8. In Spain a 1991 survey of Spanish men and women over age 18 shows that women spend more time on household work per day (7 hours and 28 minutes), versus 1 hour and 35 minutes for men (Carrasco and Rodriguez, 2002).

The inability of spouses to contract upon the efficient provision of public goods (in this case housework) is at the root of the argument. This approach contributes to the literature of inefficiencies in marriage markets (Becker 1991, Lundberg and Pollak 1993) and household models with inefficient provision of public goods (Basu 2001, Lundberg and Pollak 2001, Rasul 2002). A theoretical model is presented following Becker's seminal work on the marriage market (Becker 1973). In the basic model with perfect contractibility, couples contract before marriage regarding the division of household work (and, implicitly, leisure). The equilibrium defines therefore the future's spouses housework share (the price of marriage) and the number of marriages that take place. In this set-up, a rise in female wage will lead to a decrease in the demand for men in the marriage market, resulting in a lower equilibrium price for men (implying a higher man's housework share) and a lower equilibrium quantity of marriages. In the extended version of the model the perfect contractibility assumption is relaxed. Under this scenario, an increase in female wages is constrained by the fact that men cannot increase their level of housework. There is thus no decline in the price of marriages (and no change in male housework) but a larger decline in the equilibrium quantity of marriages.

The existence of gender-specific factors or social constraints on the division of housework has been well documented by the economic and sociological literature. Consistent with this view is the finding that husband's housework time is not responsive to changes in relative female wages (Bittman et al. 2001). The unequal division of housework has been found to persist after observable characteristics have been taken into account (Alvarez and Miles 2003). Thus, unlike predictions by comparative advantage or bargaining theories of the household, higher female wages have not led to a more egalitarian division of housework within the household. This papers further explores this question by investigating the existence of gender-specific factors (social constraints) as the explanation

of part of this residual.

The empirical analysis uses the ISSP 94 (International Social Survey Program) data set to test the general implications of the model. This is a cross-country household data set that contains information on marriage, education, attitudes toward gender roles, and actual division of household labor, among other relevant variables. Evidence for the hypothesized cultural constraint on male housework and the predicted implications for the marriage market are found. Not only is the propensity to marry lower in countries with less egalitarian gender roles, but the man's share of housework is less reactive to female education in these countries, which shows that the "price of marriage" is higher for women in less egalitarian countries.

The paper is organized as follows: Section 1 illustrates the declines in age-specific marriage rates and their link to female education levels in the case of Spain. Section 2 presents a model of the marriage market with imperfect contractibility. Section 3 describes the data and econometric specification to be developed in section 4. Section 5 concludes.

2 A Model of the Marriage market with Non-Contractibility on the Division of Marital Output

2.1 Literature on Household Formation and Marriage Markets

Economic theory understands marriage as a partnership for the purpose of joint production and joint consumption. Once marital output is defined, prospective mates need to form some notion as to whether families realize the potential gains and how those gains are divided. In other words, the existence of gains from marriage is not sufficient to motivate marriage and sustain it. The present paper focuses on two specific aspects of the gain to marriage as the driving force of marriage formation: efficiency gains from specialization in the production and gains to the consumption of a public good (household work). [1]

The common views as to how spouses allocate time to household work are based on the predictions of either the unitary household production models (Becker 1973) or bargaining models (McElroy and Horney1981). Both set of theories predict that an increase in the relative female wage results in a decrease of her hours of household work as her hours of market work go up. The

[1] We leave out other dimensions to marriage such as risk pooling or consumption smoothing for exposition purpuses.

logic deployed by both theories is, however, entirely different. The divergence stands on how both theories perceive the institution of marriage. On 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. 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. In this setting, specialization is efficient and the lower wage spouse will be the one contributing most to household production and the least to market work. 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. This theory reaches the same conclusion as the unitary view that relative wages will affect relative contribution to housework but the rationale behind it is based on the concept of bargaining power and threat points. Both set of models have been unified under the collective approach to the household, where the efficiency nature of the household maximization problem is the only assumption that is made (Chiappiori 1992).

Several research studies have attempted to distinguish between both theories in order to assess the effects of female wage on the amount of time she puts into household work. Identification processes are hard to establish however, and it is not clear what logic is operating behind the relationship above (Bittman et al 2001). What most studies seem to find is a residual that is not explained by the above theories. This residual has been referred to as the gender effect. The most clear evidence on gender effect relies on the fact that husbands unpaid work does not increase with female relative wages (Bittman et al. 2001). The unequal division of housework has been found to persist after observable characteristics have been taken into account (Alvarez and Miles 2003). Thus, unlike predictions by comparative advantage or bargaining theories of the household, higher female wages have not led to a more egalitarian division of housework within the household. This is consistent with the hypothesis presented in this paper: The existence of a "social constraint" that prevents husbands from doing the amount of housework and prevents spouses to contract upon the efficient provision of public goods within marriage. This approach contributes to the literature that recognizes inefficiencies in marriage markets (Becker 1991, Lundberg and Pollak 1993) and to recent work on household behavior (Basu 2001, Rasul 2002).

2.2 A Model of the marriage market and the division of housework

This section formally analyzes the effect of a social constraint on the marriage market following Becker's specification of the marriage market (Becker, 1973 and 1975) . A marriage market is characterized by agents that are solely differentiated by heterogeneous tastes with respect to marriage. As in the standard Becker's framework, this heterogeneity demand for and supply of husbands (the

model could equally look at a demand and supply for wives). The marital output depends on the consumption and production of a public good, housework, and a private consumption good. The first modification with respect to Becker's model is to assume that it is the division of housework that is contracted upon marriage whereas private consumption is the same for both partners. In equilibrium, the price of marriage determines how the marital output is divided, that is a married couple contracts before marriage regarding the division of household work (and implicitly leisure). Those who remain single in this market do so because the utility in marriage is lower than the utility if single. As in the standard Becker model, rise in the female wage leads to a backward shift in the demand for husbands, resulting in a lower equilibrium price for men and a lower equilibrium quantity of marriage. I further extend the model to include a non-contractible division of housework. Under this assumption, the shift in the demand for husbands runs into the constraint that men cannot increase their level of housework. There is thus no decline in the price of men (and no change in male housework) but a larger decline in the quantity of marriage. [2]

Social constraints on the division of housework can be rationalized in different ways in light of the model. For instance, in the case of a marriage market as one with information asymmetry as in Becker (1991), agents do not reveal their type (i.e. the price they are willing to pay, or the amount of housework they are willing to share). This might be argued to be especially important in less egalitarian societies where cohabitation is not an option given the social stigma attached to it. If this is the case, after the increase in female wages there will be men willing to increase the share of housework below the "traditional share" but women will have no ability to know this, and those marriages will not take place.

Another channel in which social constraints on the division of housework can be understood to affect the marriage market is when thinking about commitment failures (i.e. imperfect contractibility) as in Lundberg and Pollak (1993). The division of housework has been recognized in economic literature as being an imperfect contractible process. In general the non observability by third parties of spouse's time devoted to housework and the inexistence of credible threats for certain housework activities (especially those related to caring activities) makes it difficult for spouses to commit to the market contracted housework share. Therefore, when female wages increase, the new equilibrium share of housework increases for men but with no commitment mechanisms women know that men have no incentive to live up to their promises once married and will perceive the supply for men as flat at the level $\overline{\alpha}$. This could be thought true in general but might be particularly important in traditional societies. On the one hand,

[2] The analysis assumes no substitutability (mobility) across marriage markets (where a marriage market is defined for a particular female and male wage), and therefore the same patterns of assortative matting are maintained throughout the analysis.

the existence of credible threats can be less important where housework can be outsourced (especially if it is publicly subsidized).

Finally, drawing from the social network literature, one can argue that in less egalitarian societies men face no cost (or are rewarded) when deviating from the efficient share once married, whereas in less traditional societies there exists a punishment from the society that prevents men from deviating from the efficient share once they get married. It is not the goal of the paper to identify the source of inefficiency in the marriage market. Rather, it is the recognition of this inefficiency and the implications for the equilibrium that is the object of study.

Utility if married

A "married" household is denoted by the subscript M and is assumed to be formed by two partners a male, denoted by m, and a female f. The joint household utility depends on market consumption goods that are jointly consumed by the "married" household C_M (such as meals, housing etc) at a normalized price $p = 1$[3]. It also depends on a fixed amount of household work that needs to be done Z_M. Household work and is understood in the most extensive form, going from dish washing to caring activities. It is therefore a public good and both spouses get utility from it once it is produced. Further each partner derives disutility from the provision of time to housework $f(H_i)$, where $f(.)$ is a convex cost function that captures the disutility from each spouse's time devoted to housework H_i for $i = m, w$. We normalize $0 \leq H_i \leq 1$ for $i = m, w$.

The household's utility is therefore

$$V^M = U(C_M) + 2U(Z_M) - f(H_m) - f(H_f)$$

where $C_M = w_f(1 - H_f) + w_m(1 - H_m)$ and $Z_M \geq H_f + H_m$. That is, the household consumes all the joint disposable income, where w_i $i = m, w$ are the wages.

The amount of time that each partner devotes to housework H_i is contracted in the marriage market before the actual marriage takes place. Each partner's housework share is given by

$$H_m = (1 - \alpha)Z_M \text{ and } H_f = \alpha Z_M$$

where α is the share of total housework performed by each partner and is determined in the marriage market such that $0 \leq \alpha \leq 1$.

[3] Alternatively, private consumption for both spouses C_f and C_m could have been considered. The results are robust to this specification since an efficient household will always allocate the same privarte consumption to its members.

Given the household utility, each partner's utility within marriage is given by

$$V_i^M = U(C_M) + U(Z_M) - f(H_i)$$

where

$$\begin{aligned} V_f^M &= U(C_M) + U(Z_M) - f(\alpha Z_M) \\ V_m^M &= U(C_M) + U(Z_S) - f[(1-\alpha) Z_M] \end{aligned}$$

and $V^M = V_f^M + V_m^M$

Utility if Single

The utility when the individual is single is given by the maximization to the following problem

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

Without loss of generality let's assume that $Z_S < Z_M$, that is the amount of household work that needs to be done in the single household is less than that in the married household[4].

The solution to this problem is thus 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

$$V_i^S = U[(1 - Z_S) w_i] + U(Z_S) - f(Z_S)$$

Decision to Marry

Following Becker's theory of marriage, each individual identifies potential mates in the marriage market. Potential mates are those with whom the individual would be happier than single. These are the individuals with whom marital utility V^M is at least equal, if not greater than the sum of their single outputs V_i^S for $i = m, f$ and the individual utility in marriage would in each case exceed his or her single utility if single. From this set of possible partners

[4] This can be rationalized based on economies of scale from joint consumption of public goods and joint production.

the individual selects that partner to marry with whom his or her marital utility would be the greatest. Therefore two conditions have to be met

$$\begin{aligned} 1 &: V^M \geq V_m^S + V_f^S \\ 2 &: V_i^M \geq V_i^S + \beta_i \text{ for } i = m, f \end{aligned}$$

The first condition states that the utility of marriage must be greater than the sum of the utilities from remaining single [5]. This is motivated by the existence of economies of scale within marriage or determined public goods that can only be consumed if married like, for example, children. The second condition states that the utility each individual gets within marriage V_i^M is greater than the utility if single $V_i^S + \beta_i$ where β_i is a taste parameter towards marriage that is distributed randomly with cumulative distribution F_i for $i = m, f$.

In order to establish whether an individual gets married or not we need to look at the utility within marriage and compare it to the utility if single. The decision rule is given by

$$\text{marry if } V_i^M \geq V_i^S + \beta_i \text{ for } i = m, f$$

Marriage market and the Division of Housework

In order to find the equilibrium division of housework once the couple is married we need to solve for the equilibrium in the marriage market. The marriage market is defined for a particular level of male and female characteristics such as age or education where the only source of agent heterogeneity is on the preference for marriage. Potential partners contract over the future provision of housework in the marriage market, which determines the equilibrium level of housework share α or the price of marriage. Thus, we can specify the marriage market supply and demand as a function of α[6].

Supply for men in the marriage market:

The supply of men in the marriage market are the number of men willing to marry at any given division of housework α. That is, the number of men such that

$$V_m^M \geq V_m^S + \beta_m$$

This is

$$S \equiv p(\beta_m \leq S_m - V_m^S) = F_m[V_m^M - V_m^S].$$

[5] If $V_{mf} < V_m^S + V_f^S$ then some of the spouses will be getting less share from the utility in marriage than when single, which contradicts condition 2.

[6] The specification is done from the male's perspective, but it is symmetric for the female.

which is an increasing function of α[7].

Proposition 1 *S, the supply of men in the marriage market, is an increasing function of* α.

Proof. For $\alpha = 0$ the man does all the housework, which gives him the lowest utility in marriage $V_m^M = U(C_M) + U(Z_M) - f(Z_M)$. Given the distribution function of β_m, there will be N_{m0} men willing to marry at $\alpha = 0$, those for which $\beta_m \leq U(C_M) + U(Z_M) - f(Z_M)$. For $\alpha = 1$ the man does not do any housework, which gives him the maximum level of utility in marriage $V_m^M = U(C_M) + U(Z_M)$. Given the distribution function of β_m there will be N_{m1} men willing to marry at $\alpha = 1$, those for which $\beta_m \leq U(C_M) + U(Z_M) - f(Z_M)$ such that $N_{m1} > N_{m0}$. Given that F_m is a distribution function, it is increasing in its argument $U(C_M) - f((1-\alpha)Z_M) - V_m^S$ and therefore in any value of α between 0 and 1, with an increasing number of men willing to marry as α increases. ■

Demand for men in the marriage market:

The demand for men (or the supply of women) for any given division of housework α is defined symmetrically to the supply of men. That is, the demand for men in the marriage market is the number of women willing to marry at any given α

$$V_f^M \geq V_f^S + \beta_f$$

This is

$$D \equiv p(\beta_f \leq V_f^M - V_f^S) = F_f[V_f^M - V_f^S].$$

Proposition 2 *D, the demand for men in the marriage market, is a decreasing function of* α.

Proof. The proof is straight forward and parallel to the proof for proposition 1. ■

Equilibrium quantity and price of marriage

Figure 1 depicts the equilibrium price of marriage $\alpha = \alpha^*$ in the marriage market specified above. That is, the equilibrium price of marriage is the contracted housework share for each spouse in the case of marriage. As in any other market, the number of marriages in equilibrium is when supply equals demand.

[7] If $\alpha = 0$ the husband must do all the housework, which gives him the lowest utility in marriage $U(C_M) + U(Z_M) - f(Z_M)$. Given the distribution function of β_m there will be N_{m0} men willing to marry at $\alpha = 0$, those for which $\beta_m \leq U(C_M) + U(Z_M) - f(Z_M)$.

If $\alpha = 1$ the husband does not do any housework, which gives him the maximum level of utility in marriage $U(C_M) + U(Z_M)$. Given the distribution function of β_m there will be N_{m1} men willing to marry at $\alpha = 1$, those for which $\beta_m \leq U(C_M) + U(Z_M) - f(Z_M)$ such that $N_{m1} > N_{m0}$

Given that F_m is a distribution function, it is increasing in its argument $U(C_M) - f((1 - \alpha)Z_M) - V_m^S$ and therefore in any value of α between 0 and 1, with an increasing number of men willing to marry as α increases.

Similarly, for any $\alpha > \alpha^*$ there will be excess supply of men in the marriage market (men willing to pay (do) more housework), which would drive α down. The same reasoning applies to $\alpha < \alpha^*$.

Comparative statics: Increase in female wages with perfect contractibility

Proposition 3 *An increase in the female wage decreases the female marriage gains for any given a. Given the distribution of preferences $F(\beta)$, the demand for men in the marriage market goes down.*

Proof. We know that the net gains to marriage is given by

$$\begin{aligned} & V_f^M - V_f^S = \\ = \; & U(C_M) + U(Z_M) - f(\alpha Z_M) - U(w_f) = \\ = \; & U[w_f(1-\alpha Z_M) + w_m(1-(1-\alpha)Z_M)] + U(Z_M) - f(\alpha Z_M) - U(w_f) \end{aligned}$$

Thus,

$$\frac{\partial[V_f^M - V_f^S]}{\partial w_f} = \frac{\partial U}{\partial C}|_{C_M}(1-\alpha Z_M) - \frac{\partial U}{\partial C}|_{C_S} < 0 \text{ if } \alpha > 0.5^8$$

■

Proposition 4 *An increase in the female wage decreases the male net marriage gains for any given α. Given the distribution of preferences $F(\beta)$, the supply of men in the marriage market goes down.*

Proof.

$$\begin{aligned} & V_m^M - V_m^S = \\ = \; & U(C_M) + U(Z_M) - f[(1-\alpha)Z_M] - U(w_m) = \\ = \; & U[w_f(1-\alpha Z_M) + w_m(1-(1-\alpha)Z_M)] + U(Z_M) - f[(1-\alpha)Z_M] - U(w_m) \end{aligned}$$

Thus,

$$\frac{\partial[V_m^M - V_m^S]}{\partial w_f} = \frac{\partial U}{\partial C}|_{C_M}(1-\alpha Z_M) < 0 \text{ if } \alpha > 0.5$$

■

Proposition (3) and Proposition (4) imply that there is a decrease in the number of marriages in the new equilibrium. The new equilibrium price α^* can be lower or higher than the former. Under the assumptions that the supply of

men shifts less than the demand for men[9] the equilibrium price of marriage, that is the woman's housework share, is lower than before. This is consistent with bargaining models of the family, however these models argue that increases in women's wages increases her threat point by increasing her utility when single. In the model above an increase in female wages not only affects the utility if single but also the marital output as is depicted in figure 2 of the appendix.

Comparative statics: Increase in female wages with social constraints and imperfect contractability

In order to show why marriage rates are lower in some countries for same wage women, a social constraints in the division of the marital output (i.e. man's share of housework) is introduced in the previous model. Under the assumption of this constraint being binding. In this set up the supply of men to the marriage market is flat below some level $1-\overline{\alpha}$ that represents the maximum share of marital housework men perform in the household. As female education goes up and man's share of housework (the price of marriage) remains constant there is an excess supply of men in the marriage market. This leads to fewer marriages than in an efficient world.

3 The Data: ISSP 1994

3.1 Data Description

The data used for this section come from the International Social Survey Program (ISSP), which is an annual program of cross-national collaboration on surveys between several social science institutes dating back to 1983. Over two-dozen countries have been participating in several survey efforts covering topics such as social inequality, social networks and support systems, and the role of government. This analysis is based on the 1994 survey "Family and Changing Gender Roles," which covered 33,590 households from Australia, Austria, Bulgaria, Canada, the Czech Republic, Germany (East, West), Great Britain and Northern Ireland, Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Philippines, Poland, Russia, Slovenia, Spain, Sweden, and the United States. In each of these 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. This survey is particularly useful for my purpose because it collected general demographic information, employment and wages, the actual division of labor within the

[9] This is plausible given that women's gain to marriage decrease because of a decrease in the utility in marriage and an increase in the utility if single. However, men's net marriage gain decrease only because a decrease in the utility in marriage.

household and several attitudinal variables toward the division of labor in the household.

3.2 Sample and Variables

We use a sample of women between 18 and 70 years old at the time of the interview, that is cohorts of women between 1975 and 1924. The countries we use in our sample are Australia, Germany, Great Britain, Northern Ireland, United States, Austria, Italy, Ireland, Netherlands, Norway, Sweden, New Zealand, Canada, Japan and Spain.

Given that our focus is on household formation and not marriage per se, we define an ever married woman as a woman who is either married, divorce or widowed. We also include all women who are currently living with a partner in a long lasting relationship. We construct this variable using answer to the marital status question and steady life partner (i.e. whether living together with a partner).

We use female education as a proxy for potential outside opportunities. Education is given in years and levels, but data on levels applies a different criteria among different countries and it is hard to interpret. Instead we use education years as our education variable. We loose information on Germany, Canada and Spain, because these countries have no information on this variable (education levels is missing for Spain as well).

There is no variable on partner's earnings. We calculate it as the residual that remains after the subtracting the female's wage from the total family income for those households where the woman is working and as the family income for those where the woman is not working.

The data contains information on Division of Housework between partners. Questions on housework division include laundry, small repairs, grocery shopping, what to have at dinner and caring for the sick. Answers to the question "who does what" is tabulated in 6 different categories: From "always the woman" to "always the man". A sixth category is a third person. In our data less than 2% of the sample outsource these services, so we discard it.

A main contribution of this survey is that it asks questions about gender roles. These attitudes are measured by constructing a principal component index from a series of fifteen responses to statements designed to capture attitudes towards the gender division of housework such as "How much should women work with preschool children?" and "A man's job is to earn money and a woman's job is to look after the home and family". The responses were coded on a 1 to 5 scale, from "strongly agree" to "strongly disagree". Our composite

index indicates that attitudes toward the gender division of housework are less egalitarian in countries such as Austria, Italy, Japan, and Spain than in countries such as Norway, Sweden, and Canada. Countries in the table above are ordered by their attitudes toward gender roles, with those at the bottom being more egalitarian.

Table 3. Summary Statistics

Country	Attitudes**	Egalitarian Dummy	Laundry***	Mean Male's Earnings	Mean Female Education	% Ever Married	Observations
AU	2.82	0	1.23	18,724.95	11.05	100.00%	481
SP	3.22	0	1.24	10,170.93	--	96.94%	1,124
JA	3.26	0	1.21	25,987.57	11.71	99.33%	616
IT	3.30	0	1.10	16,035.57	9.31	100.00%	492
GE	3.40	0	1.45	18,669.61	--	100.00%	982
IR	3.40	0	1.44	12,325.63	11.55	98.36%	451
NI	3.58	0	1.42	15,447.12	11.28	100.00%	275
GB	3.60	1	1.58	17,120.07	11.31	100.00%	461
NZ	3.66	1	1.91	14,882.86	11.87	99.53%	550
AUS	3.69	1	1.67	13,788.53	11.20	92.17%	777
NL	3.72	1	1.56	12,429.90	12.11	92.38%	953
UN	3.74	1	1.98	23,164.33	13.43	94.54%	734
NO	3.89	1	1.72	17,383.42	12.55	100.00%	1,024
SW	4.04	1	1.79	13,423.95	11.51	99.10%	616
CA	4.05	1	1.97	20,853.86	--	98.55%	830
totals		--	1.55	16,693.89	11.57	98.06%	10,366

Women 19-70

** 1: Agree to 5: desagree

*** 1: Always woman to 5: Always man

Table 3

3.3 Empirical Specification

The empirical analysis attempts to test the implications on individual behavior that follow from the general equilibrium model. The first implication of the model is related to the price of marriage (i.e. the woman's housework share α that is contracted in the marriage market). The theory predicts that it is lower for those women who marry in more egalitarian countries for the observed marriages, given that they can efficiently contract upon the provision of household labor. The econometric specification for this case is

$$(1 - \alpha_{i,k}) = Z_{i,k}\beta + \gamma E_k + \varepsilon_{i,k}$$

where $(1 - \alpha_{i,k})$ is husband's share of housework for woman i, and $Z_{i,k}$ denotes the woman's i individual and household's characteristics. The model predicts that $\gamma > 0$, that is ceteris paribus the husband's share of housework is higher in countries with more egalitarian gender roles.

Related to this is the additional implication from the model that it is for high educated women that social norms toward gender roles are binding. The last part of the analysis looks at this additional implication by interacting woman's

education and the country egalitarian index. The econometric specification is then

$$(1 - \alpha_{i,k}) = X_{i,k}\beta + \gamma_1 E_k + \gamma_2 (E_k * edu_{i,k}) + \varepsilon_{i,k} \quad \text{(R2)}$$

where γ_2 is expected to be greater than 0. In words, the difference in the price of marriage between egalitarian and non-egalitarian countries is higher for high educated women. In the case of low educated women, it is women that are doing most of the housework regardless of the country, so the constraints on the division of household labor do not affect the price of marriage (i.e. woman's share of housework).

Second, the model predicts that ceteris paribus, a woman that lives in a country with more egalitarian norms toward gender roles has a higher probability of marriage than a woman in a less egalitarian country[10]. This is so because the former can contract upon the division of household labor and extract the benefits from marriage, whereas the latest is not able to do so due to the binding constraint on housework division. Formally, the econometric specification would be of the form

$$p_{i,k}(marry) = X_{i,k}\beta + \delta E_k + \varepsilon_{i,k}$$

where $p_{i,k}(marry)$ is the probability of marriage, $X_{i,k}$ is a set of individual observable characteristics and E_k is the country egalitarian index. i denotes woman and k denotes country. 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. Correlation within countries but not across countries throughout the analysis. It follows from the model that $\delta > 0$.

An additional implication from the model comes from the hypothesis that it is high educated women the ones for which social norms toward gender roles are binding. In other words, for low educated women the degree of specialization (i.e. the price of marriage) is high to begin with, thus the constraint is less likely to bind. Thus, the difference in the probability of marriage for low educated women in egalirarian and non-egalitarian countries is negligible. The econometric specification is then

$$p(marry)_{i,k} = X_{i,k}\beta + \delta_1 E_k + \delta_2 (E_k * edu_{i,k}) + \varepsilon_{i,k} \quad \text{(R1)}$$

[10] It is assumed that the marriage market faced by women is that of the country. The underlying assumptions of all the econometric specifications is that marriage markets solely differ across countries on the social constraints imposed by husbands' contributions to housework. Thus, it is implicitly assumed that the number and characteristics of partners that women face is the same across countries. A different specification could assume a narrower definition of the marriage market, for example a cohort-country. However, one of the assumptions of the model is the lack of mobility across marriage markets. This is likely to hold across countries, but becomes problematic when a narrower definition is used.

Man's Housework Share OLS regression				
	Laundry	Sick	Groceries	Dinner
age	-0.008	-0.012	-0.008	-0.013
	(2.97)**	(4.99)***	(5.38)***	(11.11)***
"egalitarian"	0.301	0.309	0.281	0.277
	(2.72)**	(3.35)***	(2.51)**	(2.24)**
years of education	0.041	0.024	0.008	0.012
	(4.92)***	(3.68)***	1.75	(2.10)*
log of husband's earnings	-0.091	-0.029	-0.017	-0.053
	(3.60)***	(1.88)*	0.67	1.53
Constant	2.441	2.683	2.697	3.025
	(8.59)***	(13.43)***	(9.92)***	(9.15)***
Observations	3138	3001	3148	3150
R-squared	0.16	0.12	0.09	0.13
- Absolute robust t statistics in parentheses - * significant at 10%; ** significant at 5%; *** significant at 1% - Married Women 18-60; using 2-point for housework				

Figure 1: Table 1

The model predicts $\delta_1 > 0$ and $\delta_2 > 0$, i.e. the difference in the probability of marriage between egalitarian and non-egalitarian countries is higher as female education increases.

3.4 Is the Price of Marriage too High?

Table 1 shows OLS regressions where the dependent variable is the price of marriage (i.e. the share of husband's housework). This variable takes value 1 if "the woman always does it", 2 if "the woman usually does it" 3 "if both spouses share it equally" 4 "if the man usually does it" and 5 "if the man always does it"[11].There are four different household tasks: Laundry, taking care of the sick, shopping for groceries and deciding what to have for dinner. The results are consistent with the model, which predicts that the price of marriage is higher for those women in less egalitarian countries at any given age. This provides evidence of a persistence of the constraint over time (or across cohorts) as differences of man's housework share between egalitarian and non egalitarian countries seems to be persistent over time[12]

[11] There is a sixth alternative where the couple outsources this activity. These observations are not used in the regression analysis since they represent only 1.5% of the data.

[12] The difference between egalitarian and non- egalitarian countries have not widen over time. A different specification that controls for the interaction between age and egalitaria was only significant for "laundry" and "shopping. The coefficient on the interaction is negative, indicating that the difference between egalitarian and non-egaliratian countries has increased for younger cohorts.

Man's Housework Share (values from 0 to 5) OLS Regressions	
	Laundry
age	-0.007
	(4.64)***
"egalitarian"	0.519
	(5.90)***
age * "egalitarian"	**-0.01**
	(6.25)*
years of education	0.043
	(7.40)***
log of husband's earning	-0.092
	(3.51)***
education * "egalitarian"	**0.018**
	(1.91)*
Constant	2.366
	(7.64)***
Observations	3138
R-squared	0.17
- Robust t statistics in parentheses - * significant at 10%; ** significant at 5%; *** significant at 1% - Married Women 18-60	

Figure 2: Table 2

To test whether the price of marriage is differentially higher for high educated women, the interaction of female years of education with the country egalitarian variable is introduced[13].

The interaction between age and the country egalitarian index is negative, indicating that the differences between egalitarian and non-egalitarian countries have increased for younger cohorts. The interaction between education and country egalitarian index is positive, indicating that the difference between egalitarian and non-egalitarian countries is greater for higher educated women. These results do not extend to other housework activities, which indicates that overall the price of marriage is not significantly higher for high educated women in less egalitarian countries.

3.5 Propensity to Marry

This section tests the hypothesis of a higher probability of marriage for women living in more egalitarian countries, where there is no constraint on the provision of housework. A probit model where the dependent variable is the probability of ever having been married (or living as married) is specified for women between

[13] The interactions are only significant for laundry.

Probit Model Probability of being married or living as married	[1]	[2]
5-year cohort	0.058	0.051
	(14.38)***	(12.98)***
"Egalitarian"	0.071	0.07
	(1.77)*	(1.73)*
years of education	-0.011	-0.006
	(-7.79)***	(-5.51)***
cohort * egalitarian	-0.009	-0.012
	-1.48	(-2.45)**
education * egalitarian	-0.001	0.001
	-0.86	0.97
Observations	5933	5861
- Robust z statistics in parentheses		
- * significant at 10%; ** significant at 5%; *** significant at 1%		
- [2] controls for employment status		
- Women 19-60		

Figure 3: Table 3

19-70 years old[14]. The coefficients are marginal effects of the independent variables on the probability of marriage. The individual control are the woman's cohort, woman's years of education and woman's work status. In order to capture the effect of the constraint in the marriage market the variable "egalitarian" is introduced, which is the average value of the principal component value for that country. Additional controls for the interaction between education and country egalitarian index as well as between cohort and country egalitarian index are also reported. These last controls are used to assess whether the difference in the probability of marriage between egalitarian and non-egalitarian countries is greater for high educated women.

The coefficient on education is negative in both regressions after controlling for age, which is consistent with traditional theories of marriage. The coefficient on the egalitarian index is positive, which suggests that the probability of marriage is higher for countries with more egalitarian norms toward gender roles. In particular, for any level of education the probability of marriage is higher by 1 percentage point for a woman living in a more egalitarian country and is robust to controlling for employment status.

Furthermore, in regression [2] we observe that the difference of the probability of marriage between women in egalitarian and non-egalitarian countries has increased for younger cohorts, which is what the negative sign on the interaction

[14]The countries for which education is availiable are: Australia, Northern Ireland, United States, Austria, Italy, Ireland, Netherlands, Norway, Sweden, New Zeland and Japan. Standard errors are clustered by country.

between cohort and egalitarian indicates. Nonetheless, the interaction egalitarian*female education is not significant and we must reject the hypothesis that high educated women living in less egalitarian countries are more constrained than low educated women in the marriage market. This is consistent with the results in the previous section that indicated that despite the fact that differences in housework share are persistent across countries, these differences have not widen for younger cohorts.

4 Conclusion

This study has looked at the effect of social constraints on the division of housework in relation to the declines in marriage rates. The motivating point for this paper is the existence of lowest-low fertility countries and the provision of a different angle to the previous research by looking at the process of union formation. The paper then turned to explanations for the decline in marriage rates. As in many theories about declining fertility and marriage, I assumed that the driving force was a rise in women's labor market opportunities due to rising female education. But why had this a greater effect in some countries than others? The proposed explanation in this paper is that rising female wages interacted with a pre-existing cultural constraint, namely a limit on the allocation share of housework between spouses, that limited the contractability upon this public good between spouses.

A formal analysis of the effect of such a constraint was presented following Becker's framework of marriage (1973). There is a market for marriage, in which the division of housework constitutes a price, and correspondingly there is a demand for and supply of potential husbands (or wives). A married couple is able to contract before marriage regarding the division of household work (and implicitly leisure). As in the standard Becker model, a rise in the female wage leads to a downward shift in the demand for husbands, resulting in a lower equilibrium price for men (implying that men will have to do more housework) and a lower equilibrium quantity of marriages. In the extended version of the model presented here, this shift in the demand for husbands runs into the constraint that men cannot increase their level of housework. There is thus no decline in the price of men (and no change in male housework) but a larger decline in the quantity of marriage.

The last part of the paper looked for evidence on whether the hypothesized cultural constraint on male housework exists. We use household level data on marriage, education, attitudes, and actual division of household labor from the International Social Survey Program. I categorized countries with respect to their average degree of egalitarian gender norms. For countries with non-egalitarian gender norms the price of marriage is higher, meaning that man's

housework share is lower for those marriages that actually take place. Further, in the former countries the share of housework done by husbands within is less responsive to the male/female wage ratio within the household. The implications of the theoretical model also hold for the number of marriages. We show that the probability of marriage is lower in countries with less egalitarian norms on gender roles.

Finally, understanding the interplay between social norms and household choices over time is not only relevant from a theoretical perspective but also from a policy point of view. The inability to contract upon the division of the marital output (housework division) in the marriage market presents an economic rationale for intervention in decisions on time allocation within the household.

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6 Appendix 1 Marriage and Fertility

Figure A1.1 Age-specific percentage of women married at any given age

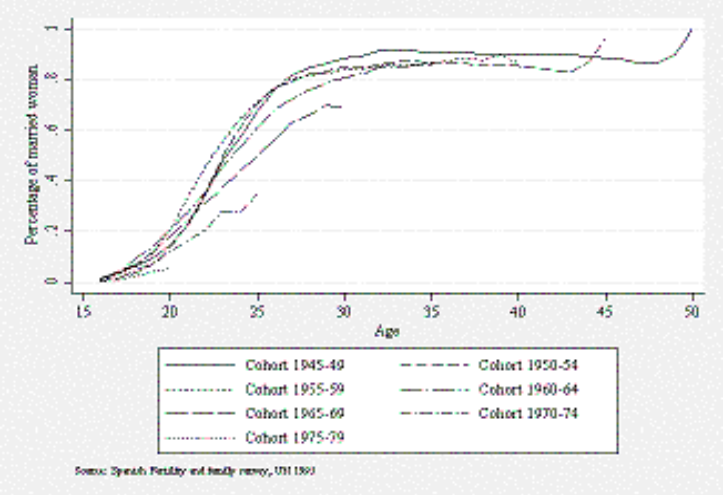


Figure A1.2 Percentage of women married at any given age, by cohort. US.

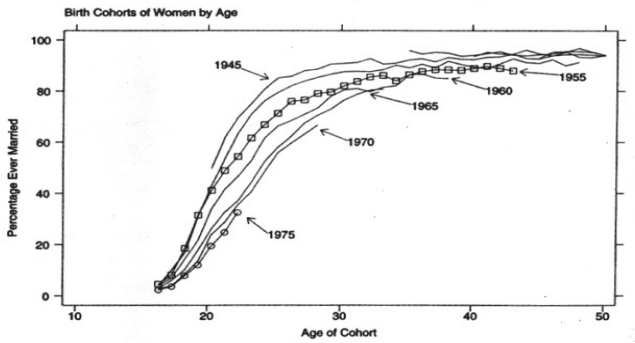


Figure 9.5. Cohort marriage patterns by age, showing the strong tendency toward convergence at older ages. Marriage isn't dead—it's just been delayed!

Figure A1.3 Propensity to have a first child within marriage

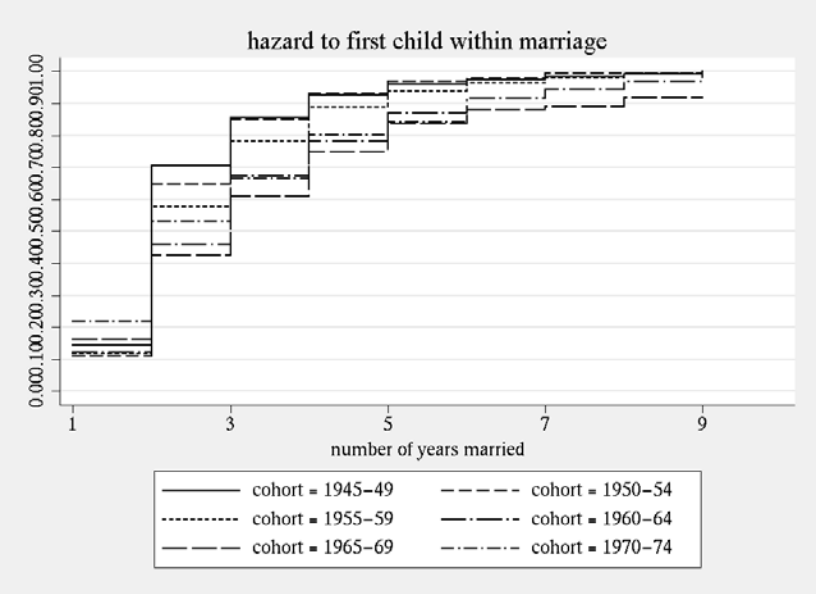
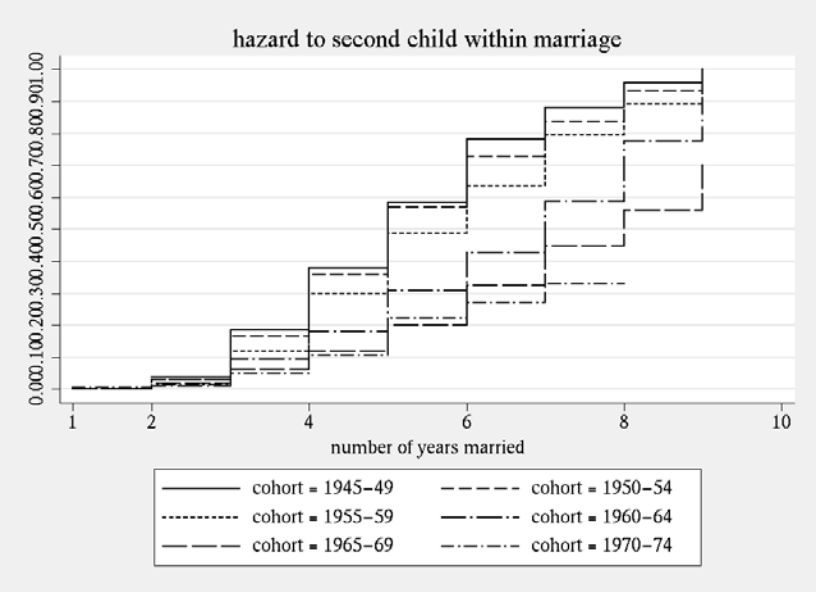
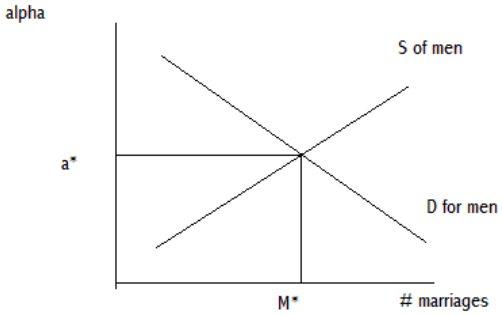


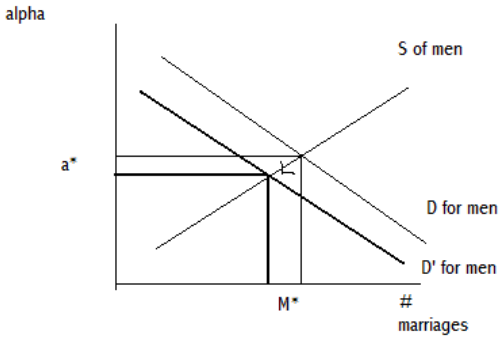
Figure A1.4 Propensity to have a second child within marriage



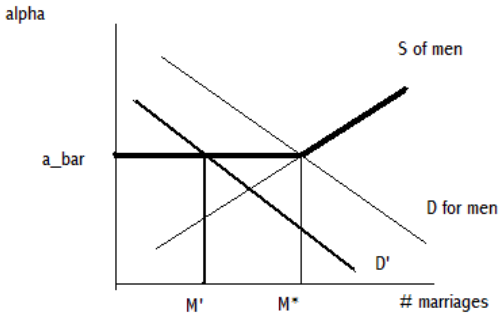
7 Appendix 2- Comparative Statics



Marriage Market Equilibrium



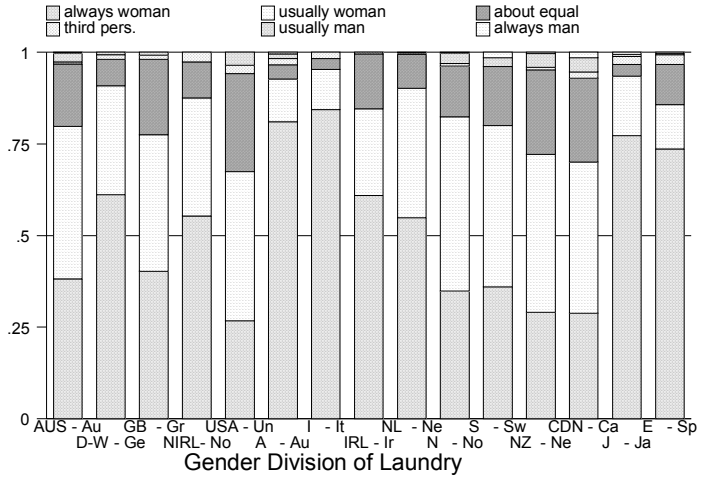
Increase in female wage, no constraints



Increase in female wage with constraints

8 Appendix 3- Description of Variables

Table A4.1 Division of Housework between Spouses- Laundry.



Source: ISSP 1994

Table A4.2.a Attitudes toward the Gender Roles-Women Sample
Question: It is woman's job to stay at home

Source: ISSP 1994

Table A4.2.b Attitudes toward the Gender Roles-Men Sample
Question: It is woman's job to stay at home

Source: ISSP 1994

9 Appendix 4 Equilibrium Quantity of Marriages

This appendix describes a different specification for the regression in table 1.3. Here, the same regressions are presented but the "country attitudes" variable has been replaced with a country dummy for "egalitarian" or "non-egalitarian". A country is considered to have egalitarian attitudes toward gender roles (egalitarian=1), if the the mean attitudes level is above the median of all countries.

Table 1.3b Equilibrium Quantity of Marriages

Ever Married				
	[1]	[2]	[3]	[4]
age	0.01	0.009	0.01	0.009
	(28.33)***	(23.90)***	(28.31)***	(23.91)***
egalitarian =1	0.05	0.072	0.119	0.125
	(5.41)***	(7.80)***	(2.94)***	(3.24)***
years of education	-0.013	-0.008	-0.009	-0.006
	(9.22)***	(6.57)***	(3.88)***	(2.75)***
interaction of education and egalitarian dummy			-0.005	-0.004
			(1.69)*	-1.33
Observations	6779	6685	6779	6685

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Women 19-70

Regression [1] and [2] present the basic probit estimators for the probability of marry for women between 19-70 years old. The coefficients are marginal effects of the independent variables on the probability of marriage. The coefficient on education is negative in both regressions after controlling for age. The coefficient on the egalitarian dummy is positive, which suggest that the probability of marriage is higher for countries with more egalitarian norms toward gender roles. In particular, for any level of education the probability of marriage is higher by 11.9 percentage points in these countries.