

Social Norms, Labour Market Opportunities, and the Marriage Gap Between Skilled and Unskilled Women

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In most of the developed world, skilled women marry at a lower rate than less skilled ones. We document heterogeneity across countries in how the marriage gap between skilled and unskilled women has evolved over time. As labour market opportunities for women have improved, the marriage gap has been growing in some countries but shrinking in others. We discuss the comparative statics of a theoretical model in which the (negative) social attitudes toward working women might contribute to the relatively lower marriage rate of skilled women and might also induce a non-monotonic relationship between their labour market prospects and their marriage outcomes. The model delivers predictions about how the skilled–unskilled marriage gap should react to changes in labour market opportunities across economies with more or less conservative attitudes toward working women. We verify the key predictions of this model in a panel of 26 developed countries, as well as in a panel of U.S. states.

Key words: Marriage markets, social norms, labor supply, education.

JEL Codes: J12, J16, J22

1. INTRODUCTION

Marriage rates have been declining throughout most of the industrialized world. In 2010, one in five adults aged 35–44 in the U.S. had never married, compared to about 7% in 1970 (Pew Research Center, 2014). The marriage rate in the EU-28 declined by close to 50% between

1965 and 2011, from 7.8 per 1,000 persons to 4.2 (Eurostat, 2015).¹ Similarly, the proportion of single women aged 35–39 has increased in East Asia (Jones and Gubhaju, 2009), reaching about one in five in Hong Kong and Japan by the mid to late 2000s compared to one in twenty, at most, in 1970. This overall decline in the marriage rate in the industrialized world has received widespread attention in the literature, and influential work has discussed a range of contributing factors including improved access to birth control and abortion, labour-saving technological change in household production, greater ease of divorce, rising income inequality, and reduced gender discrimination and gender wage gaps in the labour market.²

A more overlooked aspect of the discussion surrounding the overall decline in marriage is its differential impact on skilled versus unskilled women across the industrialized world. In the U.S., research has documented a reversal over time of the skilled–unskilled marriage gap, with college-educated women today being as likely, if not more likely, to get married relative to those without a college education (Pew Research Center, 2010; Isen and Stevenson, 2011).³ In contrast, a number of countries in East Asia have been grappling with the reverse phenomenon, with highly educated women today marrying at a particularly low rate relative to their less educated counterparts (Economist, 2011; Hwang, 2016). For example, 35% of college-educated women between the age of 35 and 39 in Hong Kong remained single in 2011, and many of these women will likely remain childless given how rare out-of-wedlock births remain in most of Asia (OECD Family Database, 2012).⁴

Figure 1 shows how the skilled–unskilled marriage gap among women aged 35–44 has evolved over time across 26 developed countries since the 1990s (classified into six groups based largely on geography). We define the skilled–unskilled marriage rate gap among women as the difference in the fraction of women who were ever married, between those with and without a tertiary education.⁵ As observed in Figure 1, in the U.S., Canada, the UK, and Ireland, while skilled women in the earliest cohort (aged 35–44 in 1995) married at a lower rate than unskilled women in that same cohort, this gap diminished over time and had fully reversed in sign by the 2005 and 2010 cohorts. A qualitatively similar picture emerges in other Western European countries—France, Germany, Belgium, the Netherlands, and Switzerland—with the exception of Austria, even though these countries have not experienced a reversal of the gap by 2010. Most of the Nordic countries have also experienced a decline over time in the relative marriage “surplus” for unskilled women; in fact, as of 2010, all of the Nordic countries, with the exception of Denmark, are characterized by a higher marriage rate for skilled women relative to less skilled ones.

The patterns over time are quite different for East Asian countries. While more educated women married at a much lower rate than less educated ones in the earliest cohort, this gap has been largely growing over time.⁶ Southern Europe and Eastern Europe are characterized by a relatively flat trend in the marriage rate gap between education levels, with skilled women

1. http://ec.europa.eu/eurostat/statistics-explained/index.php/Marriage_and_divorce_statistics

2. See, among others, Blau *et al.* (2000); Goldin and Katz, 2002; Gould and Paserman, 2003; Greenwood *et al.*, 2005; Goldin, 2006; Rasul, 2006; Stevenson and Wolfers, 2007; Greenwood and Guner, 2009; Gonzalez and Viitanen, 2009; Greenwood *et al.*, 2016.

3. Martin (2004) provided some of the earliest evidence of converging marriage probabilities between college and non-college educated women. His projections indicated a potential crossover in ever-married rates for white non-hispanic women born after 1965.

4. In 2012, the share of births outside of marriage was just over 2% in Korea and Japan, compared to the OECD average of 39%. The share of out-of-wedlock births in the U.S. is about 40% (OECD Family Database, 2012).

5. Following the Eurostat education classification, we define skilled individuals as those who completed tertiary education (individuals who completed ISCED levels 5 or 6). For the U.S., this definition corresponds to individuals with an associate’s degree and above.

6. The only exception to this pattern is Hong Kong, where the skilled–unskilled marriage gap is slightly smaller (in absolute value) in the most recent cohort than in the first cohort.

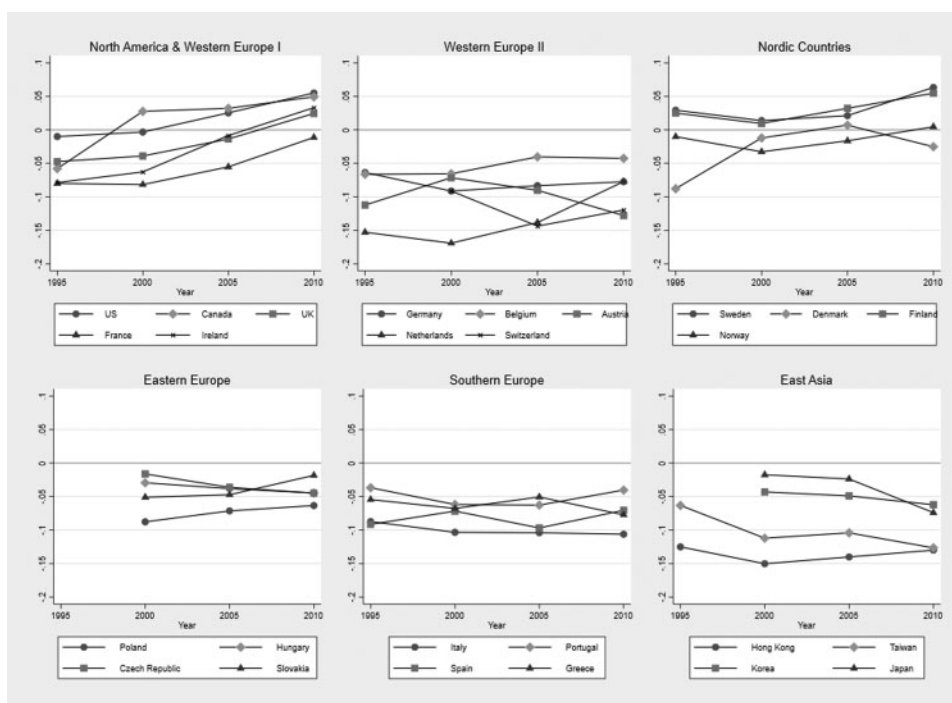


FIGURE 1

Difference in female ever married rates (skilled - unskilled) from 1995 to 2010 by country

Notes: See [Supplementary Appendix Table 1](#) for a description of the data sources. The figure shows the trends (1995 to 2010) in the skilled–unskilled difference in ever married rates among women aged 35–44 for each of the 26 countries in our sample.

being less likely to get married throughout the sample period. The observed divergence in the trends in the marriage gap between skilled and unskilled women across developed countries has occurred despite consistent patterns of increased labour market opportunities for skilled women (and men).^{7,8}

A closer look at the U.S. experience over a longer time period reveals a U-shaped relationship in the marriage gap between skilled and unskilled women by birth cohort (Figure 2). In Figure 2A, we plot the difference in ever married rates between college and non-college educated non-hispanic white women aged 35–44 by birth cohort. The relative marriage deficit experienced by skilled women increased between the early-1930s birth cohorts and the mid-1950s birth cohorts, when it reached its maximum (about a 7 percentage point deficit). Since then, the skilled–unskilled gap in marriage rate has been shrinking, with a reversal of the gap first occurring among the cohorts born in the late 1960s. Figure 2B plots the difference in the likelihood of having a family (which we define as having been ever married and having at least one child) between college and non-college

7. [Supplementary Appendix Figure 1](#) reports similar trends for men. The contrast between the trends in the skilled–unskilled marriage gap for men and women over time in East Asia is particularly striking.

8. [Supplementary Appendix Figure 2A](#) and [B](#) present marriage rate trends separately by education group and gender. In most countries, marriage rates have trended downwards for both genders and education groups. Therefore, improvements in the skilled–unskilled marriage gap are driven by marriage rates for the skilled decreasing at a lower rate than marriage rates for the unskilled and not by absolute increases in the marriage rates for skilled women.

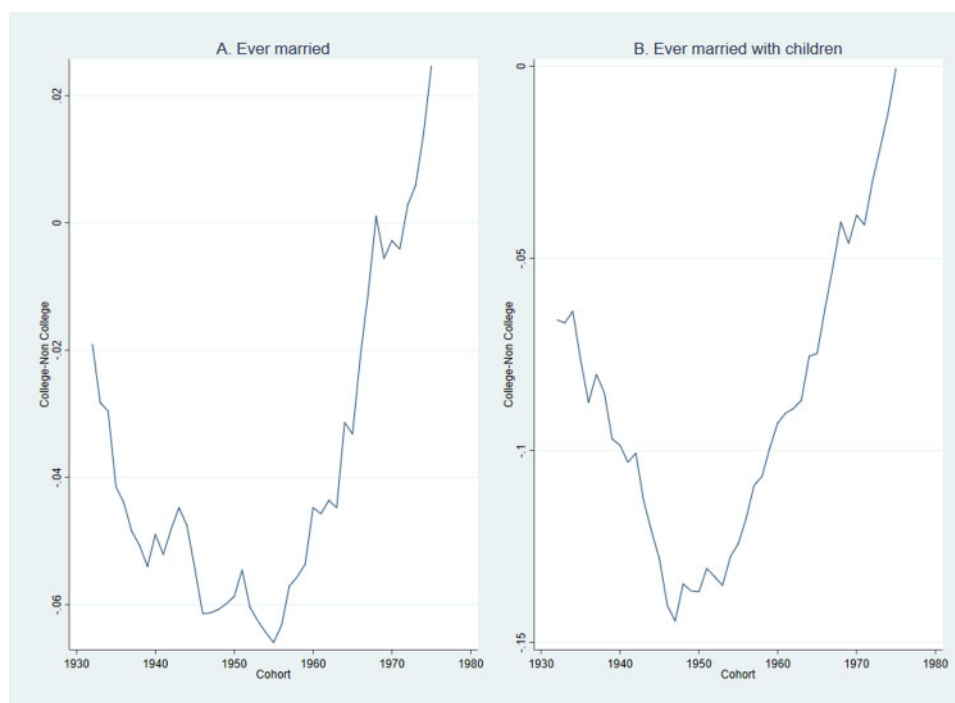


FIGURE 2

Difference in female ever married rates by skill (college - non college) across birth cohorts in the U.S.

Notes: The data are from the June Current Population Survey (CPS) and the sample is restricted to non-hispanic white women age 35–44 years old. The figure shows five-year moving averages of the difference in ever married rates (Panel A) or ever married with children rates (Panel B) between college and non-college women.

educated women. Again, we see a clear U-shaped relationship. Between the early-1930s to the early-1950s birth cohorts, skilled women were increasingly less likely to have a family compared to unskilled women; the difference has since then been shrinking, with a reversal of the gap first occurring among the cohorts born in the mid-1970s.

Our article aims to provide a theoretical rationale for the heterogeneity in the educational gap in marriage rates across developed countries, the diverging patterns across countries as labour market opportunities for skilled women increase, as well as the U-shaped relationship documented above. Our model closely follows Fernandez, Fogli, and Olivetti (FFO, 2002, 2004). We abstract away from the rich intergenerational dynamics in FFO's model and instead focus on the implication of FFO's model for how women's educational investments affect their marriage probabilities. In this model, a marriage gap between skilled and unskilled women emerges endogenously as a consequence of skilled women's higher market wages and the different time allocation decisions these higher market wages generate. The key force behind the emergence of this marriage gap is gender norms that generate spousal disagreement over the provision of the household public good (*i.e.* children). Because skilled women have higher wages, they provide less of that public good relative to unskilled women. This makes them less attractive to potential partners in the marriage market, at least for some values of the wage rate. Thus, a woman's education decision might be associated with a trade-off between a higher return in the labour market and a lower marriage probability.

We further emphasize how the strength of the marriage/work trade-off faced by skilled women is a non-monotonic function of their economic opportunities. In particular, holding gender norms constant, the model predicts a U-shaped relationship between the marriage deficit experienced by skilled women and their market wage. Intuitively, at lower wage levels, the loss in public good consumption due to the wife working—the likelihood of which is increasing in her market wage—dominates the husband's gains due to the externality he experiences from his wife's consumption. However, when the wife's market wage is high enough, she becomes increasingly more attractive relative to a non-working woman. Thus, assuming fixed or slow-moving social norms within a country, the model predicts that we should see that, as women's labour market opportunities increase, the marriage deficit experienced by skilled women first rises, reaches a peak, and then declines, eventually becoming a surplus.

The model also allows us to perform some comparative statics with respect to the strength of gender norms. Holding wages constant, the model predicts that the relative deficit skilled women experience in the marriage market is more severe in countries with more conservative gender norms. In addition, the model shows that the range of wages over which skilled women experience relatively lower marriage rates is much larger in countries with more conservative gender norms. Furthermore, the model predicts that a lower fraction of women will be willing to acquire higher education in more gender conservative countries as they anticipate facing greater barriers in the marriage market if they become more skilled.

In the empirical section of the article, we first take the key predictions of the theory to our panel of 26 developed countries. As predicted by the model, we find a strong positive relationship between the relative deficit skilled women experience in the marriage market and the degree of gender-related conservatism. While the time series in this cross-country dataset is too short (at most 15 years of data) to formally test for the U-shape relationship predicted by the theory, we observe patterns in the data that are consistent with the theory. In particular, we show that improvement in economic opportunities are strongly associated with relative gains in marriage for skilled women in more gender equal countries, while this relationship is flatter or even negative in countries with more traditional gender norms. We demonstrate the robustness of these results to alternative definitions of a long-term and stable relationship between a man and a woman, such as definitions that include cohabitation or focus instead on fertility outcomes. We also show that these results are not solely driven by East Asian countries and are robust to alternative measures of gender norms. Finally, and also consistent with the theory, we show that the share of females with tertiary education in a country is negatively related to the conservativeness of the gender norms as well as to the marriage market deficit for skilled women in that country.

Next, we take the predictions of the theoretical model to a panel of U.S. states covering the 1970 to 2010 period. Exploiting differences across 45 states in the strength of gender norms, we show that the key findings from the country-level analysis carry through in the U.S. sample. Furthermore, the longer time series in the sample of U.S. states allows us to directly document the U-shaped relationship predicted by the theory, and to compare this relationship across states grouped by the relative conservativeness of their gender norms. Consistent with the theory, we observe a U-shape relationship between the female skilled–unskilled marriage gap and labour market opportunities for skilled women in more sexist states in the U.S.; by contrast, over the measured wage range, skilled women's relative marriage rate tends to steadily increase with their labour market opportunities in the less sexist states.

The rest of the article is organized as follows. Section 2 discusses the related literature. Section 3 presents a static model of marriage, household decision making and education decisions. Section 4 lays out the empirical tests of the model, and presents the results using the cross-country panel and the panel of U.S. states. We conclude in Section 5.

2. RELATED LITERATURE

Our article is related to a recent and growing macro labour literature that has examined the relationship between women's education and marriage. This literature has been broadly motivated by the U.S. experience over the last 50 years or so. Specifically, the literature has sought to understand three main trends: the increased labour force participation of married women, the secular decline in marriage rates, and the reversal of the gender gap in education.

A couple of papers in this literature have focused on the role of improvements in the home production technology in explaining these trends. By freeing up women's time at home, these changes have asymmetrical benefits for women. [Chiappori *et al.* \(2009\)](#) theoretically show how a reduction in time spent in household production increases women's return to schooling within the marriage, potentially leading women to invest more in schooling relative to men, and result in increased marriage rates for educated women. [Greenwood *et al.* \(2016\)](#) develop and estimate a unified structural model of marriage and divorce, educational attainment, and married female labour force participation. They show how technological progress, by eroding the value of labour at home, played a crucial role in the decline in marriage as well as the rise in married women's labour force participation. Note, however, that the models in these papers are not well suited to explain the divergent experiences in the educational marriage gap across industrialized countries and U.S. states over time that motivate our study. Neither are papers that have focused on the role of female education as insurance against a bad marriage, and on how changes in divorce laws may have impacted education choices and marriage patterns ([Fernandez and Wong, 2014a,b](#); [Guvenen and Rendall, 2015](#)).

One of the trends that we examine in the U.S. context as well as in several other countries is the relatively slower decline in marriage rates among more educated women. Previous papers, largely motivated by the U.S. experience, have argued that differential changes over time in the demand for marital commitment across education groups may have contributed to the reversal of the educational marriage gap in the U.S. [Lundberg and Pollak \(2014\)](#) argue that the observed patterns can be rationalized by considering differences in child-rearing practices and the returns to investment in children across education groups. More specifically, marriage might have remained more important as a commitment device among the highly educated due to the increased returns to joint investments in children (which serve to offset the decreased returns to gender specialization). While this explanation can rationalize the convergence in the skilled–unskilled marriage gap in the U.S., it cannot easily account for the differential patterns in the skilled–unskilled marriage gap across countries (and U.S. states) at similar levels of economic development, as well as the observed widening and narrowing of the marriage gap by skill that we observe in more gender conservative states in the U.S.

Our article also contributes to the literature that studies the correlation between gender norms and various socioeconomic outcomes. [Fortin \(2005\)](#) documents that countries with more conservative gender-role attitudes tend to have worse relative female labour market outcomes. Building on the seminar work by [Akerlof and Kranton \(2000\)](#), [Bertrand *et al.* \(2015\)](#) present evidence that suggests that gender identity norms impact a variety of labour market and marriage outcomes such as relative income within the household, marriage formation and divorce, women's labour force participation and earnings, and the division of home production. [Gimenez-Nadal *et al.* \(2012\)](#) develop a static partial equilibrium model of household formation in which social norms are modelled as a constraint on the allocation of household labour and show that more conservative gender norms are negatively correlated with partnership formation, in particular for more educated women. Beyond drawing similar links between gender norms and women's marriage outcomes, a key focus in our article is to explore how the relationship

between gender norms and marriage gap between skilled and unskilled women changes as the labour market opportunities of skilled women increase.

More closely related to our article is a small but growing literature that emphasizes how the interaction between economic development (specifically women's growing labour market opportunities) and social norms impacts marriage and fertility.⁹ Hwang (2016) uses a variant of FFO's (2004) dynamic model of intergenerational transmission of gender attitudes to rationalize the decreasing marriage rates experienced by female college graduates in developed East Asian economies. Kawaguchi and Lee (2017) argue that the high demand for foreign brides in developed Asian economies is the consequence of improvements in women's economic status in countries characterized by very traditional gender roles. While both of these papers focus almost exclusively on rationalizing the recent East Asian experience, our article takes a broader view and proposes a simple model that can reconcile the divergent marriage patterns observed in a large sample of developed countries and across states within a country over a longer time horizon.

Our article is closest in spirit to earlier work by Feyrer *et al.* (2008), who propose that cross-country fertility patterns can be explained by the interaction between the increasing status of women in the workforce and their status in the household. Like us, Feyrer *et al.* (2008) suggest the possibility of a non-monotonic relationship between changes over time in the status of women in the workforce and an important social outcome—fertility, in their case—due to slow-changing norms. At low levels of female wages, women specialize in household production and fertility is high. In the intermediate phase, women have more opportunities in the labour market but still shoulder the bulk of household production, resulting in much reduced fertility. Finally, as women's labour market opportunities further improve, men begin to share in the burden of child care at home and fertility is higher than in the intermediate phase. Apart from focusing on a different set of outcomes—the marriage gap between skilled and unskilled women and implications for women's educational choices, we develop a model to formalize the intuition in Feyrer *et al.* (2008) that rationalizes the observed empirical patterns. Our model yields a richer set of testable predictions that we are able to take to the data.

3. MODEL OF MARRIAGE AND HOUSEHOLD DECISION-MAKING

The model setup closely follows FFO (2002, 2004). First, women choose whether to become skilled. Men and women then obtain a match at random in the marriage market. Given this match, they decide whether to marry because of the high match quality or stay single. Married agents decide non-cooperatively how to allocate their time between work and the household production of a public good (*i.e.* children).¹⁰ Single agents do not produce a household public good (*i.e.* they remain childless) and simply consume their labour income.¹¹

9. Anderson and Bidner (2015) study such interaction in the developing country context, showing how women's rights over the dowry may deteriorate with economic development.

10. Households could act non-cooperatively if, for example, current decisions, such as location decisions for two-earner households, affect future bargaining power and there is limited commitment (Lundberg and Pollak, 2003) or if the husband and wife make contributions to separate public goods, *i.e.*, "separate spheres," to which they have been assigned exclusive responsibility by socially prescribed gender roles (Lundberg and Pollak, 1993). A few recent papers have emphasized the trade-off between women's labour market opportunities and public goods as playing a central role in bargaining models of the household. In Doepke and Kindermann (2019), the public good is fertility. Doepke and Tertilt (2019) consider a continuum of public goods with different degree of labour-intensity. Anderberg and Rainer (2013) present a non-cooperative model that exhibits a U-shaped relationship between women's economic opportunities and intrahousehold sabotage committed by abusive males. In their model, at low w_f , a husband may thwart his spouse's work effort by resorting to bullying or direct physical violence.

11. See FFO (2002, 2004) for an in-depth discussion of the more general case.

3.1. Household Decisions

We assume that men and women care equally about the public good (children) and their own private consumption but differ in the utility they gain from spillovers of the other spouse's private consumption, with men discounting it more than women, especially in more conservative countries. Specifically, following FFO (2002), when a man and a woman marry, each individual's welfare consists of the utility from her own private consumption $c_g, g=f, m$, some spillover α_g (smaller than 1) from the spouse's consumption, utility from consumption of a household public good b , and utility from the quality of the match as perceived by the agent, q . Each individual is endowed with one unit of time, which can be allocated between producing the household public good (t_g) and working in the market ($1-t_g$). Market work hours are paid at rate w_g that varies by gender. Each agent's private consumption is equal to her earnings, which is the product of the time the agent spends working and her wages, *i.e.*, $c_g = (1-t_g)w_g$. Men and women are perfect substitutes in the production of the public good b . Given total time investment $T = t_f + t_m$, each agent obtains $b = Tn$ units of the public good. We interpret this good as children where n is the (fixed) number of children, and the total time investment T determines their quality.

Formally, the husband's and wife's utility are given by, respectively,

$$\begin{aligned} V_m^f(w_m, w_f, q_m) &= \max_{0 \leq t_m \leq 1} [(1-t_m)w_m + \alpha_m(1-t_f)w_f + \beta \log[(t_m+t_f)n] + q_{mf}], \\ V_f^m(w_f, w_m, q_f) &= \max_{0 \leq t_f \leq 1} [(1-t_f)w_f + \alpha_f(1-t_m)w_m + \beta \log[(t_m+t_f)n] + q_{fm}], \end{aligned} \quad (1)$$

where each spouse takes the labour supply decision of the other partner as given, $\beta > 0$, and $0 \leq \alpha_g < 1$.

One possible interpretation of the assumed lower weight put on one's spouse's compared to one's own consumption ($0 \leq \alpha_g < 1$) is that it reflects potential disagreement over consumption bundles (*e.g.* fancy cars versus children's medical, clothing, and other expenditures); in this case, α_g represents the utility loss deriving from the spouse's ability to influence the final allocation of household income across different consumption bundles. Another interpretation is that individuals obtain utility from their career in a way that is proportional to its status as measured by wages; in this case, α_g represents the (lower) weight an individual puts on her spouse's career.

As indicated above, we also assume that α_g is lower for husbands than for wives ($\alpha_m < \alpha_f$), and especially so in societies that hold more conservative views about women's role. This assumption captures the idea that having a working/career wife challenges traditional views of gender roles within a household as well as undermines the husband's ability to solely dictate optimal household's allocation decisions.^{12, 13}

To flesh out the properties of the model that are relevant for our empirical analysis, we make several simplifying assumptions. We assume throughout that $w_m > w_f$ so that women have a comparative advantage in home production, irrespective of whom they are matched with. We also assume that $w_m > \beta$, implying $t_m = 0$, *i.e.*, men work full time irrespective of their marital status. Given these assumptions, there are two possible cases for the wife's optimal time allocation decision: (i) $w_m > \beta \geq w_f$, in which case $t_f = 1$; (ii) $w_m > w_f > \beta$, so that $t_f = \beta/w_f$. In the first case, the wife does not work and instead dedicates herself full time to raising children while the

12. An alternative interpretation is that, in more traditional societies, a man may find it particularly demeaning to have a working wife because it signals his inability to provide for the family (Basu, 2006).

13. Similar comparative statics results would be obtained if we simply added to the man's utility a penalty directly related to his wife's work but not her wages. See FFO (2004).

husband works full time on the market. In the second case, the husband's situation is unchanged, but the wife works part time and raises children with the remainder of her time.

As shown in FFO (2002, 2004), the economic intuition for why the relationship between women's wage and marriage probability is non-monotonic in this model can be grasped from an analysis of the solution to the household's optimal time allocation problem and, specifically, an analysis of how the utility of a married man, V_m , varies as a function of his wife's wage.

First, let's consider how V_m varies with w_f when $w_f \leq \beta$, that is, for the case where the woman's wage is below the marginal utility from consumption of the public good. In this case, it is optimal from her standpoint to stay home once married and dedicate all her time to the production of the public good. Substituting from the first order condition, we get $V_m(w_f) = w_m + \beta \log n \equiv \bar{V}_m$, where \bar{V}_m is the utility a married man receives if he marries a stay at home wife. The wife does not change her time allocation in response to an increase in w_f : she remains devoted full-time to household production. Consequently, there is no effect of an increase in w_f on the husband's utility. The husband's preferences are perfectly aligned with his wife's and there is no spousal disagreement. The gender norm does not bind.

Second, let's consider the case when $w_f > \beta$. It is now optimal from the wife's standpoint to split her time between working at home ($t_f = \frac{\beta}{w_f}$) and working on the market (its complement to one). Substituting from the first order conditions and rearranging, we obtain the difference in utility for men between marrying a working or a non-working wife:

$$V_m(w_f) - \bar{V}_m = \alpha_m(w_f - \beta) + \beta \log \frac{\beta}{w_f} \quad (2)$$

with

$$\frac{\partial(V_m - \bar{V}_m)}{\partial w_f} = \alpha_m - \frac{\beta}{w_f}. \quad (3)$$

Since $w_f > \beta$ in the case of a working wife, the second term on the right-hand side of equation (2) is negative. Thus, whether a man experiences a utility loss or a premium from having a working wife depends on the sign of $\alpha_m(w_f - \beta) + \beta \log \frac{\beta}{w_f}$. One can show that this difference is negative for $w_f \in (\beta, w_f^*(\alpha_m, \beta))$ and positive for $w_f > w_f^*(\alpha_m, \beta)$, where $w_f^*(\alpha_m, \beta)$ is the wage rate that makes the husband indifferent between a working wife and a stay-at-home wife (*i.e.* $V_m(w_f^*) = \bar{V}_m$).

Furthermore, the husband's utility from marrying a working wife is non-monotonic in w_f . At relatively low levels of w_f , the positive externality that a husband receives from his wife's increased private consumption is not high enough to compensate for his utility loss coming from the lower production of the public good. His utility drops below the utility that he would obtain from having a nonworking wife. As w_f increases, the utility loss first increases, hitting a maximum when $w_f = \frac{\beta}{\alpha_m}$, that is, when the loss in production of the public good due to the wife working ($\frac{\beta}{w_f}$) is equal to the gain from the externality deriving from her consumption (α_m). Eventually, as w_f keeps on increasing, the utility loss from marrying a working wife will turn into a premium. That is, once $w_f > w_f^*(\alpha_m, \beta)$, the positive externality from the wife's private consumption dominates the utility loss in terms of public good consumption. Men gain from having a working wife when her wage is high enough to compensate for the loss of public good production.¹⁴

14. The mechanism is based on the notion that more educated (and hence, higher earning) wives provide less household production because they work more. Using data from the Multinational Time Use Survey (MTUS), we show

Equation (2) and (3) also describe how the gender norm affects the shape of the husband's net utility from having a working wife and its slope. It is easily shown, using the implicit function theorem, that the threshold wage $w_f^*(\alpha_m, \beta)$ is decreasing in α_m . Hence, the wage interval $w_f \in (\beta, w_f^*(\alpha_m, \beta))$ where a husband suffers a net utility loss is narrower the higher is α_m . The maximum net loss, $\frac{\beta}{\alpha_m}$, is also smaller the higher is α_m . The cross derivative $\frac{\partial(V_m - \bar{V}_m)}{\partial w_f \alpha_f} = 1$, has implications for the slope of $V_m(w_f) - \bar{V}_m$. When this difference is negative, that is, if $w_f \in (\beta, w_f^*(\alpha_m, \beta))$, the higher is α_m the smaller (less negative) is the change in utility from a working wife in response to an increase in w_f . If the husband experiences a net surplus from having a working wife, *i.e.* if $w_f > w_f^*(\alpha_m, \beta)$, the increase in surplus due to an increase in w_f is larger the higher is α_m .

Figure 3 depicts the utility differential for different values of α_m (Panel A) and β (Panel B). The solid line shows the husband's utility differential when $\alpha = 1$, that is the case where there is no spousal disagreement about time allocation decisions. In this extreme case, the husband gains from having a working wife and this premium monotonically increases with the wife's wage. The three remaining lines plot the utility differential for alternative values of the gender norm, keeping the utility of public good consumption constant. In the most gender-equal society (the dashed dotted line) husband's and wife's preferences are more aligned. The range of w_f over which the husband of a working wife experiences a utility loss (relative to a housewife's husband) is relatively small, as the husband cares sufficiently about his wife's career: it takes a modest increase in w_f for the positive externality effect to dominate the loss in public good consumption. In the intermediate society (the short dash line), the utility loss experienced by the husband is always larger than in the more gender equal society and the utility differential is negative for a wider range of w_f : it takes a larger increase in the wife's economic opportunities to compensate a husband for the wife's underprovision of the public good. Finally, in the most conservative society (the long dash line), men care so little about their wife's private consumption that the utility differential from having a working wife is always negative over the represented range of w_f : it would take a very large increase in the wife's wage for the penalty associated with having a working wife to turn into a premium. A comparison of the solid line, dashed dotted line, and short dash line over the wage range that the curves are all positive and upward sloping illustrates how the rate of increase in husband's net surplus from having a working wife is larger in more gender-equal societies. When $\alpha = 1$, a husband enjoys an increase in wife's wage as much as she does. Comparing across the dashed dotted line, short dash line and long dash line over the range where all three societies experience a widening utility deficit, the husband's loss following an increase in w_f is largest in the most conservative economy.

Panel B shows how the utility differential varies for two societies that differ in terms of the value that they place on household goods (*e.g.* time spent with children). We denote these values as β_L and β_H . The threshold wage that makes a woman indifferent between working and specializing in home production varies across societies with different β : holding gender norms constant, societies with higher preferences for home production have lower female participation in the labour market because the wage rate at which married women decide to work is higher. The

that high-skilled women work more than low-skilled women and devote less time to household production. [Supplementary Appendix Table 2](#) reports the results from regressions of time-use on a dummy for being high-skilled, controlling for number of children, and fixed effects for country, year, day of the week, and age of the youngest child. As shown in Panel A, high-skilled women are 14 percentage points more likely to work and while they spend somewhat more time with their children, they spend even less time on household work, such that, on net, they spend about 25 minutes less in total on household production. If instead, we use a comparison that lines up more closely with the model's assumption—*i.e.* low-skilled non-working women versus high-skilled working women—the empirical patterns of time use align even more closely with the model's predictions in that high-skilled working women spend significantly less time on *both* childcare and household work relative to low-skilled non-working women (see Panel B).

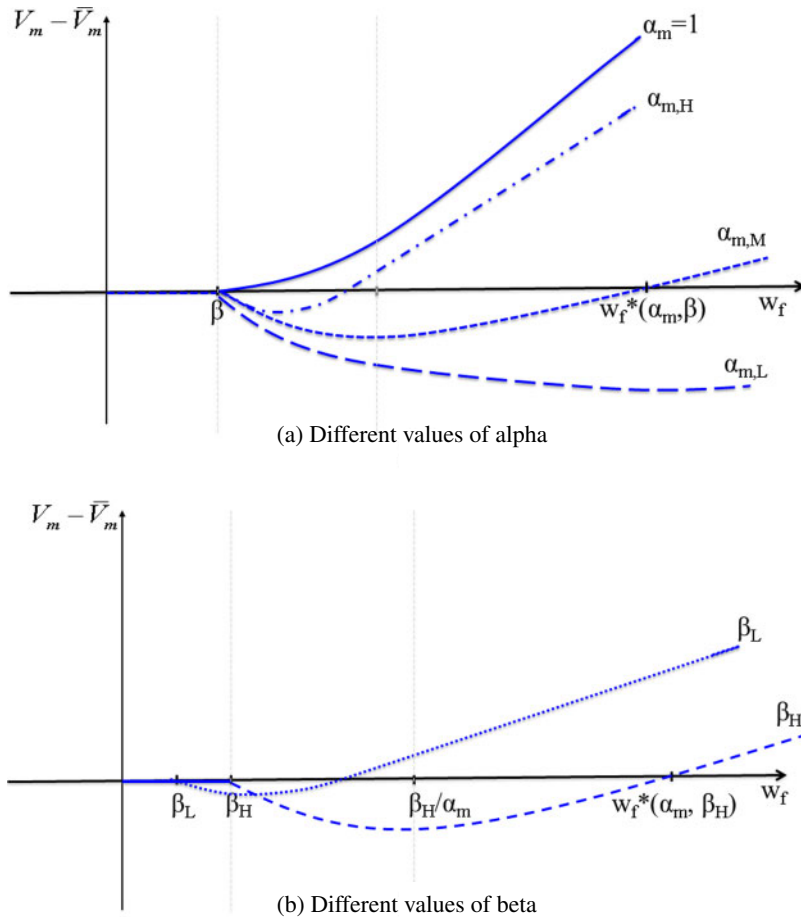


FIGURE 3

Husband's utility differential from marrying a working woman as a function of wife's wage.

shape of the husband's utility loss as a function of his working wife's earnings across societies with different values of β mirrors what is obtained when comparing societies with different gender norms. It will thus be important when we empirically test the predictions of the model in the following sections to verify that the heterogeneity we observe across countries and states with respect to gender norms is not masking correlated heterogeneity with respect to the value placed on the household public good.¹⁵

The utility of a married woman, V_f is monotonically increasing in her husband's wage w_m and her own wage w_f . When $w_f \leq \beta$, her utility when married depends only on her husband's wage, that is, $V_f(w_m) = \alpha_f w_m + \beta \log n$. When $w_f > \beta$, she works part-time and her utility is given by

$$V_f(w_f, w_m) = V_f(w_m) + (w_f - \beta) + \beta \log \frac{\beta}{w_f}. \quad (4)$$

15. We tackle this issue in Section 4.2.

It is clear from the above expressions that married women's utility increases in their husband's wage, irrespective of their work status. In other words, greater earning opportunities for men are associated with premiums both in the labour market and in the marriage market. Moreover, holding w_m constant, the net utility from being a working (relative to non-working) wife ($w_f > \beta$) is always positive and increasing in one's own wage.

3.2. Marriage decision: random matching and threshold quality

Following FFO (2002, 2004), we assume that there are only two types of individuals, skilled S and unskilled U , for each sex. The matching process is modelled as a one-period random search in which the probability that a given individual of type i meets another individual of type j , for $i, j = S, U$ depends on the proportion of that type in the relevant population of the opposite sex. While we endogenize women's decisions to become skilled (see Section 3.5), we assume that the distribution of men's type in the population is given exogenously. We further assume that men's types are defined by their earnings, with $w_{mS} > w_{mU} > \beta$, and that gender role attitudes do not vary by education.¹⁶ To simplify the analysis and for ease of exposition, we further assume that unskilled married women do not work (*i.e.* $w_{fU} \leq \beta$) while skilled married women allocate some time to labour market work (*i.e.* $w_{fS} > \beta$). This assumption is made for ease of exposition.¹⁷ Another maintained assumption throughout the analysis is that women have a comparative advantage in home production irrespective of the match skill combination, that is, $w_{mi} > w_{fi}$ for $i, j = S, U$.¹⁸

Matched individuals each obtain a random draw of match quality $q \in [-\infty, \infty]$ from a log-concave distribution and marry only if both agree to the match. In a departure from FFO (2002, 2004), we assume that when agents of the same skill type meet, they draw their match qualities from a better distribution (in the sense of first-order stochastic dominance); *i.e.*, we assume that $F_{i=j}(q) \leq F_{i \neq j}(q)$ for any q on the support of the distribution of match quality. The homogamy assumption implies that a woman's investment in education is associated with both higher earnings and a higher probability of drawing a high-quality match to a high-wage (skilled) man.

Individuals decide whether to stay in a match (marry) and obtain married utility as in equation (1) or to remain single whereby their utility is simply given by $U(w_g) = w_g, g = f, m$. That is, there is no household public good (*i.e.* no children) nor any externality from another agent's consumption when an individual decides to remain single.¹⁹ The reservation qualities, q^* , are set so that an individual is indifferent between marrying and staying single.

The comparative statics results for the effect of an increase in female wages on men's reservation quality differential mirrors the analysis of married men's utility in the previous

16. This assumption is in keeping with the empirical finding that the cross-country variation in gender roles attitudes is much larger than the within-country/cross-skill variation. However, as we discussed in the [Supplementary Model Appendix](#), this assumption can easily be relaxed.

17. As discussed in the [Supplementary Model Appendix](#), the assumption that labour supply is zero for less-educated wives is made to simplify the analysis. What is needed is that less-educated wives tend to work less than their more-educated counterparts. In [Supplementary Appendix Table 2](#) we show using the MTUS that high-skilled women indeed have relatively higher labour supply in the countries in our sample.

18. Empirically, skilled women's earnings are greater than unskilled men's earnings in some countries. Our analysis can easily accommodate this case provided that women have higher home productivity than men, that is, $b = (a_m t_m + a_f t_f)n$ with $a_f > a_m$, and an unskilled man maintains comparative advantage in market production over a skilled woman even if she holds an absolute advantage, that is, $\frac{w_{mU}}{a_m} \geq \frac{w_{fS}}{a_f}$.

19. Similar qualitative comparative static results would be obtained if we assumed that individuals need to produce home goods, *i.e.*, cleaning, cooking etc., irrespective of marital status.

section.²⁰ If $\beta < w_{fS} \leq w_f^*(\alpha_m, \beta)$, this differential is positive—men are pickier when they meet a skilled woman—and has an inverted U-shape with a peak at $\frac{\beta}{\alpha_m}$. When $w_{fS} > w_f^*(\alpha_m, \beta)$, the differential becomes negative: men are less picky toward skilled women. As discussed in Section 3.3, this pattern drives the prediction of a U-shaped skilled–unskilled marriage differential as a function of skilled women’s economic opportunities. The comparative static exercise also shows that for any $w_{fS} > \beta$, the threshold quality for skilled women is decreasing in α_m and increasing in β .

A woman’s pickiness is always increasing in her own wage, irrespective of type, implying a lower marriage probability coming from the woman’s decision. A woman’s pickiness is decreasing in men’s wages implying that skilled men are generally more attractive in the marriage market. Note that if w_f and w_m grow at the same rate, leaving the gender wage gap unchanged, the net effect is to increase unskilled women’s pickiness and decrease their marriage probability as long as $\alpha_f < 1$ (if $\alpha_f = 1$, the two effects cancel out, leaving unskilled women’s pickiness unchanged). Skilled women’s pickiness also increases as w_f and w_m grow at the same rate, provided that the spillover from their husband’s consumption is lower than the net gain in the private good consumption, that is, $\alpha_f < \frac{\beta}{w_f}$.

For ease of exposition we maintain throughout the analysis that unskilled women don’t work, i.e. $w_{fU} \leq \beta$. However, as shown in the [Supplementary Model Appendix](#), the comparative statics properties of men’s reservation quality and the skilled–unskilled differential exhibits similar (inverted) U-shaped properties once w_{fU} grows above β . As in the main case discussed in the text, this pattern hinges on the relative position of w_{fU} and w_{fS} with respect to $\frac{\beta}{\alpha}$ and, in this case, the skill premium.²¹

3.3. The skilled–unskilled marriage gap

Let’s define $\Pi_{f,ij}$ to be the probability that, for a woman of type i meeting a man of type j , the random draw of the match quality q_{ij} lies above each partner’s threshold. This probability is given by $\Pi_{f,ij} = \bar{F}_{i=j}(q_{m,i}^*)\bar{F}_{i=j}(q_{f,ij}^*)$ if she meets her own type and $\Pi_{f,i \neq j} = \bar{F}_{i \neq j}(q_{m,i}^*)\bar{F}_{i \neq j}(q_{f,ij}^*)$ if she meets the other type, where $\bar{F} = (1 - F)$ is the complementary cumulative distribution function.

The probability that a match is formed is given by the product of $\Pi_{f,ij}$ and the probability of meeting a man of type j in the population, $j = S, U$. Having defined π_m as the fraction of skilled men in the population, the skilled–unskilled difference in marriage probability is then given by $\Pi_f^S - \Pi_f^U$, where

$$\Pi_f^S = \left[\pi_m \bar{F}_{i=j}(q_{f,SS}^*) \bar{F}_{i=j}(q_{m,S}^*) + (1 - \pi_m) \bar{F}_{i \neq j}(q_{f,SU}^*) \bar{F}_{i \neq j}(q_{m,U}^*) \right] \quad (5)$$

and

$$\Pi_f^U = \left[\pi_m \bar{F}_{i \neq j}(q_{f,US}^*) \bar{F}_{i \neq j}(q_{m,U}^*) + (1 - \pi_m) \bar{F}_{i=j}(q_{f,UU}^*) \bar{F}_{i=j}(q_{m,U}^*) \right] \quad (6)$$

are, respectively, the marriage probabilities of skilled and unskilled women.

Note that Π_f^U monotonically declines as women’s economic opportunities w_f increase to a level where a single unskilled woman can live comfortably simply based on her own labour

20. For ease of exposition, we refer the interested reader to the [Supplementary Model Appendix](#) for the analytical solutions of q_f^* and q_m^* and a formal discussion of their comparative statics properties, which we briefly summarize in this section.

21. Skilled women are always pickier than unskilled women, because they have a better outside option, more so if the skill premium increases.

income (but still does not work if she marries). This is also true if men's economic opportunities are increasing contemporaneously (at the same or a lower rate), since men's pickiness does not depend on their own wage and the net effect on women's reservation quality of increasing w_m and w_f is positive (they become pickier).

On the other hand, the marriage probability for skilled women, Π_f^S , declines as their wage (w_{fS}) increases in the range $\beta < w_{fS} \leq \frac{\beta}{\alpha_m}$ and then starts increasing once $w_{fS} > \frac{\beta}{\alpha_m}$, with an acceleration once $w_{fS} > w_f^*(\alpha_m, \beta)$, when men strictly prefer skilled working women. Note again that men's pickiness does not depend on their own wage. Hence, if both w_m and w_f grow at the same rate, leaving the gender gap unchanged, men's probability of marriage will change only as a function of w_f . Therefore, the overall comparative static would be the same as in the case where w_f increases "in isolation," except that the contribution to the marriage probability coming from skilled women's choices would be muted in the decreasing part of the U-shape (at low wage levels) and amplified in the increasing part of the U (*i.e.* at very high male and female wages).²²

The marriage probabilities of skilled and unskilled women both increase if there are more skilled men around (π_m is higher) given that both types have a preference for higher wage men. However, given the homogamy assumption, the increase in marriage probability is largest for skilled women. Note that in its absence, the two probabilities would increase by exactly the same amount in the baseline model, since we assumed that the gender norm (*i.e.* α_m) is skill invariant. A similar logic holds for women since preferences for higher-educated men also do not vary by women's education. It follows that, in the absence of homogamy, an increase in the share of skilled men would increase the marriage probability of skilled and unskilled women by exactly the same amount, leaving the marriage differential unchanged.

3.4. Comparative statics

In order to illustrate the properties of the model that are relevant to our empirical analysis, we analyze how the difference in marriage probability between skilled and unskilled women varies in response to an increase in economic opportunities for all labour inputs (*e.g.* an increase in $w_{g,i}$ for $g=f, m$ and $i=S, U$). This situation appears closest to the variation in labour market opportunities we observe in the country-level panel (see [Supplementary Appendix Table 3](#)), with increases in skilled women's wages (and GDP per capita) but no systematic changes in the skill premiums or the gender wage gap. However, as discussed above, the same comparative static properties would apply if only women's earnings (both skilled and unskilled) grow or if we fix all other wages while letting only w_{fS} grow (which, theoretically, gives the strongest U-shaped pattern), as we observe in the analysis of U.S. states (see [Table 8](#)).

Panel A in [Figure 4](#) provides a graphical representation of the marriage penalty for skilled women for three different values of α_m —high, medium and low—having fixed the unskilled and skilled wages at w_{fU} and w_{fS} (or w_{fS}'), respectively. The running variable is assumed to be skilled men's wages $w_{mS} = w$ and we assume that $w_{mU} = \phi_m w$, $w_{fS} = \pi w$, and $w_{fU} = \phi_f \pi w$, where ϕ_g is the unskilled/skilled earnings ratio, which can potentially differ by gender, and π is the female/male earnings ratio (*i.e.* ϕ_g and π are both less than one). Thus, the distance between the two solid vertical lines in the figure depends on the skill premium. We consider the comparative static in response to an increase in the wage level w or to an increase in the female skill premium, $(1 - \phi_f)$, which we will use as key independent variable in our empirical analysis.

22. See [Supplementary Model Appendix](#) for a formal discussion.

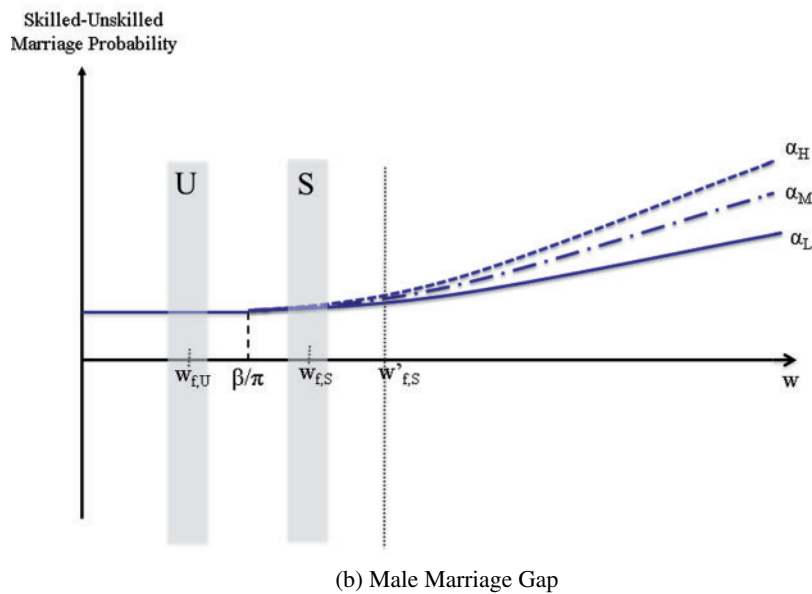
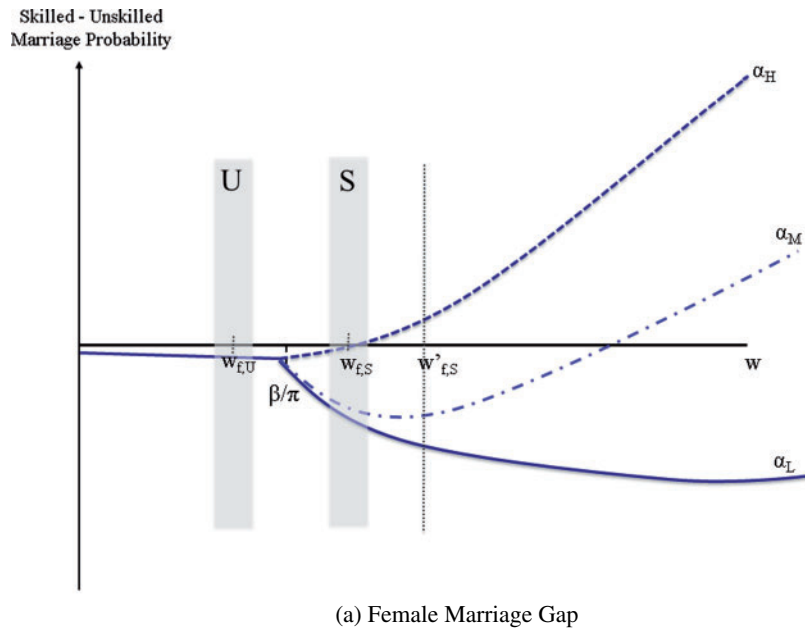


FIGURE 4

Marriage gaps as a function of wage and gender norms.

Notes: w is the wage rate for skilled men, π is the female/male wage ratio. Skilled women's wage is $w_{fS} = \pi w$, unskilled men's wage $w_{mU} = \phi w$ and unskilled women's wage rate $w_{fU} = \pi \phi w$.

For a given value of α_m , the marriage differential is U-shaped, mirroring the behaviour of men's threshold qualities.²³ For values of w_{fS} below β (*i.e.* skilled women are also stay-at-home wives), the difference in marriage probabilities is negative because skilled women have better outside options. For values of w_{fS} lying in the interval $(\beta, w_f^*(\alpha_m, \beta))$, all the terms in (5) that define a woman's marriage probability, are lower for skilled women. The skilled–unskilled marriage gap is U-shaped in this range. It first increases as men's threshold quality for a skilled woman increases, then declines for $\frac{\beta}{\alpha} < w_{fS} \leq w_f^*(\alpha_m, \beta)$. Finally, if w_{fS} is above $w_f^*(\alpha_m, \beta)$, both types of men prefer skilled women. In this range, the marriage penalty will eventually turn into a premium.²⁴ The marriage gap is always smallest in the least conservative economy ($\alpha_{m,H}$) and largest in the most conservative economy ($\alpha_{m,L}$). The comparison of the three curves in the figure also reveals that while for the $\alpha_{m,H}$ and $\alpha_{m,M}$ economies the gap can eventually turn into a premium, it is unlikely that in the $\alpha_{m,L}$ economy women's economic opportunities will ever be high enough to compensate husbands for their working wives' underprovision of the public good.

Note that, the skilled–unskilled difference in marriage probability would continue to be U-shaped for $w_{fU} > \beta$ (*i.e.* unskilled women also work part-time) as long as the parameters are such that there exist a range of wages $\beta < w_{fU} = \phi w_{fS} < w_{fS} < \beta/\alpha$ where the marriage probability of skilled women declines faster than that of unskilled women.

The figure also shows how an increase in w_{fS} might have very different consequences on the skilled–unskilled marriage differential depending on the country's prevailing gender norms. For example, suppose that economic opportunities increase so that, w_{fU} and w_{fS} increase within the shaded areas U and S , respectively, while holding the skill premium constant. The skilled–unskilled marriage gap would decline in the most gender equal economy but increase in the remaining two economies, with the increase being largest in the most conservative one. Suppose instead that w_{fS} increases from a value in the shaded area S to a value $w'_{f,S}$ (*i.e.* $(1 - \phi_f)$ increases). In this case we would observe the skilled–unskilled marriage gap turning into a marriage premium in economy H , still negative but decreasing in economy M , and negative and further increasing in economy L . In other words, the model also implies that, comparing three types of societies that differ in the conservativeness of their gender roles views from very liberal to very conservative, an increase in wages might at the same time increase the marriage penalty faced by skilled women in the more traditional society, leave the marriage penalty in the middle society mostly unchanged, and decrease it in the more gender equal society. The effect is even stronger if the wage rate increases only for skilled women. This is the key prediction we will be testing in the cross-country data.

Panel B depicts the skill differential in marriage probabilities of men. The skill differential is always positive and increasing in w . Both types of women have a strict preference for skilled men because of their higher wage. In addition, given the homogamy assumption, skilled women have an even stronger preference for skilled men and will disproportionately reject unskilled men. Therefore, as w and the fraction of skilled women in the population increases, the marriage prospect of skilled men will become increasingly better than that of unskilled men. The higher the α , the steeper the gradient of the increase in the relative marriage probability of skilled men because of strict ranking of men's preferences for skilled/working women in the more gender-equal societies. However, as shown in the figure, the differences in skilled–unskilled marriage differential for men do not vary as much with the strength of the gender norm α_m as they do for women.

23. Note that, for $w_{fU} \leq \beta$, the shape of the skilled–unskilled marriage differential depends exclusively on the behaviour of the derivative of Π_f^S with respect to w_{fS} .

24. See Supplementary Model Appendix for a formal analysis.

3.5. Education decision

Following FFO (2002, 2004), we assume that a woman faces an idiosyncratic (utility) cost of becoming skilled of γ , where γ is an iid random draw from a continuous cumulative distribution function $G(\gamma)$ with support $[0, \infty]$. Defining as $V^i(\theta) = \sum_{j=s,u} \Pi_{f,ij} V_i^j + (1 - \sum_{j=s,u} \Pi_{f,ij}) U(w_i)$ the expected utility of a woman of type $i = S, U$ as a function the model parameters $\theta = (w_m, w_f, \alpha, \beta, \pi_m)$, women choose to become skilled if the cost of doing so is lower than the net utility gain, that is, if $\gamma \leq [V^S(\theta) - V^U(\theta)]$. The equilibrium share of skilled women π_f is the fraction of women whose cost of acquiring education is lower than this threshold, that is, $\pi_f = G(V^S(\theta) - V^U(\theta))$.

If we compare two economies that differ by their gender roles, holding everything else constant, the expected utility of skilled relative to unskilled women would be larger in the less conservative economy. This implies that, holding everything else constant, the country with more equal gender norms should have a higher proportion of skilled women and a smaller skilled–unskilled marriage gap (see FFO, 2002, 2004 for a formal proof).

It is also the case that the expected utility of skilled relative to unskilled women increases with economic opportunities, by which we mean either an increase in GDP per capita that keeps the skill premium and the gender gap constant or an increase in w_{fs} at given levels of income per capita, which corresponds to a decline in the gender earnings ratios for the skilled.

Thus, a higher skilled wage or level of economic development is generally associated with an increase in the proportion of women who choose to become skilled. As we discussed above, at low levels of economic opportunities for skilled women the increase will be relatively small because of the stronger trade-off between the labour market return and the penalty coming from the higher rejection rates in the marriage market. However, the proportion of skilled women grows faster once the marriage penalty associated with the investment decision declines.

3.6. Model extensions

The objective of the model is to obtain a rich set of comparative static exercises to guide our empirical analysis while maintaining a parsimonious theoretical representation. To achieve this aim, we have made several simplifying assumptions. In the [Supplementary Model Appendix](#) (Section II), we show that relaxing some of these assumptions would leave the main intuition unchanged. Specifically, we demonstrate the model's key predictions to hold reasonably well if we allow for (i) variation in gender norms by education, (ii) differences in home productivity by skill level, (iii) different assumptions on utility transferability or the specific form of bargaining if there exists a gender norm dictating that a woman must allocate some portion of her time to childcare activities, irrespective of her comparative advantage, (iv) the option for women to outsource home production activities, and (v) the production of the public good to be a CES aggregator of the husband's and wife's time.

4. EMPIRICAL TESTS OF THE MODEL

In this section, we will provide empirical tests of the key implications of the model using a panel of developed countries and U.S. states. We test three main predictions of the model. First, all else equal, the relative deficit skilled women experience in the marriage market should be larger in societies with more conservative gender attitudes. Second, increases in economic opportunities should be more consistently associated with relative gains in the marriage rates for skilled women (compared to unskilled women) in societies with more equal gender norms; in contrast, the

relationship would be flatter, and maybe even negative in societies with more traditional norms. Third, in response to greater barriers in the marriage market, a lower fraction of women will decide to become skilled in more gender-conservative societies. Finally, using the longer time period afforded by the U.S. data, we will also provide some direct evidence of a U-shaped relationship between the female skilled–unskilled marriage gap and women’s labour market opportunities as well as evidence of differential U-shaped relationships by sexism level across U.S. states.

4.1. *Cross-country evidence*

4.1.1. Cross-country sample: data and descriptive statistics. Before turning to the empirical evidence from the cross-country panel, we describe the construction of the sample and the measurement of the key variables used in the analysis.²⁵

Selection of countries

The selection of countries is based on the following process. We start with the set of high-income countries (as classified by the World Bank) in Europe, Asia, and North America. From this set, we exclude very small countries (those with a population smaller than four million in 2015). Finally, we exclude countries for which micro wage data is not available. Our final sample consists of the following 26 developed countries: Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Taiwan, the U.K., and the U.S.

Gender norms

We use two main sources of data to measure cross-country differences in attitudes toward the role of women in society. The first dataset is the Integrated Values Survey (IVS), which is a harmonized dataset that covers both the European Value Survey (EVS) and the World Value Survey (WVS). This dataset provides a range of gender-related questions that were asked consistently across a broad set of countries. For our main analysis, we use the following question: “When jobs are scarce, men have more right to a job than women.” The possible responses to the question are: agree, disagree or neither. We interpret agreement to this question as expressing the view that it is more important for men to be employed in the labour market relative to women. We chose this question as it provides us with the broadest coverage of countries. For each country, we focus on the responses of individuals aged 18 and older. [Supplementary Appendix Table 4](#) reports the average response to this question for each of the 26 countries in our sample for both 1990 and the latest available year, as well as information on the region and sexism group (high, medium, and low) that each country belongs to.

While this variable clearly measures some degree of conservatism toward gender roles, one concern is that it does not directly contrast the specific gender roles that are central in our theoretical model above. The social norm in the model is based on the belief that a woman’s primary sphere is in the home while a man’s primary sphere is in the labour market. To get at this norm more directly, we turn to a second data source, the International Social Science Program (ISSP). The ISSP is a cross-country collaboration that seeks to build on pre-existing social surveys such as the General Social Survey (GSS) to allow for cross-country comparisons of social trends. Each year, the ISSP rotates a set of topics. Our analysis draws on the questions in the 2002 and

25. See [Supplementary Appendix Table 1](#) for data sources per country.

2012 waves of the Family and Changing Gender Roles module. To complement our measure from the IVS, we use the following question from the ISSP: “A man’s job is to earn money; a woman’s job is to look after the home and family.” Respondents indicate their agreement to this statement on a five-point scale: agree strongly, agree, neither agree nor disagree, disagree, or disagree strongly. We code the responses “agree” and “strongly agree” as indicating a greater degree of gender conservatism. The downside of relying on this question is that our sample is reduced by three countries.²⁶

As expected, there is significant variation in these gender attitude measures across regions. On average, about a third of East Asians agree with both statements, but only between 3 and 9% of people in the Nordic countries do. Countries in Eastern Europe also appear quite conservative, particularly with regard to the ISSP measure. Canada and the U.S., as well as parts of Western Europe, seem to have more liberal gender norms compared to countries in Southern Europe. Across countries, the correlation between the average response to the IVS and ISSP questions is high (0.81).

In most countries, males are more likely to agree with the statements. Interestingly, though, the gender gap within a country is rarely larger than 5 percentage points.²⁷ Given that the differences in responses between males and females are not large (particularly in terms of the cross-country variation), we will focus for our main analysis on the average response to the questions across gender groups. Because of the relatively small sample sizes available for each country in the attitude surveys, focusing on the average response also allows us to construct a more precise measure of gender-related attitudes across countries. Nonetheless, the empirical results below are robust to relying only on male responses to the survey questions.²⁸

Our empirical analysis exploits cross-country variation in gender norms in a panel data set exercise covering the period 1995–2010. In order to avoid reverse causation concerns, we use data from the 1990 IVS to construct our main measure of gender norms. An important assumption is therefore that the cross-sectional variation observed in 1990 is persistent over time. [Supplementary Appendix Figure 3](#) presents the attitude measure at the country level at two points in time: 1990 and the most recent year (varying from 2006 to 2012). The figure shows that while most countries have experienced a decline in the conservativeness of gender attitudes, the relative ranking of countries in terms of average responses to the gender-related attitude question has remained largely constant over time.²⁹ The Spearman rank correlation index between the two periods is high (0.86). We also note that conservative countries in 2010 are still very conservative: most countries in East Asia, Eastern Europe, and Southern Europe are more sexist in 2010 than North America and the Nordic countries were 20 years before.³⁰

Unfortunately, the ISSP-based measure cannot predate the period of our empirical analysis, as the sample of surveyed countries was too small in the survey’s early waves. Given that we use two years of data (2002 and 2012) to construct the country-specific aggregate measure of

26. See [Supplementary Appendix Table 4](#) for the average response to this question for each country with ISSP data. Hong Kong, Greece, and Italy are excluded from the 2002 and 2012 ISSP samples.

27. Country-level attitudes by gender are not presented in [Supplementary Appendix Table 4](#), but are available upon request.

28. The cross-country correlation between our measure and one constructed by limiting the sample to males aged 30–60 is very high (0.95).

29. Due to data availability, we are unable to exploit within-country variation over time in gender norms. Note, however, that between-countries variation is much larger than within-country variation.

30. Furthermore, [Fortin \(2005\)](#) finds that gender norms measured by the response to the questions “Being a housewife is just as fulfilling as working for pay” and “A working mother can establish just as warm and secure a relationship with her children as a mother who does not work” have been more stable over time compared to the faster change suggested by answers to “Scarce jobs should go to men first.”

gender norms, we first remove the survey year effect by obtaining the residuals from a regression of the individual responses on a dummy for the 2012 survey year. We use the residuals from this regression to create a country-specific measure of “average” gender norms, which is simply the mean of the residual individual-level responses in a given country.

For ease of interpretation, we standardize both the IVS and ISSP gender norm measures to have a mean of zero and a standard deviation of one in the sample of 26 countries.

Marriage rates

Our marriage outcomes are based on individuals aged 35–44. This age range was chosen as a compromise between having data for the most recent cohort (individuals aged 35–44 in 2010) and observing completed first marriage decisions among individuals in each cohort.³¹ The coding of the marital status variable varies by data source and country.³² In most countries, “married” individuals include either formal unions or registered partnerships. [Supplementary Appendix Figure 4](#) documents the cross-country variation, as of 2010, in the skilled–unskilled marriage rate gap for women and men. More specifically, the skilled–unskilled marriage rate gap for women (men) is defined as the difference in the fraction of women (men) who were ever married, between those with and without a tertiary education. In the majority of the countries in our sample, more educated women marry at a lower rate than their less educated counterparts; the converse appears to hold for men—marriage rates of more educated men are typically higher than that of less educated men. There are, however, some exceptions. In particular, in most Nordic countries (Norway, Sweden, and Finland), educated women marry at a higher rate than less educated ones; this is also the case in the U.S., the U.K., Canada, and Ireland. Also, skilled men marry at a lower rate than unskilled men in Italy, Austria, Spain, Switzerland, and Greece; nonetheless, even in these cases, the skilled–unskilled marriage gap is always smaller in absolute value among men than among women.

Labour market outcomes

For each country and year, we construct various measures of labour market opportunities for skilled women aged 25–54. These measures include the average annual wages of high-skilled females, the gender wage gap by skill group, and the skilled–unskilled wage premium for males and females.³³ The wage sample is based on full-time workers, defined as those working 35 plus hours per week.³⁴ To facilitate cross-country comparisons, we convert all the country-specific annual wage measures to 2000 U.S.\$\$. Details on the construction of the labour market variables can be found in the [Supplementary Data Appendix](#). We also use data on GDP per capita (PPP) from the World Bank as an alternative proxy for overall labour market conditions. [Supplementary Appendix Table 3](#) presents the evolution of these labour market condition measures over time by sexism level groups.³⁵ We observe that while GDP per capita and skilled women’s wages have

31. While we could extend the age range to, say, 50 years old, this may weaken the mapping between the theory and the empirics in that (the few) women that enter into their first marriage so late are unlikely to have children, and hence the main mechanism of the model is unlikely to apply to them.

32. Details on the coding for each data source can be found in the [Supplementary Data Appendix](#).

33. Ideally, we would have liked to construct labour market conditions for individuals aged 35–44 in year t based on the labour market outcomes of those aged 25–54 in year $t - 10$ as this might be closer to the labour market conditions that were prevalent when making marital status decisions. However, due to data limitations, this is not feasible, as this would entail a much smaller set of countries for our analysis. We do, however, use these more accurate measures in our U.S. state panel exercise.

34. For the two countries (Norway and Sweden) where workers’ full-time status is not available, we use the average wage for all workers.

35. Since not all countries have information for the whole period, we show changes between 1995 and 2010, 2000 and 2010, and 2005 and 2010, keeping the group of countries the same between the first and last years.

been increasing over time, there have been much smaller changes in the gender wage gaps and limited changes in the skill premiums. As such, over the period under study, skilled women's labour market opportunities have been growing in our sample of developed countries at a rate that was not systematically different from the rate of growth of labour market opportunities for other groups in the economy.

4.1.2. Empirical evidence. For the cross-country analysis, the primary source of variation in labour market opportunities for skilled women in this panel comes from rising wages, with little systematic changes in the gender wage gap or skill premium (see [Supplementary Appendix Table 3](#)). Given this, we use two measures of labour market opportunities for high-skilled women: skilled women's real wages and GDP per capita. In a model in which all wages are a constant proportion of GDP (the first comparative statics case discussed in the theoretical section), these measures are interchangeable. One advantage of the GDP per capita measure is that it is less subject to measurement error. Indeed, measurement error is likely to arise in the wage data because it is drawn from numerous different, often small, surveys, sometimes covering different samples of workers (*e.g.* full-time versus all workers). Furthermore, the wage data are not available in some years for some countries, leading to smaller sample sizes.

The first prediction of the theoretical model is that, all else equal, the skilled–unskilled marriage gap should be larger in countries with more conservative gender attitudes. Suggestive evidence of such a relationship is presented in Figure 5 for the cohort of women who were between 35 and 44 years of age in 2010. Specifically, in the left panel of Figure 5, we graph the relationship between the gap in marriage rates between high-skilled and low-skilled women and the IVS-based measure of gender role attitudes in that country. The figure clearly shows that countries that are more conservative according to this measure are also countries where educated women marry at especially low rates compared to less educated ones. In contrast, we see a weaker relationship for men (right panel of Figure 5).

Table 1 shows the regression version of Figure 5. The baseline correlation is reported in Column 1. The magnitude of the coefficient suggests that a one standard deviation increase in the sexism index increases the relative deficit in ever-married rate for high-skilled women by about 4 percentage points. Columns 2 and 3 show the robustness of this correlation to the addition of controls. Our choice of controls is based on the theoretical model as well as on the observed trends reported in [Supplementary Appendix Table 3](#). Specifically, we control for the share of males with a tertiary education, women's opportunities (using either GDP per capita or skilled women's wages), the gender wage gap, and the skill premium.³⁶ Columns 4 and 5 present an alternative specification where countries are grouped into high, medium, and low sexism (see [Appendix Table 4](#)). In Column 4, we estimate that the gap in ever-married rates between high- and low-skilled women in low-sexism countries is 14 percentage points smaller than in high-sexism countries and 8 percentage points smaller than in mid-sexism countries.

Columns 6–8 replicate the specification in Column 4 for the other three cohorts of women that we observe in our data. We see that the negative correlation between sexism and the skilled–unskilled marriage gap also exists for earlier cohorts (especially when it comes to high sexism levels), although the coefficients are of slightly smaller magnitude in 2000 and 1995 and at best significant at the 10% level for the mid-sexism group.³⁷

36. The gender wage gap is measured by combining skilled and unskilled individuals; a unique skill premium is computed using men and women. All our results are robust to allowing the gender wage gap to vary by skill and the skill premium to vary by gender.

37. Note that we do not include the set of controls in Columns 6–8 because of missing data on wages for earlier periods. If controls were included, the coefficient for high sexism would be negative and marginally significant for 2000

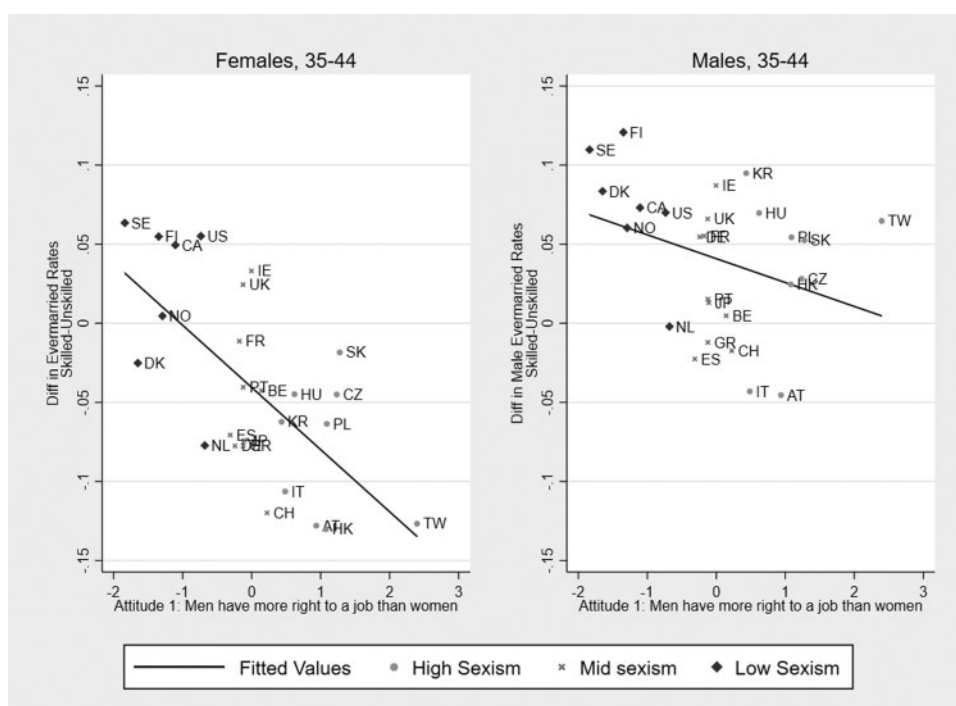


FIGURE 5

Skilled–unskilled marriage gaps and social norms by gender, 2010.

Notes: See [Supplementary Appendix Table 1](#) for a description of the data sources. The figure shows the cross-country relationship between the skilled–unskilled difference in ever married rates for females (left panel) and males (right panel) aged 35 to 44 and the IVS-based measure of gender attitudes.

Another prediction of our model is that the relative marriage outcomes of skilled women will be more strongly affected by the gender norms in their country than skilled men will (see Figure 4). As shown in Figure 5, the correlation, while negative for both women and men, is much stronger for women. The remaining columns of Table 1 confirm this fact in a multivariate regression. Columns 9 and 10 show that while the estimates on the gender norm measures are of the same sign as those for women, they are quantitatively smaller and, in the case of the specification using the continuous measure, not statistically significant.

Next, we turn to empirical tests of additional predictions of the model regarding the heterogeneity across countries in how the skilled–unskilled marriage gap will change as labour market opportunities for skilled women improve. While the time series in our sample of countries is too short (15 years at most) to formally test for the existence of U-shape relationships (and differential U-shape relationships based on the strength of gender attitudes) in the cross-country sample, we can still verify some weaker predictions of the theory. In particular, we expect increases in economic opportunities to be more consistently associated with relative gains in the skilled–unskilled marriage gap in countries with more equal gender norms; in contrast, we expect that relationship to be flatter, and maybe even negative, in countries with more conservative gender norms. This is because, as seen in Figure 4, less sexist countries are more likely to be on the

and 2005 and negative and large but not statistically significant for 1995. The regression with controls for 1995 has only 15 observations.

TABLE 1
Correlation between the skilled–unskilled marriage gap and social norms

	Dep var. difference in ever married rates (high skilled–low skilled)									
	A. Females					B. Males				
	Year=2010					Year=2010				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sexism Index: men have more right a job than women (mean 0, var 1)	–0.039*** [0.008]	–0.047*** [0.012]	–0.048*** [0.010]							–0.019 [0.013]
High sexism dummy				–0.137*** [0.033]	–0.128*** [0.030]	–0.103*** [0.031]	–0.086*** [0.032]	–0.070*** [0.029]	–0.063*** [0.028]	
Mid sexism dummy				–0.084** [0.030]	–0.072** [0.029]	–0.066** [0.030]	–0.054* [0.026]	–0.042 [0.029]	–0.070*** [0.027]	
Measure of women's opportunities	None	LGDP pc	L(HS F Wage)	LGDP pc	L(HS F Wage)	LGDP pc	LGDP pc	LGDP pc	LGDP pc	LGDP pc
Other controls	No	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Observations	26	26	26	26	26	26	26	19	26	26
R ²	0.421	0.466	0.485	0.512	0.502	0.298	0.190	0.228	0.618	0.597

Notes: The unit of observation is a country. Each column is a separate regression with the difference in ever married rates between high-skilled and low-skilled for females (Panel A) and males (Panel B) for the year indicated as the dependent variable. The high (mid) sexism dummy refers to the top (middle) tercile of countries in terms of conservatism of gender norms as measured using the IVS. Sexism Index is the continuous measure of gender norms from the IVS, standardized to have mean of 0 and standard deviation of 1 in the sample of 26 countries. Log(HS F Wage) is the logarithm of average wage among women age 25 to 54 with a tertiary education and working full-time in each country (expressed in 2000 US dollars). Other controls include the share of males with tertiary education, the skill premium, and the gender wage gap. Robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Significance level is based on the t-distribution.

TABLE 2
Skilled–unskilled marriage gap, social norms and women’s labor market opportunities

	Dep var. difference in ever married rates (high skilled–low skilled)							
	Females						Males	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LGDP pc	0.186** [0.087]	0.283*** [0.096]	0.060 [0.056]	0.075 [0.064]			0.125** [0.058]	0.020 [0.038]
LGDP pc*high sexism	−0.218*** [0.078]	−0.409*** [0.087]					−0.155** [0.070]	
LGDP pc*mid sexism	−0.078 [0.085]	−0.178* [0.097]					−0.103* [0.056]	
LGDP pc*sexism index			−0.071** [0.027]	−0.144*** [0.030]				−0.041 [0.029]
L(HS F wage)					0.092** [0.037]	0.052 [0.039]		
L(HS F wage)*high sexism					−0.125** [0.046]			
L(HS F wage)*mid sexism					−0.018 [0.043]			
L(HS F wage)*sexism index						−0.029 [0.031]		
Other controls	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	86	97	86	86	86	86	86

Notes: The unit of observation is a country-year. The sample includes 26 countries across four time periods (1995, 2000, 2005, 2010). Each column within the panel is a separate regression with the difference in evermarried rates between high-skilled and low-skilled females or males as the dependent variable. All regressions include year and country fixed effects. The number of observations in each column is fewer than 104 due to missing information on wages or marriage gaps for some countries in some years. The high (mid) sexism dummy refers to the top (middle) tercile of countries in terms of conservativeness of gender norms as measured using the IVS. Sexism Index is the continuous measure of the conservatism of gender norms from the IVS, standardized to have mean of 0 and standard deviation of 1 in the sample of 26 countries. Log(HS F Wage) is the logarithm of average wage among women age 25 to 54 with a tertiary education and working full-time in each country (expressed in 2000 US dollars). Other controls include the share of males in each country with tertiary education, the skill premium, and the gender gap. Robust standard errors clustered at the country level are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

upper-part of their U-shape than more sexist countries. Moreover, as discussed in Section 3.3, even if more and less sexist countries are on the same side of their respective U-shape, we expect a positive difference between the slope of the “U” in the less sexist places and the slope of the “U” in the more sexist places. In particular, if both more and less sexist countries are on the upper-part of their U-shape, we expect the slope in less sexist countries to be steeper than in more sexist ones because less sexist husbands derive greater utility gain from an increase in wife’s wage.

In Table 2, using the pooled sample of countries from 1995 to 2010, we regress the difference in ever-married rates for skilled versus unskilled women on a proxy for skilled women’s opportunities in the labour market: $\log(\text{GDP per capita})$ (Columns 1–4) or $\log(\text{high-skilled female wages})$ (Columns 5 and 6) and the interaction between this proxy and country-level sexism. All regressions include country and year fixed effects, and standard errors are clustered at the country level. Models in Columns 1 and 3 do not include other controls, while models in other columns do. These controls (share of males with a tertiary education, a measure of women’s opportunities, the gender wage gap, and the skill premium) are chosen to approximate the comparative statics from the theoretical model; our preferred specifications include them.

The point estimates in all of our regression models (Columns 1–6) indicate that higher labour market opportunities for skilled women are associated with a decrease in the deficit

they experience in the marriage market in low-sexism countries and that this relationship is systematically weaker, and sometimes even of opposite sign, as sexism increases. For example, in Column 2, we see that a 10% increase in GDP per capita reduces the marriage market “penalty” for high-skilled women by 3 percentage points in low-sexism countries and by 1 percentage point in mid-sexism countries, but increases it by 1.2 percentage points (2.9–4.1) in high-sexism countries. We can reject the null hypothesis that the coefficient on Log(GDP per capita) plus the coefficient on its interaction with the high sexism dummy is equal or larger than zero at the 10% level (p -value is 0.06). Similarly, the coefficient on the continuous variable interacted with GDP per capita suggests that on average, for countries one standard deviation below the average sexism level, an increase in GDP per capita narrows the skilled–unskilled marriage gap, but for countries one standard deviation above the average sexism level, it widens it (Columns 3 and 4). Specifications using skilled women’s wages suggest similar patterns, even though the estimates are noisier. Note that, unlike in Column 2, we cannot statistically reject a flat or positive slope for high-sexism countries in Column 5.

To assess the magnitude of the estimated coefficients, we apply the observed changes by sexism group in GDP per capita and high-skilled female wages from 1995 to 2010 to our panel model estimates and compare those predictions with the observed change in the skilled–unskilled marriage gap. We find that our model explains between 15% (using wages) and 35% (using GDP) of the observed increase in the marriage deficit for skilled women in the most conservative countries, and between 40% (using wages) and 100% (using GDP) of the observed decline in that deficit in the least conservative countries.³⁸

Finally, in the last two columns of Table 2, we replicate the analysis of Columns 2 and 4 for men. While the point estimates on the interaction terms of interest are of the same sign as those in the regressions using the female sample, the magnitudes are in general smaller and, in the case of the continuous measure of sexism, not statistically significant. The sign and relative magnitude of the coefficients vis-a-vis the women’s estimates are consistent with the model’s prediction (see Figure 4), with the exception of a negative point estimate (1.3–1.6) for the effect of an increase of GDP per capita on the skilled–unskilled marriage gap for males in high-sexism countries; we however cannot reject that this effect is equal to or larger than 0 (p -value = 0.3), while we can reject the same hypothesis for women in Column 2.

A final implication of the theory that we bring to the cross-country data is that the share of skilled women should be lower in more gender-conservative countries, as educated women in those countries expect to face greater barriers in the marriage market.³⁹ This is exactly what we find. Column 1 of Table 3 indicates that the share of women with tertiary attainment is significantly lower in high-sexism and mid-sexism countries relative to low-sexism countries in 2010, controlling for the share of men with tertiary education.⁴⁰ This basic relationship is

38. We obtain these numbers by applying the mean change in GDP per capita and wages by sexism group. We restrict the calculations to countries with data on wages in 1995. As an example, the observed mean change in GDP per capita for the high sexism group is 28%. When we multiply 0.28 by -0.032 (0.186–0.218) we get a predicted change in the gap of -0.009 , which accounts for 35% of -0.026 (the observed mean change in the marriage gap for this group of countries).

39. Given that women’s education choice is an endogenous variable in our model, we do not control for it in our cross-sectional and panel data models of marriage gaps. When we do (see Tables 5 and 6), all our coefficients of interest are of the expected sign and statistically significant at at least the 10% level, although the magnitudes in the cross-sectional exercise are smaller.

40. Supplementary Appendix Figure 5 provides a graphical illustration of the cross-country relationship between the gender gap (female–male) in tertiary education among 35–44 year old in 2010 and the conservativeness of gender-role attitudes in each country. Consistent with the results shown in Table 3, we observe a strong negative relationship, with the smallest gender education gaps in Nordic countries and the largest gaps in East Asian countries.

TABLE 3
Correlation between female tertiary attainment and social norms

[illegible]

Notes: The unit of observation is country. Each column is a separate regression with the share of females with tertiary education in each time period (2010, 2005, 2000, 1995) as the dependent variable. The high (mid) sexism dummy refers to the top (middle) tercile of countries in terms of conservativeness of gender norms as measured using the IVS. Sexism Index is the continuous measure of gender norms from the IVS, standardized to have mean of 0 and standard deviation of 1 in the sample of 26 countries. All regressions include a control for the share of men with tertiary education in each country. Other controls include the skill premium and the gender gap. Robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE 4
Household production and social norms

	Hours a week spent in activity relative to the U.S. demographics		
	Total household production		
	(1) Female	(2) Male	(3) Total
Sexism Index: men have more right to a job than women (mean 0, var 1)	1.949 [1.957]	−1.400* [0.727]	0.748 [2.110]
Mean of Dep. Var	−10.27	−10.30	−17.94
Observations	18	18	18
R^2	0.077	0.086	0.008

Notes: The outcome variable is the country dummy coefficient of a regression of hours a week spent in the activity (by the respondent or by her/his spouse) on country fixed effects, number of children, dummy for children under 5 years of age, household size, education and age of the respondent, and a dummy for whether the respondent has a partner living in the household. Total household production is the sum of care for family members and household work. The excluded country dummy is for the U.S. Data come from the 2012 ISSP, with the sample restricted to individuals aged 18–64 with at least one own child living in the household. The countries included in the regression are: AT, CA, CH, CZ, DK, DE, ES, FI, FR, IE, JP, KR, NO, PL, SE, SK, and TW. We also have data for the US, which we use to construct the outcome variable. Robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

robust to the inclusion of controls for skilled women's labour market opportunities and the other labour market controls (see Column 2). The point estimates in Column 2 imply that the share of females with tertiary education is about 10 percentage points lower in mid-sexism countries compared to low-sexism ones, and 13 percentage points lower in high-sexism countries compared to low-sexism ones. We obtain qualitatively similar results when we use the continuous sexism index in Columns 4–6. In Column 7, we show that there is a positive correlation between the share of females with higher education and the skilled–unskilled marriage gap among women. Hence, women's educational achievement is higher in countries where skilled women marry at a relatively higher rate compared to unskilled ones. While certainly not dispositive, this correlation is consistent with the mechanism that drives the link between the gender gap in education and gender norms in our theoretical model: the value women derive from acquiring more education tends to be lower in more sexist countries because of the negative impact of this additional schooling in the marriage market. Finally, Columns 8–10 show that the relationship we find between sexist attitudes and female educational attainment for 2010 is also observed for the other years in our sample.

4.2. Robustness

α or β ? As discussed in the theory section, cross-country differences in the value placed on the household good could also generate patterns similar to those we observed in the prior tables. This is a potential concern for our analysis if there is a strong positive correlation between such preferences for the household good and the strength of gender norms. In Table 4, we assess whether such a correlation exists across countries. To proxy for the value placed on the household good (β in our model), we compute the total time households devote to the production of the public good. We rely on data from the 2012 International Social Survey Program (ISSP) to construct the following variables (all measured in hours per week): time spent by parents on total household production (household work + care for family members), time spent by female parent, and time spent by male parent. From the micro data, we then estimate, for each variable above, a country

dummy based on regressing the variable on country fixed effects, number of children, a dummy for the presence of children under 5 years of age, household size, education, and age of the respondent, and a dummy indicating if the respondent has a partner living in the household. In a final step reported in Table 4, we regress the estimated country dummies for each of the three variables above on the continuous index of sexism.⁴¹

As is apparent from Table 4 and [Supplementary Appendix Figure 6](#), there is no systematic correlation between total (*e.g.* husband plus wife) time spent on household production and gender norms. Not surprisingly, gender norms correlate strongly with the distribution of time spend in household production between spouses: women do a greater share of the non-market work in more sexist countries. Also, in Columns 1 and 2 of Table 5, we re-estimate the main specifications reported in Table 1, including the proxy for β (time spent by parents on total household production) as a control. Reassuringly, the results remain unchanged. In sum, we fail to find support for the possibility that our results are picking up on differential valuation of the household good across countries.

Cohabitation. Another concern with our analysis so far is that marriage might not be the core outcome of interest or, more precisely, it might be a poor proxy for the prevalence of long-term partnerships within a country. This could be especially problematic for countries where long-term cohabitation is common and couples live in a marriage-like relationship without actually entering a formal union. To account for this, we complement our analysis in Tables 5 and 6 with alternative dependent variables that might better capture the existence of such long-term partnerships. We construct an alternative measure of marriage that also includes cohabitation. We compute the skilled–unskilled gap in ever-married or currently cohabiting rates for women who are between 35 and 44 years old in 2010.⁴² Unfortunately, cohabitation is only available in the EU-SILC and in the U.S. CPS, and therefore this analysis must be restricted to the subset of European countries and the U.S. In Columns 5 and 6 of Table 5, we see that more conservative gender norms reduce the likelihood of marriage or cohabitation for skilled women relative to unskilled women. In other words, our results in Table 1 do not appear too sensitive to the possible miscoding of some long-term partnerships—the coefficients are highly statistically significant, if somewhat smaller in magnitude.⁴³

Fertility. Yet another way to proxy for the existence of a long-term partnership is to look for the presence of children. Fertility is an important outcome in itself, and it is measurable for a large number of countries and for a longer period of time than cohabitation. A weakness of this alternative measure is that it also includes children who may have resulted from short-term and less stable relationships (*e.g.* teen pregnancy). Moreover, the likelihood of fertility outside of a stable relationship might be more relevant in some countries than in others and, more importantly for us, differentially relevant across skill groups. With these caveats in mind, we construct a

41. [Supplementary Appendix Figure 6](#) provides a visual inspection of this analysis.

42. We cannot measure whether a person was cohabiting at some point in the past but is currently not. Results are similar if we use as our measure currently married or currently cohabitating.

43. We are not able to estimate a version of Table 2 for this outcome as the cohabitation measure is not available for the earlier periods.

TABLE 5
Correlation between the skilled–unskilled marriage gap and social norms: robustness tests

	Dep Var. Difference in Outcome (High Skilled - Low Skilled) in 2010 - Females									
	A. Evermarried rates, include as control:			B. Alternative outcomes				C. Alternative measure of attitudes		
	Household production (1)	Share of females with tertiary education (3)	(4)	Currently cohabitating or ever-married (5)	(6)	Own child at home (7)	(8)			
High sexism dummy	-0.150*** [0.029]	-0.079* [0.039]		-0.070** [0.025]		-0.103*** [0.029]		-0.115*** [0.039]		
Mid sexism dummy	-0.096*** [0.025]	-0.039 [0.034]		-0.054*** [0.017]		-0.079** [0.029]		-0.052 [0.033]		
Sexism index			-0.027** [0.010]		-0.027** [0.010]		-0.027** [0.010]		-0.048** [0.019]	
Measure of women's opportunities	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc	LGDGP pc
Other controls	No	Yes	Yes	No	No	Yes	Yes	No	No	No
Observations	18	26	26	21	21	26	26	23	23	23

Notes: The unit of observation is a country. The dependent variable is the difference in the outcome indicated in each panel between high-skilled and low-skilled females in 2010. Panel A examines robustness of the results reported in Table 1 to the inclusion of controls for time spent by parents on total household production (see Table 4 for details) and share of females with a tertiary education. Panel B uses evermarried + currently cohabitating and fertility as alternative outcome variables (both measured among women age 35 to 44). Fertility is defined based on the presence of an own child at home. Panel C examines the robustness of the results reported in Table 1 to using an alternative measure of gender norms based on the ISSP survey. The ISSP survey is not available for Italy, Greece, and Hong Kong. Other controls include the share of males in each country with tertiary education, the skill premium, and the gender wage gap. Robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE 6
Skilled-unskilled marriage gap, social norms and women's labor market opportunities: robustness tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	A. Drop East Asia		B. Controls for share of females with tertiary education		C. Dep. var: own children at home		D. ISSP measure of sexism	
			IVS attitude measure: Men have more right to a job than women					
LGDP pc	0.265*** [0.084]	0.109** [0.043]	0.290*** [0.083]	0.073 [0.057]	0.428** [0.192]	0.190 [0.124]	0.244* [0.122]	0.028 [0.064]
LGDP pc*high sexism	-0.294*** [0.085]		-0.413*** [0.083]		-0.332* [0.168]		-0.364*** [0.116]	
LGDP pc*mid sexism	-0.167* [0.092]		-0.179* [0.098]		-0.311** [0.150]		-0.135 [0.116]	
LGDP pc*sexism index		-0.133** [0.053]		-0.143*** [0.029]		-0.078* [0.043]		-0.133*** [0.036]
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	72	72	86	86	71	71	74	74

Notes: The unit of observation is a country-year. Each column is a separate regression with the difference in ever married rates between high-skilled and low-skilled females as the dependent variable. The high (mid) sexism dummy refers to the top (middle) tercile of countries in terms of conservativeness of gender norms as measured using the IVS (Panels A, B, and C) and the ISSP (Panel D). Sexism Index is the continuous measure of the conservatism of gender norms from the IVS/ISSP, standardized to have mean of 0 and standard deviation of 1. Other controls include the share of males in each country with tertiary education, the skill premium, and the gender wage gap. Robust standard errors clustered at the country level are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

variable for fertility defined as a dummy variable that equals to 1 if a woman reports the presence of an own child within her household.^{44,45}

In Columns 7 and 8 of Table 5, we see that more conservative gender norms are associated with lower relative fertility of skilled women compared to less skilled ones. Columns 5 and 6 of Table 6 also establish that our results in Table 2 generally continue to hold when we define the dependent variable of interest as the skilled–unskilled gap in fertility: higher labour market opportunities for skilled women are associated with a relative increase in their fertility in low-sexism countries and this relationship is systematically weaker in more sexist countries.⁴⁶ Note, however, that the coefficient on the interaction between GDP and the mid-sexism dummy is larger in absolute value than the coefficient of the interaction with high sexism, which is unlike the patterns we observed in Table 2.

Excluding East Asia. Another potential concern is the extent to which our key findings are solely driven by the East Asian experience. We show that this is not the case. First note that the results in Columns 5 and 6 of Table 5 already exclude East Asian countries, as we do not measure cohabitation in these countries. Second, in Columns 1 and 2 of Table 6, we find qualitatively similar patterns as Table 2 when East Asian countries are excluded from the sample: the relationship between the skilled–unskilled gap in marriage rate and women’s labour market opportunities is more negative as sexism increases.

Alternative measure of gender norms. Finally, as discussed above, we also construct an alternative measure of the strength of gender norms within a country based on the answer to the following question in the ISSP: “A man’s job is to earn money; a woman’s to look after the home.” In Columns 9 and 10 of Table 5 and Columns 7 and 8 of Table 6, we confirm that our core findings are qualitatively unchanged when we use this alternative measure. We note, however, that some of the estimated coefficients are not statistically significant.

4.3. Evidence from U.S. states

The empirical tests that we have presented in the previous section can also be performed in a panel of U.S. states. One advantage of focusing on the U.S. context is that there is considerably less unobserved heterogeneity across U.S. states than across countries. Specifically, one may be concerned that unobserved differences across countries, such as differential views towards cohabitation, differential availability of substitutes to time in household production, or other institutional or cultural forces, may confound the relationship that we observe between the female skilled–unskilled gap in ever-married rates and gender norms. While we have attempted to address some of these issues directly in the robustness analysis above, showing that our key results also hold in a sample of U.S. states where such unobserved differences are not expected to be as large would be reassuring and would reinforce the validity of our interpretation of the country-level findings. Another advantage of the U.S. context is data availability—in particular, we can

44. In the EU-LFS, we derive this dummy from a variable that links children to their parents. The fertility measure for many European countries is available for 2005 and 2010 from both the LFS and the SILC. For some EU countries (mostly Nordic ones), fertility measures cannot be constructed using the LFS. Given the much larger samples of the LFS, our preferred specification uses the LFS measures when available and the SILC only when they are not.

45. Given the age range of interest (35–44), there is possible mismeasurement for the older women in the range since their children may have left the household. Also, given educational differences in age at first birth, this mismeasurement is likely greater for the less educated.

46. The variable linking mothers to children is included in the EU-LFS starting only in 1998; thus we do not have fertility measures for Europe in 1995.

construct longer panels of all the key state-level variables that are required for our analysis and provide cleaner measures of labour market opportunities at the time when individuals make their marriage decisions. However, this also comes at a cost. Compared to the country-level analysis, there is less variation across states in the U.S. than across developed countries in the key variable that drives our theory: the strength of gender norms.⁴⁷

We combine data from the 1970 to 2000 U.S. Census and the 2008 to 2011 American Community Survey (ACS) to construct a panel of U.S. states across four decades, from 1970 to 2010. We limit our sample to native-born, non-hispanic whites, since marriage patterns among minority groups (*e.g.* blacks and hispanics) have evolved quite differently over the period under study for reasons that are not captured well by our model, such as the higher incarceration rates of low-skilled black males and higher incidence of single-parenthood.⁴⁸ We proxy for gender norms at the state-level using data from the 1977 to 2014 waves of the General Social Survey (GSS).⁴⁹ Specifically, we rely on answers to the question “It is better if the man is the achiever outside the home and the woman takes care of home and family.” Respondents indicate their agreement to this statement on a four-point scale—agree strongly, agree, disagree, and disagree strongly. We code the responses “agree strongly” and “agree,” as indicating a greater degree of gender conservatism. Since the GSS did not include the “jobs scarce” question from the IVS that we used in the country-level analysis, we focus on this specific question as it is most comparable to the ISSP question. Moreover, this question appears closest in spirit to proxying for the gender norms that are central in the model, which are based on the belief some hold that a woman’s primary role is to take care of the home.

To combine the individual responses from different GSS waves into a single state-specific measure, we use the same procedure as that for the ISSP-based measure.⁵⁰ We use responses for all individuals aged 18 and older and are able to construct a state-level measure of sexism for 44 states and DC.⁵¹ Similar to the gender norm measures at the country-level, we standardize the state-level measure to have a mean of zero and a standard deviation of one in the sample of states. [Supplementary Appendix Table 5](#) provides descriptive statistics of the gender norm measure by state, as well as the classification of states into three sexism groups based on terciles of the standardized residual state-level measure. An important assumption that underpins the use of a single state-level index over this period of time is that there are persistent and stable differences in gender norms across states. In results available upon request, we demonstrate that while average attitudes have become less conservative over time across all states,⁵² the relative ranking of states in terms of the sexism index has remained relatively constant over time.⁵³

47. One might be concerned that selective internal migration might bias the results—in particular, that women who prefer to acquire education and reside in a sexist state might move to states that are more tolerant toward career women. In results available on request, we show that our main findings are similar if we limit the sample to only individuals who live in the same state that they were born in.

48. Since immigrants’ preferences and behaviour are likely to also be shaped by gender norms in their country of origin, we do not include them in our analysis.

49. The question is available in the 1977, 1985–1991, 1993, and every 2 years from 1994 to 2014.

50. Specifically, we first regress individual-level responses to the question on a full set of year dummies. Next, we use the residuals from this regression to create a measure of the average gender conservatism in a particular state, which is simply the mean across all years of the residual individual-level response in a given state.

51. The six states that were not included in earlier waves of the GSS are Hawaii, Idaho, Maine, Nebraska, Nevada, and New Mexico.

52. This is consistent with the trends documented in [Fernandez \(2013\)](#).

53. Specifically, using the procedure described above, we create two measures of the sexism index—the first based on an earlier time period (1977–1998) and the second based on a later time period (2000–2014). When we restrict the sample of states to those with at least 30 respondents in the early and late periods (39 states), the Spearman rank correlation between the “early” and “late” index is 0.75. The correlations between the overall (early + late) sexism and the “early”

[Supplementary Appendix Table 6](#) presents the evolution of the labour market conditions faced by individuals at the time they make their marriage decisions, separately by sexism level groups. The annual wage measures are based on the sample native-born workers age 22–65 who report working full-time (35 or more hours per week).⁵⁴ Similar to our results from the cross-country analysis, skilled female wages have been steadily increasing over time for all sexism groups. Over this longer time period, we observe declining gender wage gaps for both skilled and unskilled workers and a generally increasing skilled wage premium for both men and women. We use real wages of college-educated women to proxy for labour market opportunities for high-skilled women. Given the higher quality of the wage data in the U.S. sample, as well as the fact that we observe declines in the gender wage gap and increases in the skill premium over the sample time period, we do not use the state-level GDP per capita as an alternative proxy for women's opportunities.⁵⁵ In addition, since both the gender wage gap and the skill premia have changed alongside the increase in high-skilled female wages in the panel of U.S. states (unlike the cross-country analysis), to isolate the effects of changes in skilled women's labour market opportunities, we adopt a richer set of labour market controls—namely, quadratics in female low-skilled wages as well as wages for high-skilled and low-skilled males.

To illustrate the extent of the cross-state variation in the skill gap in ever-married rates by gender in 2010, [Supplementary Appendix Figure 7](#) replicates [Supplementary Appendix Figure 4](#) for the U.S. state-level analysis. As of 2010, in all states except Missouri and Wyoming, skilled men marry at a higher rate than unskilled ones. While we observe no deficit for skilled women in the marriage market in 2010 in the U.S. at the aggregate level, this statistic hides substantial variation across states, which we propose to explain through the lens of our theory. We also see that in the majority of states, skilled women experience a greater deficit in the marriage market compared to skilled men. It is apparent from the figure that DC stands out as a clear outlier in the size of the skilled–unskilled marriage gaps for both women and men. In our subsequent analysis, we present results that include DC; however, we have also estimated specifications where we omit DC, and the results are very similar.

We now turn to replicating [Tables 1 to 3](#) in the U.S. state-level data. [Table 7](#) mirrors [Table 1](#) and estimates the correlation between the skilled–unskilled gap in women's marriage rates and the strength of gender norms in 2010. The gap is more likely to be positive in low-sexism states and more likely to be negative in high-sexism states. The univariate correlation in [Column 1](#) between the skilled–unskilled gap in marriage rates in 2010 and the high-sexism dummy is, if anything, strengthened when controls for high-skilled female wages, the share of males with tertiary education, as well as the other state-specific labour market controls, are included.⁵⁶

[Columns 3 and 4](#) show that the results are robust to using the continuous measure of sexism. In [Supplementary Appendix Table 7](#), we further show that these results are robust to controlling for measures of household production (a proxy for β) as well as for the share of females with college

and “late” sexism indices are 0.92 and 0.93, respectively. This suggests that our main measure is indeed capturing stable rank differences in gender norms across states.

54. We exclude those who are currently in school as well as the self-employed.

55. This is because, unlike the case for the cross-country analysis, the assumption that all wages are a constant proportion of GDP does not hold.

56. Note that these labour market controls are measured among individuals aged 22–65 in the preceding decade; this ensures that the labour market controls proxy for the labour market conditions that individuals were likely to face when making their marriage decisions (*i.e.* when they were aged 25–34). As discussed previously, due to data limitations, we were not able to construct the variables in the preceding time period for the country-level exercise.

education.⁵⁷ Furthermore, the results are qualitatively similar when we use alternative proxies for long-term partnerships, such as the skilled–unskilled gap in fertility as well as marriages that include children. Another concern is that the choice of age range may affect the measure of the skilled–unskilled marriage gap especially if the well-educated tend to get married later (within the 35–44 age range). We use data from the 2008–11 ACS to address this concern. [Supplementary Appendix Figure 8](#) plots the share of females ever-married by age separately for high-sexism and low-sexism states in the U.S. If anything, the marriage rates for unskilled women (*i.e.* those with no college degree) tend to be higher than that for skilled women (those with at least a college degree) at the upper end of the 35 to 44 age range in high-sexism states. For low-sexism states, ever-married rates of skilled women are slightly higher than that of unskilled women in the 35–44 age range, but not differentially so at the lower versus upper end of the age range (*i.e.* the relative gap is similar for those 35–39 versus 40–44). Therefore, the concern of later marriages among skilled women relative to unskilled women affecting our measure of the skilled–unskilled marriage gap does not seem to have much empirical traction in the data.

Columns 5 to 8 replicate Column 2 for 2000, 1990, 1980, and 1970. The relationship is most pronounced in the last three decades (1990–2010) and not present in 1970 and 1980. Recall that one prediction of our model is that educated women will only start experiencing a decline in their relative marriage rate compared to less-educated ones when (i) they become less appealing to men who dislike having a working wife and (ii) they become more picky in the marriage market as their labour market opportunities and utility if they remain single increase. When labour market opportunities for skilled women are relatively low, we would not expect to see large differences in their relative marriage rates based on the sexism of the environment. Hence, the lack of a relationship between our two key variables in the earlier decades could be rationalized through the lens of our model.

The two remaining columns of Table 7 replicate the analysis for men. The estimated coefficient for high-sexism states for men is negative, but about half the size of the corresponding estimate for women and not statistically significant, while the coefficient estimate for mid-sexism states for men is similar to that for women. In addition, the estimated relationship between the continuous measure of sexism and the male skilled–unskilled marriage gap is negative, albeit not statistically significant. We interpret these findings as suggestive of a weak negative relationship between state-level sexism and the skilled–unskilled gap in marriage rates among men, which again is in line with what the theory predicts.

Table 8 mirrors Table 2. In particular, we test for the additional theoretical prediction that increases in labour market opportunities for skilled women are likely to be associated with increases in their relative marriage rate in less sexist states and that this relationship will be weaker, and maybe even of opposite sign, in more sexist states.

The evidence in Table 8 is broadly consistent with that presented in Table 2 for the country sample. The findings in Column 1 of the top panel indicate that an increase in labour market opportunities for skilled women is associated with higher relative marriage rates for skilled women in low-sexism states (0.055). The relationship is also positive in mid-sexism states, but flatter (0.055–0.038). The point estimates indicate that this relationship is of opposite sign in high-sexism states (0.055–0.066), even though the estimates are noisy enough that we cannot reject a zero or positive slope.⁵⁸ Column 2 shows that the patterns in Column 1 are qualitatively unchanged when we include time-varying state controls.

57. Just like in the cross-country case, we do not find any systematic correlation across U.S. states between total (*e.g.* husband plus wife) time spent on household production and sexism level (even though gender norms correlate in the expected direction with the allocation of that time between husband and wife). These results are available on request.

58. The *p*-value for the test that the slope for high-sexism states (0.055–0.066) is zero or positive is 0.388.

TABLE 7
Correlation between the skilled-unskilled, marriage gap and social norms, U.S. states

	Dep Var. Difference in Ever Married Rates (High Skilled - Low Skilled)									
	A. Females					B. Males				
	Year=2010	2000	1990	1980	1970	Year=2010	2000	1990	1980	1970
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
High sexism dummy	-0.031** [0.012]	-0.036*** [0.010]			-0.018** [0.009]	-0.011* [0.005]	0.021** [0.008]	0.033 [0.031]	-0.017 [0.020]	
Mid sexism dummy		-0.029** [0.012]			-0.017** [0.007]	-0.005 [0.005]	0.011 [0.008]	0.009 [0.017]	-0.021* [0.011]	
Sexism Index: better if man is achiever outside home and women take care of home and family (mean 0, var 1)			-0.012*	-0.012***						-0.007
Measure of women's opportunities										
Other Controls	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45	45	45	45	45	45	45	45	45	45
R ²	0.215	0.683	0.159	0.637	0.764	0.602	0.537	0.212	0.675	0.657

Notes: The unit of observation is a state (including DC). The data is from the 1970 to 2000 US Census and 2008 to 2011 ACS. The sample is restricted to native-born, non-hispanic whites. Attitudes are measured using the 1977 to 2014 General Social Survey and are not available for 6 states (Hawaii, Idaho, Maine, Nebraska, Nevada, and New Mexico). Each column is a separate regression with the difference in ever married rates between high-skilled and low-skilled for females (Panel A) and males (Panel B) age 35 to 44 for the indicated year as the dependent variable. The high (mid) sexism dummy refers to the top (middle) tercile of states in terms of conservatism of gender norms as measured using the GSS. Sexism Index is the continuous measure of gender norms from the GSS, standardized to have mean of 0 and standard deviation of 1 in the sample of 45 states. Log(F HS wage) is the logarithm of the average wage among women age 22 to 65 with a college degree working full-time (35 h or more+A10e) in the preceding decade (t-10) in each state. Other controls include the share of males with college education, a quadratic in male high skilled wages, and quadratics in female and male low skilled wages; the labor market controls are measured among individuals age 22 to 65 in year t-10. Robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE 8
Skilled–unskilled marriage gap, social norms and women’s labor market opportunities, U.S. states

	Dep var. difference in ever married rates (high skilled–low skilled)		
	A. Females		B. Males
	1. Terciles		
	(1)	(2)	(3)
Log(F HS wage)	0.055 [0.040]	0.056 [0.054]	0.053* [0.030]
Log(F HS wage)*high sexism	–0.066*** [0.019]	–0.059** [0.028]	–0.030** [0.015]
Log(F HS wage)*mid sexism	–0.038* [0.021]	–0.032 [0.022]	–0.020** [0.009]
R^2	0.599	0.637	0.859
	2. Continuous Measure		
	0.021 [0.041]	0.025 [0.046]	0.036 [0.034]
Log(F HS wage)*Sexism Index	–0.021*** [0.007]	–0.012 [0.011]	–0.003 [0.006]
Other controls	No	Yes	Yes
Year FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
R^2	0.575	0.617	0.853
Observations	225	225	225

Notes: The unit of observation is a state (45 states) by decade (1970, 1980, 1990, 2000, and 2010). The data is from the 1970 to 2000 US Census and 2008 to 2011 ACS. The sample is restricted to native-born, non-hispanic whites. Attitudes are measured using the 1977 to 2014 General Social Survey and are not available for 6 states (Hawaii, Idaho, Maine, Nebraska, Nevada, and New Mexico). Each column in each panel is a separate regression with the difference in evermarried rates between high-skilled and low-skilled for females (Panel A) and males (Panel B) age 35 to 44 as the dependent variable. All regressions include year and state fixed effects. The high (mid) sexism dummy refers to the top (middle) tertile of states in terms of conservativeness of gender norms as measured using the GSS. Sexism Index is the continuous measure of gender norms from the GSS standardized to have mean 0 and standard deviation 1 in the sample of 45 states. Log(F HS wage) is the log average wage of full-time (working 35 or more hours per week) females age 25 to 65 with a college degree in the preceding decade (t–10) in each state. Other controls include the share of males with college education, a quadratic in male high skilled wages, and quadratics in female and male low skilled wages. The labor market controls are measured among individuals age 25 to 65 in year t–10. Robust standard errors clustered at the state level are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The first column in the lower panel shows a similar relationship when we use the continuous sexism measure. However, the magnitude of the coefficient on the interaction between high-skilled women’s wages and the continuous measure of sexism, while still negative, is smaller and not statistically significant when we include additional controls.⁵⁹ Similar patterns also hold when we use the skilled–unskilled difference in fertility or the skilled–unskilled difference in marriages that include children as alternative outcome variables.

Column 3 replicates Column 2 for males. In line with the prediction of the theory, we observe that, for all groups, increases in the labour market opportunities for skilled women are associated with increases in the relative likelihood of marriage among skilled men. This effect, however, appears to be smaller for men in more sexist states relative to less sexist states. Nevertheless, consistent with the theory, the observed relationship between the skilled–unskilled marriage gap

59. [Supplementary Appendix Table 8](#) shows that these patterns are largely similar when we control for the share of females with college education.

and the interaction between high-skilled women's wages and gender norms is weaker for men as compared to women.

Finally, Table 9 mirrors Table 3 and examines the cross-state relationship between female educational attainment and gender norms, conditional on the share of men with a college degree in the state. In Column 1, we observe that the share of women who have completed a college degree in 2010 is highest in low-sexism states. The observed correlation is robust to the inclusion of the usual set of state-level controls and to using the continuous sexism measure (see Columns 2–4).

As we had observed in the cross-country data, we see in Column 5 that there is a positive relationship between the share of women who have completed a college degree and the difference in marriage rate between high- and low-skilled women, consistent with the mechanism articulated in the theory. However, unlike in the cross-country analysis, this relationship is not statistically significant.

Finally, the remaining columns of Table 9 replicate Column 2 for the years included in our data. While sometimes imprecise, the estimates suggest a negative correlation between sexism and female educational attainment from 1980 onwards. Sexism does not appear to relate to women's educational outcomes for the earliest decades. Our theory suggests that if higher education is less likely to translate into greater labour market opportunities for women in the earlier periods, then the relative sexism of the state is less likely to matter in these earlier periods.

In summary, the state-level evidence is largely consistent with the findings from the cross-country analysis. The fact that similar patterns are observed within a single-country context is reassuring and suggests that the cross-country patterns are not entirely driven by unobserved heterogeneity.

4.4. *Direct evidence of a U-shaped relationship between the skilled–unskilled marriage gap and women's labour market opportunities*

While our analysis of the U.S. data so far has solely focused on replicating the country-level analysis, the availability of a longer time period allows us to present additional evidence in support of our proposed model. In particular, and as already suggested by the cohort-analysis in Figure 2, the longer time series might allow us to demonstrate the existence of the U-shape relationship between the female skilled–unskilled marriage gap over time as women's labour market opportunities rise, as well as the differential U-shape relationships by sexism level the theory predicts (see Figure 4).

Figure 6 examines how differences in ever-married rates between skilled and unskilled women have evolved over time from 1970 to 2010, separately by sexism group. Specifically, we regress the skilled–unskilled marriage gap on the interaction between each of the sexism group dummies and each of the year dummies, controlling for state fixed effects. The omitted category is 1970 for each sexism group. Panel A graphs the estimated coefficients on the interaction terms for each sexism group and year (relative to 1970) from a model with no additional controls. Panel B graphs the estimated coefficients from a similar regression that also includes the usual set of state-level education and wage controls.

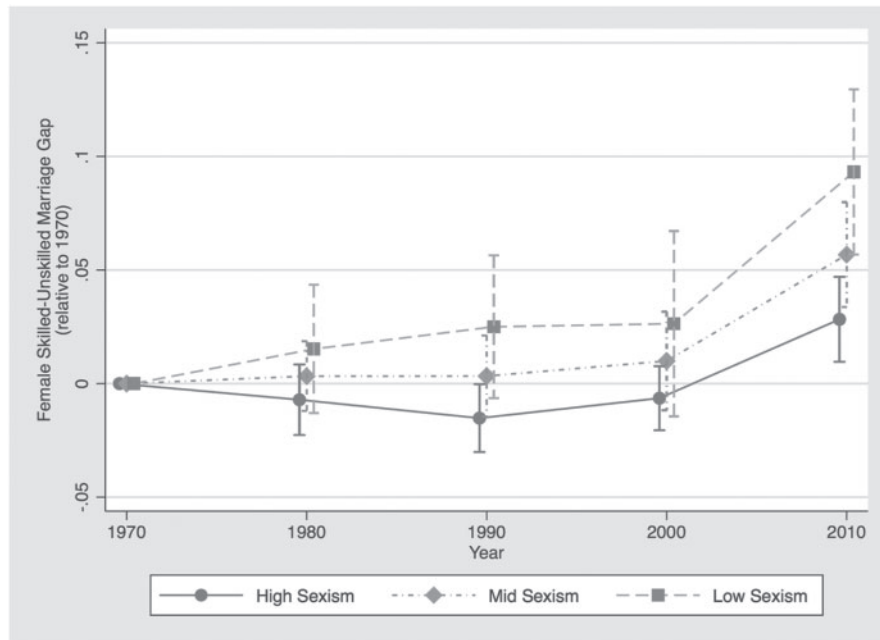
In Panel A, we observe that for the least sexist states, skilled women's relative deficit in the marriage market has been declining since 1970. In contrast, for the most sexist states, there is evidence that the skilled–unskilled marriage gap widened (in absolute value) from 1970 to 1990 before declining from 1990 to 2010. States with medium levels of sexism experienced little change in the skilled–unskilled marriage gap between 1970 and 1990, followed by relative increases in marriage rates for skilled women in the following two decades. In the controlled specification (Panel B), we observe U-shape relationships across all three groups of states.

TABLE 9
Correlation between female college attainment and social norms, U.S. states

	Dep var. share of females with college degree (age 35 to 44)								
	Year=2010								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
High sexism dummy	-0.020** [0.010]	-0.022* [0.012]				-0.017 [0.013]	-0.010 [0.010]	-0.003 [0.006]	0.000 [0.005]
Mid sexism dummy	-0.014** [0.005]	-0.013* [0.007]				-0.009 [0.010]	-0.005 [0.006]	-0.001 [0.005]	-0.000 [0.005]
Sexism Index: better if man is achiever outside home and women take care of home and family (mean 0, var 1)			-0.012** [0.006]	-0.018*** [0.006]					
Diff. in ever married rates (high skilled - low skilled) - females					0.158 [0.139]				
Share of males with college degree	0.986*** [0.034]	0.914*** [0.096]	0.957*** [0.043]	0.911*** [0.066]	0.904*** [0.090]	0.814*** [0.141]	0.861*** [0.078]	0.666*** [0.050]	0.619*** [0.060]
Measure of women's opportunities					Log(F HS wage)				
Other Controls	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45	45	45	45	45	45	45	45	45
R ²	0.975	0.981	0.979	0.987	0.979	0.973	0.978	0.983	0.940

Notes: The unit of observation is a state. Each column is a separate regression with the share of native-born, non-hispanic white females age 35 to 44 with a college degree in each time period as indicated in the columns as the dependent variable. The high (mid) sexism dummy refers to the top (middle) tertile of states in terms of conservativeness of gender norms as measured using the GSS. Sexism Index is the continuous measure of gender norms from the GSS standardized to have mean 0 and standard deviation 1 in the sample of 45 states. All regressions include a control for the share of men age 35 to 44 with a college degree in each state. Other controls include the share of males with college education, a quadratic in male high skilled wages, and quadratics in female and male low skilled wages. The labor market controls are measured among individuals age 22 to 65 in year t-10. Robust standard errors are reported in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(a) No controls



(b) Including all controls

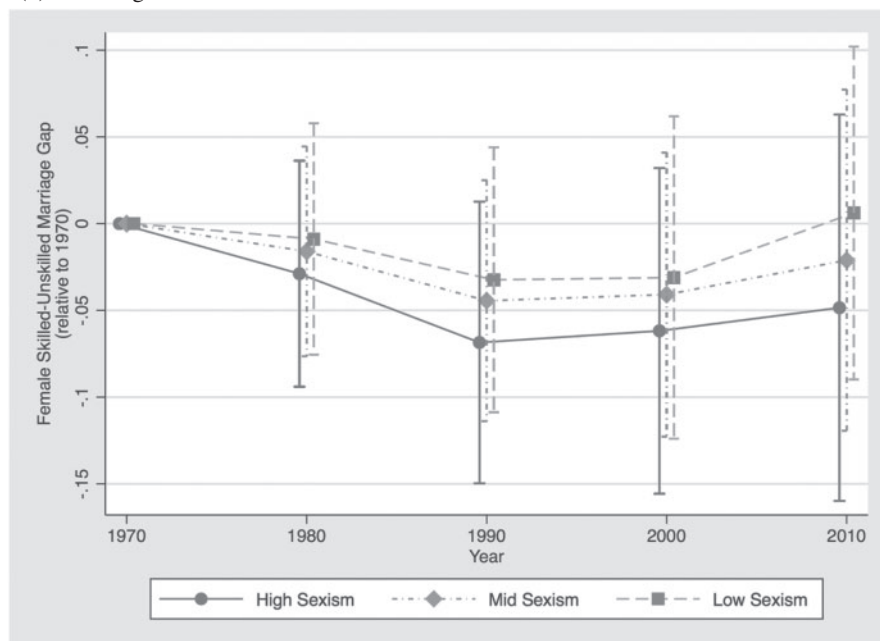


FIGURE 6

Female skilled–unskilled marriage gaps by sexism group, 1970 to 2010: U.S. States.

Notes: The data are from the 1970 to 2000 U.S. Census and the 2008 to 2011 ACS. There are 15 states in each sexism group (see [Supplementary Appendix Table 5](#) for the classification of U.S. States to each sexism group). The figure plots the coefficient (and 95% confidence intervals) on the interaction between the sexism group dummy and the year dummy controlling for state fixed effects. The omitted category is 1970 for each sexism group. The top figure reports the raw, unadjusted trends in the skill gap in ever married rates for native-born non-hispanic females age 35 to 44 from 1970 to 2010. The bottom figure reports the same trends, controlling for all the controls used in the regression analysis (male college share, a quadratic in male high-skilled wages, and quadratics in female and male low-skilled wages).

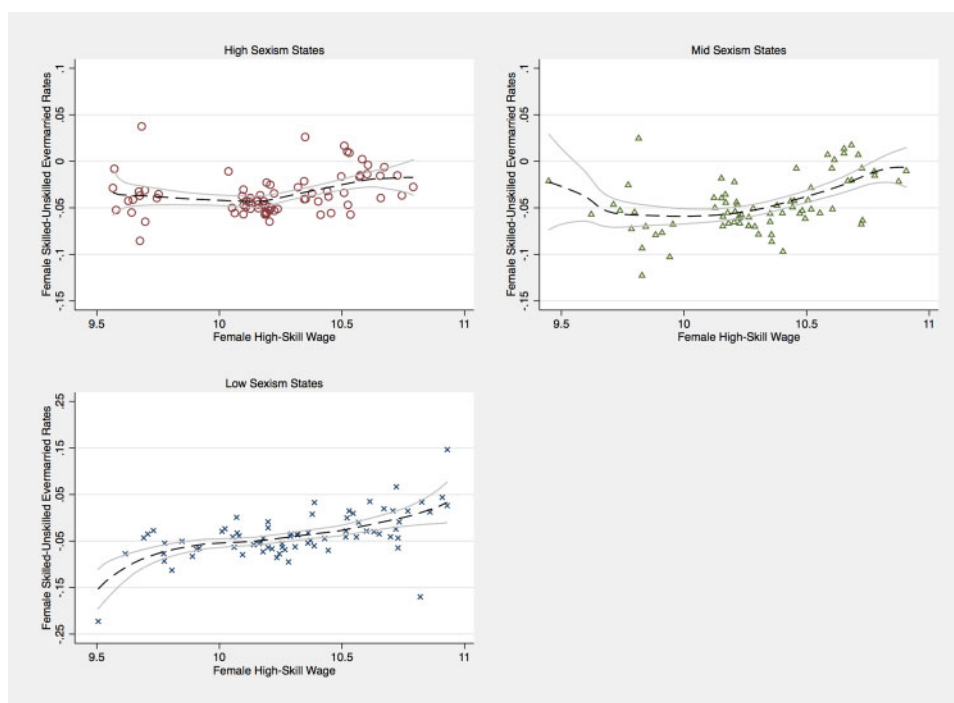


FIGURE 7

Female skilled–unskilled marriage gap and female high-skilled wage by sexism group, U.S. states.

Notes: The data are from the 1970 to 2000 US Census and the 2008 to 2011 ACS. Each point in the figure is a state by decade (1970 to 2010) for each of the three sexism groups represented in each panel (high, mid, and low). There are 15 states in each sexism group (see [Supplementary Appendix Table 5](#) for the classification of U.S. States to each sexism group). The dashed lines in the figure represent the smoothed relationship for the states in each sexism group and solid grey lines plot the corresponding 95% confidence interval bands.

However, as predicted by the theory (see Section 4.3), the first half of the “U” is steeper (in absolute value) in more sexist states.⁶⁰

Finally, in Figure 7, we directly examine how the female marriage gap by skill varies as a function of our proxy for women’s labour market opportunities, the wages of skilled women, separately for states with different levels of sexism. The lines in the figure represent the smoothed relationship for each sexism group. We observe a U-shape pattern for high-sexism states and mid-sexism states. By contrast, over the measured wage range, the skilled–unskilled marriage gap appears to be more steadily increasing in the low sexism group.⁶¹ In other words, and consistent with the comparative statics in Figure 4, high- and mid-sexism states were more likely than low-sexism states to be riding down the first half of their “U” in the lower part of the skilled women’s wage range observed in the data; as skilled women’s wages increased further, all states finally reached the second half of their “U.”

[Supplementary Appendix Table 9](#) presents the parametric regression analogue of Figure 7. In particular, for states in each of the sexism groups, we regress the female skilled–unskilled marriage gap on a quadratic term in female high-skilled wages, only further controlling for fixed differences between states in this marriage gap. Confirming the visual evidence in Figure 7, we estimate a convex relationship between the skilled–unskilled marriage gap and female high-skilled

60. The corresponding figure for males is reported in [Supplementary Appendix Figure 9](#).

61. The corresponding figure for males is reported in [Supplementary Appendix Figure 10](#).

wage for high-sexism states (see Column 1); this remains true after we include additional controls (see Column 4). While we find some evidence of a convex relationship for mid-sexism states in the baseline specification, the inclusion of additional controls weakens this relationship. Finally, we find little evidence of a convex relationship for low-sexism states. Overall, these results are consistent with the existence of a U-shaped relationship over the period under study in U.S. states characterized by more conservative gender norms.

5. CONCLUSION

We develop a simple theoretical model that helps to rationalize the relatively lower marriage rate of educated women through the lens of gender identity norms. The model can also provide an explanation as to why educated women's relative deficit in the marriage market reacts in opposite directions to improvements in their labour market opportunities in more versus less gender conservative societies, and hence why women's educational choices in the face of growing labour market opportunities might depend on the strength of these gender norms as they balance labour and marriage markets considerations. We verify some of the key predictions of our model in both a panel of developed nations as well as a panel of U.S. states.

The model we propose abstracts from various relevant factors and could be enriched by future work. In particular, to emphasize how better labour market opportunities for skilled women interact with slower-moving social norms, we have taken the extreme perspective of fixed and exogenous gender role attitudes. A richer model would account for the fact that, even if slowly, gender role attitudes have been converging toward less conservative views, and would endogenize this process of change.

Our analysis has implications for the expected long-run trend of what is today a troubling phenomenon in many gender-conservative countries, and in particular East Asia and Southern Europe: the increasing singleness rate of college-educated women. Given that non-traditional family structures and out-of-wedlock births continue to be quite rare in these societies (particularly in East Asia), this "flight from marriage" among highly educated women is also likely to translate in a decline in fertility for this educational group, only reinforcing the already low fertility rate in this part of the world. The fact that highly skilled women are disproportionately foregoing childbearing could also result in lower social returns to education in these societies, and it may further slow down the dynamics of adjustment of gender norms to the new labour market reality if children of educated and/or working women tend to develop more liberal gender attitudes (FFO, 2004).

Even if gender role attitudes do not change (or change very slowly) in East Asia, our analysis suggests that further improvements in the labour market opportunities for skilled women should ultimately improve their relative attractiveness in the marriage market. While predicting when this will happen is beyond the mainly descriptive nature of the exercise we have performed here, the fact that the marriage rate of educated women has caught up to (and in some cases surpassed) that of less educated women in more gender-equal societies should give East Asian and Southern European countries hope about the transitional nature of the phenomenon they are experiencing.

Supplementary Data

[Supplementary data](#) are available at *Review of Economic Studies* online.

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