

# Women's Liberation: What's in It for Men?\*

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## Abstract

The nineteenth century witnessed dramatic improvements in the legal rights of married women. Given that they took place long before women gained the right to vote, these changes amounted to a voluntary renouncement of power by men. In this paper, we investigate men's incentives for sharing power with women. In our model, women's legal rights set the marital bargaining power of husbands and wives. We show that men face a tradeoff between the rights they want for their own wives (namely none) and the rights of other women in the economy. Men prefer other men's wives to have rights because men care about their own daughters and because an expansion of women's rights increases educational investments in children. We show that men may agree to relinquish some of their power once technological change increases the importance of human capital. We corroborate our argument with historical evidence on the expansion of women's rights in England and the United States.

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# 1 Introduction

*“Once married, a bride was obliged by law and custom to obey her husband—a requirement so fundamental to the biblical idea of a wife that it remained in most Jewish and Christian wedding vows until the late twentieth century. After all, wives were considered a husband’s ‘property,’ alongside his cattle and his slaves.”* (Yalom 2001)

The cause of gender equality has made dramatic progress over the past 200 years. Today, the expansion of *political rights* through female suffrage, introduced in 1918 in the United Kingdom and in 1920 in the United States, is often regarded as the main breakthrough. However, important reforms of women’s *economic rights* took place much earlier. In England and the United States (which have similar common-law legal systems), this is especially true for the rights of married women. Prior to 1830, in these countries married women essentially had no rights at all, as all legal authority rested with their husbands. This meant that a married woman could not own property, she could not enter into contracts, she had no rights to her own earnings, she had no parental rights over her legitimate children, and she could not obtain a divorce. Throughout the nineteenth century, both England and the United States carried out a series of reforms in areas such as child custody, divorce, and marital property law that substantially altered the rights and obligations of husbands and wives during and after marriage. By the end of the century, the rights of husbands and wives in these areas were close to being equal.

Our research is motivated by the observation that this great improvement of married women’s economic rights took place *before* women were granted political rights. All the reform laws of this period were passed by all-male legislatures that were accountable only to male voters. Given that the granting of rights to women implied a weakening of men’s rights, it amounted to a voluntary renouncement of power by men. This brings us to our main question: Why would men ever agree to grant more economic rights to women?

The idea put forth in this paper is that from a man’s perspective, there is a trade-off between the rights of his own wife versus the rights of other men’s wives. Improvements in married women’s economic rights increase women’s bargain-

ing power relative to their husbands within the household. Since husbands have nothing to gain from an increase in their wives' bargaining power at their own expense, men ideally want their own wives to have no rights. But men might stand to gain from other women having rights. We focus on two channels that give men a stake in the rights of other men's wives. First, men are altruistic towards their own children, half of which are daughters. Men prefer their daughters to have a strong bargaining position vis-à-vis their sons-in-law.<sup>1</sup> Second, in our model an improved bargaining position for wives translates, among other things, into increased investments in children's human capital. A father prefers his children to find high-quality mates, and therefore stands to gain from increasing the power of his children's future mothers-in-law.

We argue that this tradeoff between the rights of a man's own wife versus those of other men's wives has shifted over time, because of a changing role of human capital. When the return to education increases, finding well-educated spouses for one's children becomes a more important concern. Similarly, a rising return to education increases fathers' concern about the rights of their daughters, because the daughter's marital bargaining power matters for the grandchildren's education. According to our theory, the ultimate cause of the expansion of women's rights throughout the nineteenth century was technological change that increased the demand for human capital. This change elevated the importance of children's education, it strengthened men's incentives to expand women's bargaining power, and it ultimately induced men to voluntarily extend rights to women.

The framework for our theoretical analysis is an overlapping-generations model in which married couples face a tradeoff between the quantity (i.e., number) and quality (i.e., education) of their children. In addition, couples have to allocate consumption between husband and wife. Our theory builds on the altruistic-parents model of Becker and Barro (1988) and Barro and Becker (1989). We modify the original setup by explicitly modeling husbands and wives.<sup>2</sup> We fol-

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<sup>1</sup>Washington (2008) and Oswald and Powdthavee (2009) provide empirical evidence that men's political preferences are influenced by their number of daughters.

<sup>2</sup>Papers that analyze two-gender OLG models in non-altruistic settings include Aiyagari, Greenwood, and Guner (2000), Fernández, Guner, and Knowles (2005) and Tertilt (2005).

low Chiappori (1988, 1992) and model household decision-making by solving a Pareto problem, with different weights on husband and wife that represent their relative bargaining power. There is disagreement between the spouses in two dimensions. First, even though the spouses are altruistic towards each other, both husband and wife value their own consumption more than their spouse's. Marital bargaining power therefore affects the allocation of consumption. Second, we assume that mothers care more about the well-being of their children than fathers do. Bargaining power therefore also matters for the children's education; in particular, extending rights to women will lead to more education.<sup>3</sup>

We then analyze the economic implications of two alternative political regimes. Under *patriarchy* all family decisions are made solely by the husband, whereas under *empowerment* decisions are made jointly by husband and wife. We allow men to vote on the political regime, and we analyze their incentives for supporting empowerment. We find that when returns to education are low, men are better off living in patriarchy. As returns to education increase, parents choose to have fewer children and to educate them more. We show that once returns to education reach a critical threshold, men stand to gain from improving women's rights and will vote for empowerment.

As an extension, we consider an environment where human capital formation depends not only on parental inputs, but also on government-provided public education. Male voters choose the quality of public education in addition to voting on female empowerment. We find that an increase in the returns to human capital leads to a higher quality of public education. Moreover, as long as pub-

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Fernández, Fogli, and Olivetti (2004) also provide a formal model where men's attitudes towards women change endogenously, although the application is to female labor force participation rather than women's rights.

<sup>3</sup>The idea that female empowerment leads to higher investments in child quality is also present in Edlund and Lagerlöf (2004), who have a model in which a shift in power towards women leads to faster human capital accumulation (see also Iyigun and Walsh 2007b). Eswaran (2002) argues that one reason for such behavior is that women bear relatively higher utility costs of child-bearing (e.g. pains and mortality associated with child-bearing) than men. In another empirical contribution, Miller (2008) analyzes the connection between women's suffrage, public health spending, and child survival rates in the U.S. and argues that investment in children increased significantly in response to women having more power. Similar ideas are also extensively discussed in the demography literature (Federici, Mason, and Sogner 1993). In Gould, Moav, and Simhon (2008), the link from female education to investments in children leads to a switch from polygyny to monogamy once the return to education is sufficiently high.

lic and private inputs in human-capital formation are complements, support for public education and female empowerment is mutually reinforcing. In another extension, we examine the alternative hypothesis that an increase in the demand for female labor may have led to female empowerment. We find that, in the context of our model, such a demand shift leads to higher female education and labor supply, but does not alter men's incentives to vote for empowerment. Thus, both extensions are consistent with our view that an increase in the demand for human capital was the main driver of the expansion of women's rights in the nineteenth century.

We corroborate our arguments with historical evidence on the expansion of women's economic rights in England and the United States. Our theory places the introduction of women's rights in the context of the demographic transition and the increased accumulation of human capital in the second phase of the industrial revolution.<sup>4</sup> We show that the historical timing of increased investments in education, declining fertility, and the expansion of women's rights is consistent with the implications of our theory. We also show that the historical debates surrounding the major reforms of women's rights during this period reflect the key arguments in our analysis. Based on evidence from parliamentary debates and newspaper editorials, we document that in both England and the United States there was a gradual shift during the nineteenth century from arguments that concentrate on the rights of men towards a view that gives first priority to the needs of children.

Our mechanism is also consistent with existing empirical evidence that exploits the state-by-state variation in the expansion of women's rights in the United States. Geddes and Lueck (2002) find that the first states to extend property and earnings rights to women were those that had a higher city population, more female schooling, and higher average household wealth. Given that human-capital intensive sectors are generally associated with urban rather than rural production, these findings are consistent with our theory. Roberts (2006) examines an

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<sup>4</sup>To this end, our theory builds on unified models of economic and demographic change such as Galor and Weil (1996), Galor and Weil (2000), Greenwood and Seshadri (2002), Hansen and Prescott (2002), Boldrin and Jones (2002), Doepke (2004), and Jones and Schoonbroodt (2007). However, none of these papers focus on political changes.

alternative hypothesis, namely that women's rights were expanded because of an increase in women's participation in the formal labor market. However, he finds that female labor-force participation was in fact higher in states without women's earnings and property laws. Moreover, using a difference-in-differences approach, Roberts does not find any causal effect of a change in women's rights on female labor-force participation. Fernández (2008) also builds on the empirical analysis in Geddes and Lueck to investigate the role of fertility. As our theory would predict, she finds a negative correlation between fertility and women's rights at the state level. When including fertility in a regression similar to the specification in Geddes and Lueck, Fernández finds that household wealth is no longer statistically significant. These findings suggest that changes within the organization of families, rather than women entering the labor force, played a key role in the extension of economic rights to women.

Our theory leads to an interesting reassessment of the relationship between traditional family roles and the progress of women's liberation. During the twentieth century, a major focus of the women's liberation movement was the advancement of women in the formal labor market. From this perspective, traditional role models and the glorification of motherhood were often viewed as obstacles which the women's liberation movement aimed to overcome. A longer-term perspective, however, reveals that the "traditional" roles for women and mothers are a relatively recent invention. Social historians document that the sharp distinction between the roles of mothers and fathers in the household as well as the heightened status of motherhood arose only in the nineteenth century, when industrialization led to a greater separation of home and work spheres and the nurturing and education of children gained in importance. In our theory, it is exactly the increasingly prominent role of mothers in the education of their children that triggers improvements in women's rights.

By focusing on the "supply" of rights by men, our approach provides a contrast to theories advanced by historians that focus on the "demand" side by highlighting the role of the women's movement in achieving gender equality. In the economics literature, there are only a few papers that attempt to explain changes in the legal position of women. Geddes and Lueck (2002) emphasize that women's

rights will expand when an increasing return to female labor induces more women to enter the formal labor market. While such arguments may be applicable to more recent changes in women's rights, they are unlikely to be relevant for the major reforms of married women's rights during the nineteenth century, because these occurred long before married women entered the formal labor market in large numbers. As late as 1920 (when female suffrage was introduced at the federal level), only five percent of married women in the United States were in the labor force. Another strand of the literature focuses specifically on the extension of political rights to women, which we do not consider here.<sup>5</sup> For example, Bertocchi (2007) argues that a decline of the gender wage gap reduced disagreement about the optimal tax rate between men and women, which lowered the cost for men to include women in the franchise. While interesting, this argument is not applicable to the nineteenth-century reforms of the economic rights of married women, which took place long before women received the right to vote.<sup>6</sup>

In the next section, we provide a summary of the main reforms of married women's economic rights throughout the nineteenth century in England and the United States. Section 3 sets up the model. In Section 4 we analyze men's incentives to share power with women and describe the transition from patriarchy to empowerment that is triggered by a rise in the return to education. In Section 5 we consider several extensions. Section 6 contains historical evidence from England and the United States. Section 7 concludes and discusses some implications of our theory for economic development. All proofs are contained in the mathematical appendix.

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<sup>5</sup>Empirical papers on the causes and consequences of female suffrage include Jones (1991), Lott and Kenny (1999), Edlund and Pande (2002), and Funk and Gathmann (2006).

<sup>6</sup>Papers that analyze the general extension of the franchise (not restricted to women) include Acemoglu and Robinson (2000, 2006), Lizzeri and Persico (2004), Diaz (2000), and Jack and Lagunoff (2006). The arguments in these papers are specific to expansions of political rights. Our work is more closely related to Galor and Moav (2006), who argue that an increase in the return to education helped overcome the historical conflict between workers and capitalists and induced capitalists to support public education.

## 2 The Expansion of Married Women's Rights in the Nineteenth Century

Up until the nineteenth century, the English common law (which formed the foundation of the legal systems in both England and the United States) distinguished sharply between the rights of a *feme sole*, a single woman, and a *feme covert*, a married woman. Single women's economic rights were nearly on par with those of men: these women could own property, hold land, make a will or contract, and they had full parental rights over their (illegitimate) children (Hecker 1971).<sup>7</sup> Upon marriage, however, a woman became a *feme covert* and lost these rights: the legal rights of husband and wife were merged and subsequently exercised solely by the husband. As a consequence, married women had no separate legal existence.<sup>8</sup>

Throughout the nineteenth century, the disparity in the rights of husbands and wives was reduced substantially through a series of reforms in areas such as child custody law, divorce law, and marital property law. Most of these civil-law changes ultimately concerned the distribution of power within a household. In contrast, the main reforms to women's political rights (such as the right to vote and the right to sit on juries) occurred only in the twentieth century.

One of the earliest legal changes was in child custody rules, with Iowa being the first U.S. state that permitted custody to mothers in 1838.<sup>9</sup> In England, the Custody of Infants Act was passed in 1839 and allowed mothers to be awarded custody of children under the age of seven in the event of separation or divorce. These laws were expanded on a number of occasions, and by the end of the cen-

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<sup>7</sup>However, in contrast to economic rights, political participation was equally limited for married and single women.

<sup>8</sup>The legal impotence of married women in the mid-nineteenth century is famously summarized in Elizabeth Cady Stanton's Seneca Falls Declaration and Caroline Norton's pamphlet "A Letter to the Queen on Lord Chancellor Cranworth's Marriage and Divorce Bill" (Stanton 1848 and Norton 1855) for the United States and England, respectively. Stone (1977) gives a detailed description of the legal position of wives in sixteenth and seventeenth century England.

<sup>9</sup>Note that the majority of laws concerning the legal status of women in the U.S. were state laws, which meant that legal rights varied somewhat from state to state and that changes occurred at different points in time. However, all states eventually went through the same transition (Mason 1994).

tury mothers could be awarded custody of all minor children, regardless of age.

In divorce law, a key step was the passing of the 1857 Matrimonial Causes Act, which permitted secular divorce in England and allowed both men and women to apply for divorce. The act also gave divorced women the status of *feme sole*, and thus the same legal rights as single women. Similarly, in the United States divorce laws were relaxed gradually over the century. By 1900, almost all states allowed divorce on grounds of cruelty (Griswold 1986).

Another major area of reform was marital property law. Here, the United States took the lead. The first state to pass a law allowing married women to own separate property was Maine in 1844, closely followed by New York in 1848.<sup>10</sup> In England, the Married Women's Property Act was passed in 1870 and expanded in 1874 and 1882. The reforms to property law dramatically improved the legal position of married women relative to their husbands by giving them control over their earnings and property and the ability to write contracts (Holcombe 1983).

Political rights, including most importantly female suffrage, were reformed only several decades after married women's economic rights had been expanded. The 19th Amendment to the United States Constitution granted full voting rights to women in 1920.<sup>11</sup> Similarly, most English women gained full voting rights in 1918 through the Representation of the People Act. Other forms of political engagement, such as jury service, continued to be denied to American women long after they gained the right to vote.<sup>12</sup>

One exception to the relative timing in reforms of economic and political rights was school suffrage, i.e., the enfranchisement of women to vote and run in local school district elections. In Kentucky, school suffrage was granted to women

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<sup>10</sup>Many more states introduced similar laws in the 1860s and 1870s, and by the end of the nineteenth century all married women in the United States had access to some form of property and/or earnings protection. See Khan (1996) for a detailed account of these laws in the United States.

<sup>11</sup>Some states had granted suffrage to women for state election prior to the 19th Amendment, but only four states prior to 1900 (Wyoming 1869, Utah 1870, Colorado 1893, and Idaho 1896), with the majority of states following after the 19th Amendment.

<sup>12</sup>For example, as as late as 1961 the Supreme Court upheld Florida's practice of automatically exempting women from jury service (Ritter 2006).

already in 1838 (Hecker 1971). Similarly, in England the Elementary Education Act of 1870 established the same active and passive election rights for men and women (Hecker 1971). School suffrage is an interesting case because, while a political right, it is tied directly to the education of children. In most states, school boards had some control over setting property taxes to finance schools. Thus, giving women the right to vote for school boards was a way to allow female preferences regarding children's well-being to enter the decision-making process. We discuss school suffrage from the perspective of our theory in Section 5.

In the labor market, unequal legal treatment of men and women persisted long into the twentieth century. In the United States, restrictions on hours worked, wages, and work conditions of female employees were introduced by almost all states during the late nineteenth and early twentieth centuries and stayed in place until the 1960s (Goldin 1990, chapter 7). Marriage bars, which excluded married women from certain occupations such as clerical work and teachers, were common until the second world war. Comprehensive legislation that guaranteed equal treatment in the labor market was introduced mostly in the second half of the twentieth century.<sup>13</sup>

While our focus is on England and the United States, legal reforms in other major industrializing countries during the nineteenth century followed a broadly similar pattern. In France and Germany, countries with legal origins distinct from the English model, married women's rights initially were stronger than in the Anglo-Saxon countries. For example, the Prussian Civil Code of 1794 explicitly stated the principle of gender equality. Similarly, the French Revolution generated some early advances for women's rights. The Constitution of 1791 established marriage as a civil contract that included some basic rights for married women. However, this was reversed in the French Civil Code of 1804, which stated that wives owed obedience to their husbands and that the husbands had control of communal property (Stetson 1987).<sup>14</sup>

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<sup>13</sup>An important example is Title VII of the 1964 Civil Rights Act, which prohibited employment discrimination based on race, color, religion, sex and national origin (see Goldin 1990, chapter 6).

<sup>14</sup>Our analysis has little to say about why the position of married women was different initially in France and Germany relative to the United States and England. Obviously a variety factors come into play when specific laws are implemented, not all of which are represented in our theory.

Despite the difference in initial conditions, as in England and the United States the rights of married French and German women improved substantially in the late nineteenth and early twentieth centuries. The German Civil Code of 1900 was a big step forward for married women in Germany, as it established a married woman's right to her own earnings, recognized gender equality regarding legal relationships, and eliminated the representative agency of the husband (Vogel 1993). In France, in 1881 married women were allowed to open savings accounts. Divorce became legal in 1884, and women received the rights to their own earnings in 1907 (Stetson 1987). As in England and the United States, women gained the right to vote only long after these economic rights were granted (1918 in Germany and 1938 in France).

### 3 A Model of Women's Rights

Our model economy is populated by overlapping generations of men and women who are joined in marriage. Each household is composed of a husband, a wife, and their children. Couples have to decide on fertility, the education of their children, and the allocation of consumption between the husband and the wife. Women's rights are represented as the relative bargaining power of the husband and the wife in the decision making of the household.<sup>15</sup> Women's rights are endogenous; in particular, men can vote on whether to extend rights to women. The aim of our analysis is to determine how the economic environment affects men's incentives to grant rights to women.

#### 3.1 Preferences and Constraints

Each couple in our economy has an equal number of sons and daughters. We use  $i \in \{m, f\}$  to denote gender (male or female) and  $-i$  to denote the gender opposite to  $i$ . People care about their own consumption  $c_i$ , their spouse's consumption

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<sup>15</sup>Echevarria and Merlo (1999) use a related two-parent dynastic model to analyze gender differences in education. There is no voting on women's rights, but men can improve the position of their daughters by choosing a higher education level, which increases the daughters' outside options and hence their bargaining positions in marriage.

$c_{-i}$ , their number of children of each gender  $n$  (i.e.,  $n$  sons and  $n$  daughters), and the average of the utilities of their sons  $U'_m$  and daughters  $U'_f$ . The utility function of an adult  $i$  with spouse  $-i$  is given by:

$$U_i(c_i, c_{-i}, n, U'_m, U'_f) = u(c_i, c_{-i}, n) + \gamma_i \left( \frac{U'_m + U'_f}{2} \right), \quad (1)$$

where:

$$u(c_i, c_{-i}, n) = \log(c_i) + \sigma \log(c_{-i}) + \delta \log(n).$$

Thus,  $\sigma$  is the weight on spousal consumption, and  $\delta$  is the weight on the number of children. We assume that  $0 < \sigma < 1$  (people value their spouses' consumption less than their own) and  $\delta > 0$  (people like children). The only gender-specific part of the utility function is the weight  $\gamma_i > 0$  attached to the welfare of the children.

A central assumption of our model is that women attach relatively more weight to the welfare of their children than men do, i.e.,  $\gamma_f > \gamma_m$ . There is a substantial empirical literature supporting this assumption. Several studies use natural experiments to show that when women have control of household decisions, they tend to spend more resources on children.<sup>16</sup> From an evolutionary perspective, the altruism gap between women and men can be rationalized by higher paternity uncertainty for men or by the more limited reproductive capacity of women.<sup>17</sup> Note that the utility weight attached to children differs between mothers and fathers only with regard to the children's well-being, not their number. In other words, we assume that men and women have different views of the quantity-quality tradeoff, which is critical for the results.<sup>18</sup>

<sup>16</sup>See Lundberg, Pollak, and Wales (1997), Pitt and Khandker (1998), Case and Deaton (1998), and Attanasio and Lechene (2002).

<sup>17</sup>See Wright (1995) for a summary of the key arguments in the evolutionary psychology literature. For an empirical documentation of paternity uncertainty see Anderson (2006). Another reason for the asymmetry might be that altruism towards children increases in time spent with children, and that women typically do most of the child-rearing. Bauer and Chytilova (2008) presents experimental evidence from India showing that women are more patient than men on average and that women's patience increases with their number of children.

<sup>18</sup>There is evidence that men in fact desire a larger number of children than women (see Bankole and Singh 1998 and Mason and Taj 1987). Shiue (2008) presents data from Chinese clans showing that the quantity-quality tradeoff was already relevant for family decision-making before the industrialization period.

Both spouses have one unit of time available. Men use all of their time for work,  $t_m = 1$ , while women split their time between working,  $t_f$ , and raising and educating children. The assumption that women bear the entire burden of caring for children is not crucial, but is made for simplicity and realism.<sup>19</sup> Weakening or even reversing this assumption would not alter the main results.

The labor effort of men and women is combined by a Cobb-Douglas household production function to produce the consumption good. For a family where the husband and the wife have human capital  $H_m$  and  $H_f$ , respectively, the budget constraint for consumption is given by:

$$c_m + c_f = A(t_f H_f)^\alpha (t_m H_m)^{1-\alpha}, \quad (2)$$

where  $0 < \alpha < 1$ .

There is a time cost  $\phi$  for raising each boy-girl pair. In addition, the couple can decide how much time to devote to their children's education. The time spent educating the daughters is denoted by  $e_f$  per daughter, and the time spent educating each son is  $e_m$ . The time constraint for women is thus

$$t_f + (\phi + e_m + e_f)n \leq 1. \quad (3)$$

The point of education is to increase the children's human capital, which improves their welfare. The laws of motion for human capital are given by:

$$H'_m = \max\{1, (Be_m)^\theta H_f^\beta H_m^{1-\beta}\}, \quad (4)$$

$$H'_f = \max\{1, (Be_f)^\theta H_f^\beta H_m^{1-\beta}\}, \quad (5)$$

where  $H'_m$  and  $H'_f$  denote the human capital of sons and daughters, and the parameters satisfy  $B \geq 0$ ,  $\theta \geq 0$ , and  $0 < \beta < 1$ . Two features are noteworthy here. First, the human capital of both parents has a positive effect on the productivity of education. Second, even without education ( $e_m = e_f = 0$ ) children receive one unit of human capital, which can be interpreted as the basic productive capac-

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<sup>19</sup>One reason why women historically have done most of the child-rearing is their ability to breast-feed and the fact that high-quality breast milk substitutes were developed only in the mid twentieth century, as documented in Albanesi and Olivetti (2007).

ity of an uneducated person (such as the ability to perform unskilled physical tasks). If the education technology is relatively unproductive (i.e.,  $B$  or  $\theta$  is low) the individual choice problem will yield a corner solution in which parents do not educate their children. While this possibility is not critical for our results, analyzing the no-education case will help illuminate the extent to which human capital accumulation is a necessary prerequisite for female empowerment.

The elasticity parameter  $\theta$  in the production function for human capital plays an important role in our analysis. In particular,  $\theta$  pins down the return to education, i.e., the percentage increase in children's earnings for a given increase in education time  $e_m$  or  $e_f$ . We will see below that the level of  $\theta$  is a key determinant of men's incentives for granting women's rights.

### 3.2 Determination of Economic Choices

Decision-making in a household depends on the political regime. Under either political regime, the current generation sets only current economic choices. That is, there is no possibility of committing future family members to particular decisions. There are two possible political regimes. Under the *patriarchy regime*, men make all decisions. Economic choices therefore are determined by maximizing male utility:

$$\{c_m, c_f, n, e_m, e_f\} = \operatorname{argmax} \{U_m(c_m, c_f, n, U'_m, U'_f)\}, \quad (6)$$

where the maximization is subject to the constraints (2) to (5) above. In the alternative regime, decisions are made through efficient bargaining between the husband and the wife with equal weights.<sup>20</sup> We call this the *empowerment regime*.

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<sup>20</sup>The exact weighting is not essential for the qualitative results. What matters is that the weight of the wife increases relative to patriarchy. An alternative approach to modeling family decision-making is Nash bargaining, which allows for a more explicit treatment of the outside option, either as being single (see Manser and Brown 1980 and McElroy and Horney 1981) or as non-cooperation within marriage (Pollak and Lundberg 1993). Pollak and Lundberg (2008) provide a survey of household bargaining models. Recent discussions of the importance of household bargaining for explaining family labor supply include Burda, Hamermesh, and Weil (2007) and Knowles (2007). We choose our formulation mostly for tractability, but also because in our historical context divorce was not a meaningful outside option for women. As discussed in Stone

Under this regime, economic choices are given by:

$$\{c_m, c_f, n, e_m, e_f\} = \operatorname{argmax} \left\{ \frac{U_m(c_m, c_f, n, U'_m, U'_f) + U_f(c_f, c_m, n, U'_m, U'_f)}{2} \right\}, \quad (7)$$

where once again the maximization is subject to (2) to (5). Implicitly, we assume that the government can set the relative bargaining power of the spouses (with women receiving zero weight under patriarchy and equal weight under empowerment). The political regime is determined through a vote of the male population, to be described in more detail below.

To solve the maximization problems in (6) and (7), we first need to determine how the children's utilities are affected by parental choices in each regime. This can be done by formulating the decision problem of a household recursively, so that all utilities become functions of the state variables. Clearly, the human capital of husband and wife  $H_m$  and  $H_f$  are state variables for a family. However, these state variables are not sufficient to describe the decision problem. Parents care about the welfare of their children, which in turn depends on the human capital of the children's future spouses. We assume that the sons and daughters of a given family do not marry each other, but draw a spouse at random from other families. We therefore also need a state variable that summarizes the family's expectations regarding the human capital of their children's future spouses. Given our setup, these state variables are given by the economy-wide averages of male and female human capital, denoted  $\bar{H}_m$  and  $\bar{H}_f$ . The aggregate state vector is written as  $\bar{H} = \{\bar{H}_m, \bar{H}_f\}$ .<sup>21</sup>

We use  $V_m^P$  and  $V_f^P$  to denote the male and female value functions under patriarchy, and  $V_m^E$  and  $V_f^E$  denote the value functions under empowerment. For either gender  $i \in \{m, f\}$  and under either political regime  $j \in \{P, E\}$ , the value

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(1993) for the case of England, women suing for separation would bring extreme financial hardship upon themselves, and they would lose control over, and in many cases even contact with, their children. They would also face public embarrassment, as the only grounds for divorce were extreme cruelty or adultery, the details of which would be discussed in court.

<sup>21</sup>We focus on equilibria in which all dynasties start out with the same initial human capital, in which case individual and aggregate human capital are always equal,  $H_i = \bar{H}_i$ . Nevertheless, the distinction between individual and aggregate variables is essential, because individuals do not internalize their impact on aggregate human capital.

functions satisfy the recursive relationship:

$$V_i^j(H_m, H_f, \bar{H}) = u(c_i, c_{-i}, n) + \gamma_i \left[ \frac{V_m^j(H'_m, \bar{H}'_f, \bar{H}') + V_f^j(\bar{H}'_m, H'_f, \bar{H}')}{2} \right], \quad (8)$$

where the economic choices are given by (6) and (7), respectively. The children's utilities in (6) and (7) as a function of the political regime  $j$  are thus given by:

$$U'_m = V_m^j(H'_m, \bar{H}'_f, \bar{H}'), \quad (9)$$

$$U'_f = V_f^j(\bar{H}'_m, H'_f, \bar{H}'). \quad (10)$$

Notice that the family has direct control only over the human capital  $H'_m$  of their sons and the human capital  $H'_f$  of their daughters. In contrast, the human capital of their daughters-in-law and sons-in-law is given by economy-wide averages  $\bar{H}'_f$  and  $\bar{H}'_m$ . These quantities, in turn, are determined by equilibrium laws of motion as a function of current average female and male human capital:

$$\bar{H}'_m = G_m^j(\bar{H}_f, \bar{H}_m), \quad (11)$$

$$\bar{H}'_f = G_f^j(\bar{H}_f, \bar{H}_m), \quad (12)$$

which have to be consistent with the individual laws of motion (4) and (5). The recursive system (6) to (12) can be solved to yield allocations and the welfare of men and women under either political regime.

### 3.3 Determination of the Political Regime

The political regime is determined by a once-and-for-all vote among the male population.<sup>22</sup> Before economic decisions are made in the initial period, men can vote on which political regime should be adopted. Men are utility maximizers in their voting decisions as well. Under the assumption that men will vote for patriarchy when both regimes yield the same utility, empowerment will be adopted if

<sup>22</sup>Our focus on a once-and-for-all vote is consistent with the finding below that in the relevant cases the tradeoff between the political regimes depends only on parameters, and not on state variables. If there are changes in parameters over time, on the other hand, dynamic voting would be a more natural concept. We will address this issue in Section 4.3.

and only if:

$$V_m^E(H_m, H_f, \bar{H}) > V_m^P(H_m, H_f, \bar{H}).$$

At first sight, it may appear that patriarchy is advantageous for men. Given that  $\sigma < 1$ , men would like to claim a disproportionate share of consumption for themselves, and patriarchy allows them to do so. However, there are also frictions in this economy that could make a lopsided distribution of power unattractive to men. First, men care about their daughters, and do not want their sons-in-law to have too much power over them. Second, the political regime also affects the accumulation of human capital, and this may provide additional motives for men to support women's rights. In what follows, we examine these tradeoffs in more detail, and derive conditions under which men prefer to share power with their wives.

## 4 Men's Incentives for Voting for Empowerment

To determine how men's utility is affected by women's rights, we need to solve the recursive system (6) to (12) and then compare the male value functions under each political regime. It is instructive to carry out this analysis for two separate cases depending on whether parents invest in the education of their children. We will see that even if parents do not educate their children, men's support for women's rights is weak and based exclusively on their concern for daughters. In contrast, if the return to human capital is sufficiently high and parents choose to educate their children, additional rationales for supporting women's rights arise, inducing men to vote for empowerment.

### 4.1 Incentives when Parents Do Not Invest in Education

Consider an economy where everyone starts out with the basic level of human capital  $H_m = H_f = 1$  and the human capital technology is sufficiently unproductive for zero education to be optimal. The economy will behave as if there were no human capital technology at all. Since in this regime parents do not influence

the human capital of their children, the children's utility is exogenous from the parents' perspective, and the family decision problem is static.

In the patriarchy regime, the maximization problem in (6) simplifies to:

$$\begin{aligned} \{c_m, c_f, n\} &= \operatorname{argmax} \{u(c_m, c_f, n)\} \\ \text{s.t. } c_m + c_f &= A(1 - \phi n)^\alpha. \end{aligned} \quad (13)$$

The optimal choices (i.e., optimal from the husband's perspective) are given by:

$$\begin{aligned} c_m^P &= \frac{1}{1 + \sigma} A \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} \right)^\alpha, & c_f^P &= \sigma c_m^P < c_m^P, \\ n^P &= \frac{\delta}{\phi(\alpha(1 + \sigma) + \delta)}. \end{aligned} \quad (14)$$

Under empowerment, the maximization problem in (7) can be written as:

$$\{c_m, c_f, n\} = \operatorname{argmax} \left\{ \frac{u(c_m, c_f, n) + u(c_f, c_m, n)}{2} \right\}$$

subject to (13). The optimal value of fertility is unchanged,  $n^E = n^P$ . The consumption choices now become:

$$c_m^E = c_f^E = \frac{1}{2} A \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} \right)^\alpha.$$

Not surprisingly, female consumption is higher and male consumption is lower under empowerment than under patriarchy. One might think that this implies that men would never favor women's rights. This is not necessarily true, however, since men also value the utility of their daughters (and granddaughters etc.). The concern for daughters induces a *taste for equality* in the future. Therefore, men prefer empowerment if either they care enough about their children ( $\gamma_m$  high) or if they care sufficiently little about their wives ( $\sigma$  low). A low  $\sigma$  strengthens the incentive to support empowerment because it implies low utility for daughters, granddaughters etc. under patriarchy, which men would like to avoid. Conversely, if concern for children is not too high and men do not mistreat their wives too much, then men prefer to live in a patriarchal world. These

results are summarized in the proposition below.

**Proposition 1 (Optimal Regime in No-Education Case)** *Consider an economy in which positive education is never optimal, so that  $e_m = e_f = 0$  and  $H_m = H_f = 1$  in all generations. For any remaining parameters, there exists a threshold  $\bar{\gamma}_m < 1$  such that  $V_m^E > V_m^P$  (men prefer empowerment) if and only if  $\gamma_m > \bar{\gamma}_m$ . Similarly, for any remaining parameters there exists a threshold  $\bar{\sigma} > 0$  such that  $V_m^E > V_m^P$  if and only if  $\sigma < \bar{\sigma}$ .*

## 4.2 Incentives when Education Investment is Positive

We now move on to the second regime of our model in which investment in education is positive. The nature of the family is substantially different in this regime; whereas before the family was mostly about producing and allocating consumption goods, here it becomes a center for the accumulation of human capital. As we will see, human capital investment generates additional motives for men to support women's rights. Thus, an increase in the economic significance of human capital may act as a trigger of political reform.

As in the previous section, our strategy is to solve for the equilibrium value functions under patriarchy versus empowerment, and then compare the two to determine the conditions under which men prefer to share power with their wives. The following lemma establishes that the value functions are log-linear.

**Lemma 1 (Characterization of Value Functions under Positive Education)** *Consider an economy in which it is always optimal to educate, so that  $e_m, e_f > 0$  in all generations. The male and female value functions under either political regime (as defined by the recursive system (6) to (12)) can then be solved analytically, and take the form:*

$$\begin{aligned} V_m^P(H_m, H_f, \bar{H}) &= a_1^P + a_2 \log(H_m) + a_3 \log(H_f) + a_4 \log(\bar{H}_m) + a_5 \log(\bar{H}_f), \\ V_f^P(H_m, H_f, \bar{H}) &= b_1^P + b_2 \log(H_m) + b_3 \log(H_f) + b_4 \log(\bar{H}_m) + b_5 \log(\bar{H}_f), \\ V_m^E(H_m, H_f, \bar{H}) &= a_1^E + a_2 \log(H_m) + a_3 \log(H_f) + a_4 \log(\bar{H}_m) + a_5 \log(\bar{H}_f), \\ V_f^E(H_m, H_f, \bar{H}) &= b_1^E + b_2 \log(H_m) + b_3 \log(H_f) + b_4 \log(\bar{H}_m) + b_5 \log(\bar{H}_f). \end{aligned}$$

The solutions for the value function coefficients are given in the proof of the lemma (see Appendix A). Notice that when comparing the value functions for a given gender across political regimes, only the constant terms are regime-specific ( $a_1^P$ ,  $b_1^P$ ,  $a_1^E$ , and  $b_1^E$ ), whereas the slope coefficients ( $a_2$  to  $a_5$  and  $b_2$  to  $b_5$ ) are the same across regimes. To determine political preferences, we therefore merely need to compare the constant terms in the male value function across political regimes. It will be more instructive, however, first to consider how the political regime affects education choices in our economy. Given the explicit solutions for the value functions, the choice problems (6) and (7) under patriarchy and empowerment can be easily solved. Under patriarchy, the optimal decisions are:

$$\begin{aligned}
c_m^P &= \frac{1}{1+\sigma} A \left( \frac{\alpha(1+\sigma)}{\alpha(1+\sigma)+\delta} H_f \right)^\alpha H_m^{1-\alpha}, \\
c_f^P &= \sigma c_m^P < c_m^P, \\
n^P &= \frac{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta}{\phi(\alpha(1+\sigma) + \delta)}, \\
e_m^P &= \frac{\phi \frac{\gamma_m}{2} a_2 \theta}{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta}, \\
e_f^P &= \frac{\phi \frac{\gamma_m}{2} b_3 \theta}{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta}.
\end{aligned} \tag{15}$$

For analyzing the empowerment regime, it will be useful to define  $\gamma$  as the average of the male and female weight on children's utility,

$$\gamma = \frac{\gamma_m + \gamma_f}{2}.$$

Writing out the right-hand side of (7) (the function to be maximized under empowerment) yields:

$$\frac{u(c_m, c_f, n) + u(c_f, c_m, n)}{2} + \gamma \left( \frac{U'_m + U'_f}{2} \right).$$

Thus,  $\gamma$  is the weight applied to children's utilities if decisions are made under

empowerment. The optimal choices are:

$$\begin{aligned}
c_m^E = c_f^E &= \frac{1}{2} A \left( \frac{\alpha(1+\sigma)}{\alpha(1+\sigma) + \delta} H_f \right)^\alpha H_m^{1-\alpha}, \\
n^E &= \frac{\delta - \frac{\gamma}{2}(a_2 + b_3)\theta}{\phi(\alpha(1+\sigma) + \delta)}, \\
e_m^E &= \frac{\phi \frac{\gamma}{2} a_2 \theta}{\delta - \frac{\gamma}{2}(a_2 + b_3)\theta}, \\
e_f^E &= \frac{\phi \frac{\gamma}{2} b_3 \theta}{\delta - \frac{\gamma}{2}(a_2 + b_3)\theta}.
\end{aligned} \tag{16}$$

Comparing (15) and (16), two key differences between the regimes become apparent. First, under patriarchy women consume less than men ( $c_f^P/c_m^P = \sigma$ ), whereas under empowerment consumption is equalized between the genders ( $c_m^E = c_f^E$ ). This effect arose also in the no-education case. Second, under empowerment couples invest more in education ( $e_m^E > e_m^P, e_f^E > e_f^P$ ) but have fewer children ( $n^E < n^P$ ) than under patriarchy. The only difference between the expressions for fertility and education is that the weight  $\gamma_m$  under patriarchy is replaced by the larger weight  $\gamma$  under empowerment, reflecting that women place greater weight on the welfare of children than men do. Put differently, empowerment increases the influence of those family decision-makers who care more about their children's education (i.e., mothers). The following proposition summarizes the economic implications of the two regimes.

**Proposition 2 (Economic Implications of the Political Regimes)** *For given state variables, aggregate consumption is identical under patriarchy and empowerment. Women's time allocation between production and raising children (including basic time cost and education time) is also independent of the political regime. However, the tradeoff between the number of children and their education does depend on the regime, with fertility being lower and education being higher under empowerment. In either regime, fertility and education are independent of the state variables. The ratio of female to male education  $e_f/e_m$  is independent of both the political regime and the state variables. The growth rate of the economy (in terms of output, human capital, and consumption) is higher under empowerment than under patriarchy.*

To summarize, we find that the key implication of empowerment (other than equalizing consumption between men and women) is that it leads to faster accumulation of human capital and consequently to faster growth. For the political tradeoff, we need to determine whether the effects of empowerment on education and growth could induce men to support female empowerment. In a model without frictions (where the welfare theorems apply), men would always prefer patriarchy. In our model, however, there are frictions that may lead to a different outcome.

The first friction is the lack of commitment across generations. Men can decide on consumption and education choices only for their own generation, and they are not able to impose decisions on their future family members. Lack of commitment across generations matters only if there is a conflict of interest between current and future decision makers, i.e., if intertemporal preferences are time-inconsistent. In our model, such a conflict arises, because men turn out to have quasi-hyperbolic preferences with regard to the utility of current and future generations.<sup>23</sup> Iterating forward on (1) and using  $t$  to index generations (with 0 being the current generation) results in the following expression for male utility:

$$U_m = u(c_{m,0}, c_{f,0}, n_0) + \gamma_m \sum_{t=1}^{\infty} \gamma^{t-1} \left( \frac{u(c_{m,t}, c_{f,t}, n_t) + u(c_{f,t}, c_{m,t}, n_t)}{2} \right),$$

where, as before,  $\gamma > \gamma_m$  is the average of male and female utility. Thus, men use discount factor  $\gamma_m$  when comparing their own period utility to that of their children, but they use the higher discount factor  $\gamma$  when evaluating the relative welfare of future generations, such as that of their children versus their grandchildren. The reason for this discrepancy is that in our altruistic preference structure, grandchildren enter the grandparents' utility through the utility of the children. That is, men look at their children through their own (male) eyes, whereas they look at half of their grandchildren through the (female) eyes of their daugh-

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<sup>23</sup>The quasi-hyperbolic structure of intertemporal preferences was first introduced by Phelps and Pollak (1968) in an intergenerational context. Recently, following Laibson (1997), a number of authors have applied the hyperbolic discounting model to intragenerational choice problems as well. Our microfoundation for hyperbolic discounting is related to Amador (2003), who presents a political-economy setting in which the current government heavily discounts the near future because of the probability of losing the next election.

ters.<sup>24</sup> As a consequence, grandfathers prefer a higher level of education for these grandchildren than would be chosen by the sons-in-law.

This *dynastic time-inconsistency* effect may lead men to prefer empowerment if they care enough about the education of their descendants in the future relative to the allocation of consumption between them and their wives in the present. The strength of the effect therefore depends on the importance of human capital.

The second friction that may lead men to support empowerment in the model with education is an externality created by the marriage market. When a father invests in the education of his children, he creates a positive externality on the future spouses of his children (his children-in-law), as well as on the parents of those spouses (who care about their own children). This externality is not taken into account when maximizing individual utility.<sup>25</sup> Put differently, men stand to gain from forcing all other men in the economy to invest more in the education of their children, because this would improve the quality of their own children's spouses. In our model, one way to increase overall investment in education is to vote for female empowerment. Thus, the *marriage market externality* effect can also lead men to support women's rights. Once again, this effect becomes more powerful as the importance of human capital and education in the economy increases.

The dynastic time-inconsistency and marriage market externality effects generate the main result of our theoretical analysis: provided that male and female preferences do not diverge too much,<sup>26</sup> men will be willing to vote for empowerment if the return to education (as measured by the parameter  $\theta$ ) is sufficiently high.

**Proposition 3 (Optimal Empowerment under Positive Education)** *Consider an economy in which parents choose to provide positive education to their children. If*

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<sup>24</sup>This causes an asymmetry in attitudes towards maternal and paternal grandchildren. Such an asymmetry has indeed been documented in the social biology literature, see Sear, Mace, and McGregor (2000) and Volland and Beise (2002).

<sup>25</sup>More formally, note that on the right-hand side of (8) parents control only their children's own human capital, but not the human capital of the children's spouses or the average human capital in the society. The private and social returns of investing in education therefore differ.

<sup>26</sup>The condition  $\gamma_m > \frac{\gamma_f}{3}$  is sufficient to guarantee that men benefit from giving more power to women for some  $\theta$ . If men do not put enough weight on future generations, it is never optimal to vote for empowerment.

$\gamma_f > \gamma_m > \frac{\gamma_f}{3}$ , then there exists a  $\bar{\theta}$  such that for all  $\theta$  that satisfy  $\theta > \bar{\theta}$  men prefer empowerment to patriarchy, i.e.,  $V_m^E(H_m, H_f, \bar{H}) > V_m^P(H_m, H_f, \bar{H})$ .

We conclude our theoretical analysis with a proposition that highlights how our main result is related to the underlying model assumptions. In particular, the proposition establishes that two features are essential: the assumption that women put a higher weight on the welfare of children, and the presence of a marriage-market externality.

**Proposition 4 (Economic Forces Underlying Main Result)** *If  $\gamma_m = \gamma_f$  then the optimal regime does not depend on  $\theta$ . If there is no human capital externality across dynasties, then, if  $\gamma_m < \gamma_f$ , there exists a  $\bar{\theta}$  such that for all  $\theta$  that satisfy  $\theta > \bar{\theta}$  men prefer patriarchy to empowerment, i.e.,  $V_m^E(H_m, H_f, \bar{H}) < V_m^P(H_m, H_f, \bar{H})$ . That is, unlike in the case with the externality, a high return to education does not lead men to support empowerment.*

The gender difference in the appreciation of children is essential for our findings because it drives the positive effect of women's rights on education. If husbands and wives valued children equally, but the marriage-market externality were still present, men would still like to impose higher education choices on other families, but extending rights to women would no longer achieve that purpose. Conversely, if the gender difference in preferences were present but the marriage-market externality were absent, men would still like to impose higher education choices on their descendants due to the time-inconsistency in preferences. However, without the externality, ceding control over the family's current decisions would be too high a price to pay from the men's perspective for committing future generations to higher human-capital investment.

### 4.3 The Transition to Female Empowerment

Up to this point, we have focused on the determination of women's rights in a stable environment: the parameters of the model economy were assumed to be

constant, and in the initial period men made a once-and-for-all choice of the political regime. In this section, we expand our analysis to an economy that is subject to technological change, and in which the political regime can change over time. In particular, we envision an economy in which the return-to-education parameter  $\theta$  shifts upward due to an increased role for human capital in the economy. In every period, before any other economic decisions are taken, men can vote on whether to introduce female empowerment. A vote for empowerment only affects the economic rights of women in the present period, i.e., the current distribution of marital bargaining power. The decision on whether women should also be empowered later on is up to future voters. A vote for empowerment does not affect women's political rights (i.e., female suffrage), implying that only men can vote in any period.

In this dynamic environment, voters' expectations over future parameter changes and political outcomes have to be taken into account. We address this issue by introducing perfect foresight regarding the time path for  $\theta$  as well as dynamic voting. In their voting decision men fully anticipate future political outcomes. This setting leads to a dynamic game that is played between the male voters of different generations. The set of equilibria of this game is potentially large. As is standard in the dynamic political-economy literature, we focus on the subclass of equilibria where voters condition their strategies only on payoff-relevant state variables.<sup>27</sup> In our setup, the only payoff-relevant state variable is the current level of the return-to-education parameter  $\theta$ .<sup>28</sup>

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<sup>27</sup>See for example Krusell and Ríos-Rull (1999) and Hassler et al. (2003).

<sup>28</sup>We assume that the return to education is sufficiently high to lead to positive education before female empowerment is introduced. Notice that as long as education is positive and human capital is growing, the current level of human capital is not payoff-relevant as far as the voting decision is concerned. Current human capital enters current and future constraints multiplicatively. Given that utility is logarithmic, the current level of human capital enters utility as an additive constant, so that the political tradeoff between empowerment and patriarchy is not affected by current human capital.

It is possible to construct additional, expectations-driven equilibria. For example, consider the trigger-strategy equilibrium in which each generation votes for empowerment, unless any preceding generation has voted for patriarchy, in which case all following generations vote for patriarchy as well. In this equilibrium, the payoffs are the same as under once-and-for-all voting, because (given the future voters' strategies) the present vote will stay in place forever. This equilibrium therefore exists if, given the time path for  $\theta$ , all generations would vote for empowerment under once-and-for-all voting.

Given that the time path for  $\theta$  does not depend on policies, future political decisions are independent of the outcome of today's vote, which simplifies the characterization of voting equilibria. In particular, the vote in a given period only affects education choices in the present period. Voters therefore weigh the cost of sharing power with their wives against the benefits of the one-time upward shift in future human capital levels that is implied by empowerment. Compared to the case of once-and-for-all voting (where a vote for empowerment also raises future education levels), the benefits of empowerment are smaller under dynamic voting. In fact, as far as the taste-for-equality and the dynastic-time-inconsistency effects are concerned, men ideally would like to leave the vote in favor of empowerment to the next generation. The situation is different for the marriage-market externality effect; here men would like to introduce the law immediately to improve the quality of their children's future spouses. Qualitatively, dynamic voting leads to the same main result as once-and-for-all voting: if the return to human capital  $\theta$  is sufficiently high, men will vote for empowerment.

**Proposition 5 (Transition to Empowerment)** *Consider an economy in which parents choose to provide positive education to their children, and in which the return to education follows an exogenous time path  $\{\theta_t\}_{t=0}^{\infty}$ . In every period, all men can vote on the political regime for the present period. The time path for  $\theta$  as well as future voting outcomes are perfectly anticipated. If  $\gamma_f > \gamma_m > \frac{\gamma_f}{3}$ , then there exists a  $\tilde{\theta}$  such that in all periods  $T$  where  $\theta_T > \tilde{\theta}$  men vote for empowerment. The threshold for empowerment is higher than under once-and-for-all-voting, i.e., we have  $\tilde{\theta} > \bar{\theta}$ , where  $\bar{\theta}$  is the threshold characterized in Proposition 3.*

The proposition allows us to characterize the main features of an economy undergoing a transition towards female empowerment. Consider an economy that starts out with parents not educating their children (so that  $e_m = e_f = 0$  and  $H_m = H_f = 1$ ), but in which the return-to-education parameter  $\theta$  trends upwards over time. We also assume that the conditions of Proposition 1 are not satisfied; that is, the taste-for-equality effect alone is not strong enough to induce men to vote for female empowerment.<sup>29</sup> The economy therefore starts out in the patriarchy regime.

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<sup>29</sup>This assumption requires  $\gamma_m < \bar{\gamma}_m$ , while for a transition to empowerment  $\gamma_m > \frac{\gamma_f}{3}$  is needed

At some point, the return to education  $\theta$  will be sufficiently high for parents to prefer educating their children,  $e_m, e_f > 0$ , so that human capital starts to rise over time. Comparing (14) to (15), we see that the fertility rate drops once parents educate their children.<sup>30</sup> Intuitively, families economize on their number of children to devote more time to educating each child. Subsequently, as  $\theta_t$  keeps increasing fertility will continue to fall, education levels  $e_m$  and  $e_f$  will continue to rise, and growth in human capital and output will accelerate. Ultimately, the return to education  $\theta_t$  will reach the threshold  $\tilde{\theta}$  at which men vote to introduce the empowerment regime (see Proposition 5).<sup>31</sup> At this time, according to equations (15) and (16) there will be a further drop in fertility, a further rise in education, and a further acceleration of economic growth.

We conclude our analysis with a numerical example of an economy undergoing the transition from patriarchy to female empowerment.<sup>32</sup> The time path for  $\theta$  starts at 0.4 in period 1 and then increases linearly until reaching 0.6 in period 8, and then remains constant at that level. Figures 1 and 2 display the evolution of fertility, education, human capital, and output per adult in the economy throughout this technological shift.<sup>33</sup> In both figures, the solid lines represent the equilibrium political-economy outcome, i.e., female empowerment is introduced once it is advantageous for men to do so. For comparison, the dashed lines display outcomes under permanent patriarchy (i.e., empowerment is never introduced).

At the beginning of the transition, parents do not educate their children, fertility is high at about four children per family, and human capital and output per adult are constant. The switch to education takes place in period 4, and is accompanied by an immediate drop in the fertility rate. The return-to-education

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(see Proposition 5). It can be shown that for a large set of parameters,  $\bar{\gamma}_m > \frac{\gamma_f}{3}$ , so that both conditions can be satisfied simultaneously.

<sup>30</sup>Individual decisions are the same in the static and dynamic environments if we set  $\theta = \theta_t$ , i.e., only the current return to education matters for decisions.

<sup>31</sup>Depending on parameters, it is possible that men will vote for female empowerment immediately once the switch to education occurs. Empirically, the relevant case is where there is a gap between the switch to education and the extension of women's rights.

<sup>32</sup>The parameter values used in the numerical example are  $\gamma_f = 0.45$ ,  $\gamma_m = 0.4$ ,  $\sigma = 0.66$ ,  $\delta = 0.66$ ,  $\alpha = 0.4$ ,  $\beta = 0.5$ ,  $\phi = 0.25$ , and  $B = 35$ .

<sup>33</sup>For simplicity, only female education and human capital are displayed. Male education and human capital are proportional to the female values.

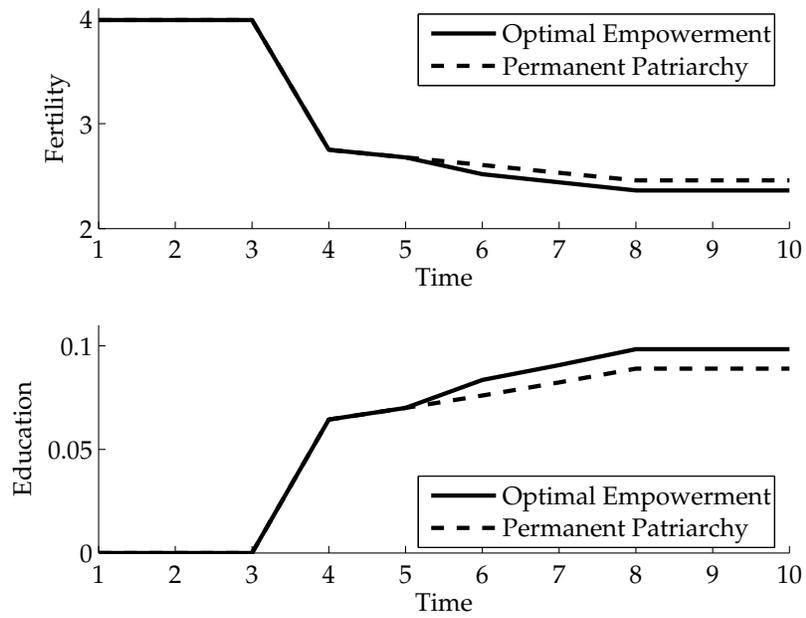


Figure 1: Fertility Rate and Female Education in Numerical Example

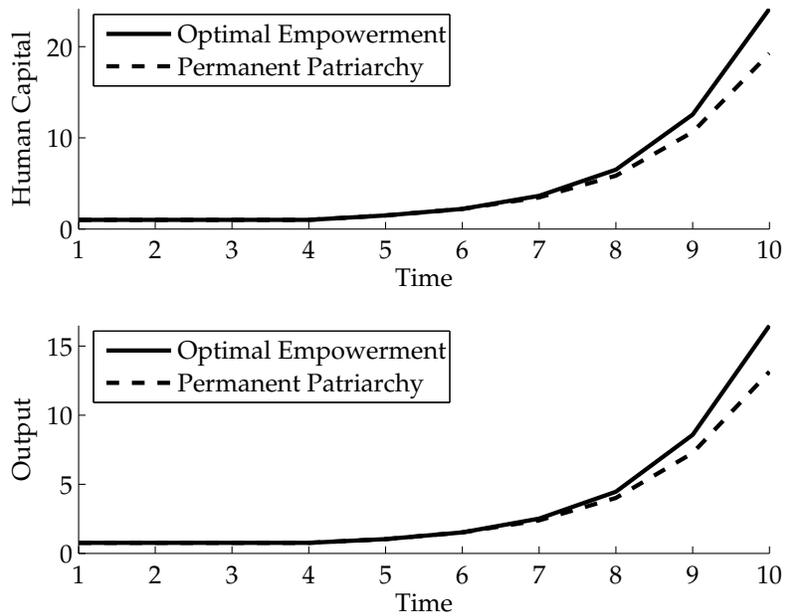


Figure 2: Female Human Capital and Output per Adult in Numerical Example

parameter  $\theta_t$  reaches the critical level  $\tilde{\theta}$  in period 6, when empowerment is introduced. Relative to the case of permanent patriarchy, optimal empowerment results in a further drop in fertility and a further increase in education. As Figure 2 shows, these changes lead to an increasing advantage in terms of human capital and income per adult under empowerment relative to patriarchy. That, of course, is one of the main reasons why men introduce women's rights in the first place: high returns to human capital make the growth effects of female power too big to ignore.

In contrast to existing explanations for expanding female rights, our model does not imply that the introduction of power sharing should coincide with or be followed by increased female labor force participation: the fraction of time that women devote to production is unchanged throughout the entire transition.

## 5 Extensions and Alternative Explanations

In this section, we discuss potential alternatives and objections to our theory of female empowerment. First, we ask whether alternative policies may have achieved the same objective of increasing education investments, bypassing the need for an expansion of women's rights. Then, we examine whether women's increased participation in the formal labor market (rather than their role in educating children) may have been instrumental for the advance of female empowerment.

### 5.1 Alternatives to Empowerment

We argue that men's main motive for supporting women's rights is to induce other families (in particular, the parents of their future children-in-law and the families of their daughters and granddaughters) to invest more in children's education. A natural question to ask, then, is whether men could take any other measures to achieve the same objective, without having to share power with their wives. This question is especially relevant given that extending rights to women

does not provide a perfect fix for the underlying frictions. If the return to education is sufficiently high, we know that sharing power with women will improve men's welfare, but in general empowerment will not implement the efficient level of education.

In principle, it is possible to imagine contracts that would offset the underlying frictions and implement the level of education that is optimal from the perspective of the initial generation of men. However, these contracts would be difficult or impossible to implement in the real world. Within dynasties, the initial generation would have to be able to commit all future descendants to particular choices regarding the investment in their children. Such contracts would be illegal in most countries, and even if they were feasible in principle, it is hard to see how they could be enforced. We do observe some legal constructs (such as education trust funds for grandchildren that exclude access by the grandchildren's parents) that serve a similar purpose, but such instruments do not fully resolve the underlying commitment problem.

Similarly, bride prices or dowries that are conditional on the bride's and groom's education levels could help to overcome the marriage market externality. In modern times, a perhaps more important mechanism is assortative mating. If well educated children attract higher-quality spouses, the marriage-market externality will be at least partially internalized. Nevertheless, it is unlikely that such mechanisms could remove the underlying inefficiency entirely.<sup>34</sup> This would not only require highly assortative matching, but also a high degree of heterogeneity in realized education levels. For example, if all families are homogeneous (as in our theoretical framework), assortative matching cannot arise at all. Similarly, it is hard to imagine a contractual solution for the marriage-market externality. This would require writing contracts involving all families who will be linked

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<sup>34</sup>The literature identifies a number of particular assumptions under which assortative mating does exactly offset the marriage-market externality. In the two-period model of Laitner (1991), there is no joint production in marriage and all consumption is shared equally. In Peters and Siow (2002) there are no gender differences and only public goods are consumed in marriage. These assumptions are not satisfied in more general models such as ours. Iyigun and Walsh (2007a) derive an efficiency result for premarital investments in a more general framework. Here, however, the key assumptions are a frictionless marriage market and an endogenous sharing rule between spouses. Sharing between spouses is unlikely to change endogenously if women initially have no rights as in our model.

at any future date through intermarriage, which cannot be done in the absence of perfect foresight regarding future marriages. The marriage-market externality is thus difficult to overcome privately by individual families: this is one reason why extending women's rights is done through political institutions.

## 5.2 Public Education and Female Empowerment

In our baseline model, education is privately provided by parents. In reality, however, the government often is a major provider of education. In England and the United States, public education was introduced or expanded during the major phase of the expansion of married women's economic rights.<sup>35</sup> At first sight, it might seem that public education might be a substitute for women's rights, so that the introduction of public education would tend to delay progress on female liberation. This is true, however, only if private and public inputs (i.e., education within the family versus schools) are substitutes in the production of education. The available empirical evidence suggests that private and public inputs are, rather, complementary.<sup>36</sup> In this case, reforms in the areas of education and women's rights are mutually reinforcing, and both can be explained by the same underlying economic change: an expanded role for human capital.<sup>37</sup> We now illustrate this point with an extension of our model.

In the model with public education, children's human capital depends on the provision of public schooling  $s$  (in addition to the private education inputs  $e^m$  and  $e^f$ ). The production function for human capital is given by (for simplicity,

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<sup>35</sup>See Goldin and Katz (2008, chapter 4) for a description of the origins of the U.S. educational system and the importance of public funding and public provision during the nineteenth century.

<sup>36</sup>The assumption that parental time and formal education are complements is relatively uncontroversial in the literature (e.g. Cunha et al. 2006), although direct evidence on the form of the production function is relatively scarce. One piece of evidence is the high empirical correlation between the level of education of parents and children (Card 1999). Many studies find that returns to education are increasing in cognitive skills and parental education, which can be interpreted as a complementarity between parental inputs and formal schooling (see Hanushek and Woessmann (2008) for a recent survey of the literature).

<sup>37</sup>See Doepke and Zilibotti (2005) for an analysis of child labor restrictions and compulsory schooling laws along these lines.

we abstract from the no-education case here):

$$H'_i = (B(e_i)^\eta (s)^{1-\eta})^{\hat{\theta}} H_f^\beta H_m^{1-\beta},$$

where  $i \in \{m, f\}$ . Public schooling  $s$  is provided by teachers, and is thus measured in units of (male) time. The teachers are paid the market wage by the government. To finance this expense, the government raises a proportional tax  $\tau$  on men's income, and observes budget balance in every period.<sup>38</sup> The goods consumption constraint of a household is therefore given by:

$$c_f + c_m = A(t_f H_f)^\alpha ((1 - \tau)t_m H_m)^{1-\alpha}.$$

We assume that every teacher can teach  $S$  students simultaneously. The budget constraint of the government is then given by:

$$\tau = s \frac{2n}{S}.$$

On the right hand side, we multiply the teaching time  $s$  per student with the number of teachers (i.e., classes) per man ( $2n$  is the number of children per man and  $S$  is class size).

As before, we assume that in every period there is a referendum concerning the introduction of empowerment. In addition, in the extended model there is also a second vote on the tax rate  $\tau$ , which determines the quality of public schooling  $s$ . We assume that the vote on  $\tau$  takes place after the referendum on empowerment in every period.

As in the original setup, the male and female value functions can be solved for analytically. If we define  $\theta = \eta \hat{\theta}$ , the slope coefficients  $a_2$  to  $a_5$  and  $b_2$  to  $b_5$  are unchanged relative to the original setup. However, public education does affect the level parameters  $a_1$ ,  $b_1$ ,  $\hat{a}_1$ , and  $\hat{b}_1$ . The following results can be established.

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<sup>38</sup>The tax applies only to male income because we interpret female work time as home work, which is harder to measure and tax. Results would be qualitatively unchanged in female income was taxed as well.

**Proposition 6 (Voting on Public Schooling)** *The voting outcome leads to a tax rate for public schooling that is independent of the political regime (patriarchy or empowerment) and given by:*

$$\tau = \frac{\frac{\gamma_m}{2} \frac{1-\eta}{1-\bar{\gamma}} \hat{\theta}}{\frac{\gamma_m}{2} \frac{1-\eta}{1-\bar{\gamma}} \hat{\theta} + 1 - \alpha}.$$

*The provision of public schooling  $s$  is:*

$$s = \frac{\tau S}{2n}.$$

*Schooling  $s$  does depend on the political regime through the impact of the political regime on fertility  $n$ .*

Not surprisingly, we find that the provision of public education is increasing in the return to education  $\hat{\theta}$ . Next, we establish the interaction of the presence of public education with the political economy of women's rights. In particular, we find that public education increases men's incentives to vote for female empowerment.

**Proposition 7 (Voting for Female Empowerment)** *If  $\gamma_f > \gamma_m > \frac{\gamma_f}{3}$ , then there exists a  $\bar{\theta}$  such that for all  $\theta$  that satisfy  $\theta > \bar{\theta}$  men prefer empowerment to patriarchy, i.e.,  $V_m^E(H_m, H_f, \bar{H}) > V_m^P(H_m, H_f, \bar{H})$ . For any given  $\theta$ , the incentive to vote for empowerment is higher in the model with public education compared to the baseline model.*

The intuition for this result is that voting for empowerment has a positive effect on the quality of public education. While the tax rate is independent of the political regime, under empowerment fertility rates are lower, so that for a given tax revenue more education can be provided per student. This effect provides an additional incentive to vote for female empowerment. Thus, we find that in the expanded model, reforms in women's rights and public education are driven by the same underlying economic process (technological change that raises  $\theta$ ) and mutually reinforce each other.

An interesting property of the public-education model is that the dynastic time-inconsistency friction that helps to bring about female empowerment also affects

the determination of public education.<sup>39</sup> The friction leads to an underprovision of education, since each cohort of men determines only the schooling of the next generation, whose utility they discount heavily. One way to address this underprovision is to let women vote on school funding as well, because women care more about the next generation's utility. Introducing the female vote then serves as a commitment device. The extended model therefore provides a rationale for why women gained political power on education matters long before obtaining general political rights.<sup>40</sup> In England, female school suffrage (the right to run and vote in school board elections) was introduced alongside public schooling, and in many U.S. states school suffrage long predates general suffrage as well.<sup>41</sup> The model does not predict that men would be in favor of the female vote in general—the friction modeled here affects only policies that amount to intergenerational investment.

### **5.3 Women in the Labor Market and Female Empowerment**

An alternative explanation for the expansion of women's rights centers on women's labor market opportunities. For example, Geddes and Lueck (2002) argue that increasing demand for female labor accentuated a moral hazard problem between husband and wife, which could be mitigated by sharing power with women. A similar moral hazard problem might exist between female workers and their employers: women's effort is likely to be low when they lack legal rights to their own earnings. Thus, one could envision a theory in which male employers face a tradeoff between the rights of their own wife and those of their workers. As the productivity of female labor increases, the tradeoff would shift in favor of women's rights.

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<sup>39</sup>In contrast, the marriage-market externality is not present here, because education decisions are made at an aggregate level, and contemporaneous externalities are taken into account by the voters.

<sup>40</sup>Whether the underprovision of schooling is large enough for men to actually favor school suffrage depends on parameters.

<sup>41</sup>School boards were the central governing institution of U.S. schools during most of the nineteenth century (Howell 2005). In particular, school boards took primary fiscal responsibility for schools: they wrote budgets, levied taxes, and ensured that schools spent their funds appropriately.

As an empirical matter, in our view this line of reasoning is unlikely to explain a lot of the main legal changes affecting married couples during the nineteenth century, because most of the female workforce consisted of single women (whose economic rights were close to being on par with men).<sup>42</sup> By the end of the nineteenth century, married women's labor-force participation rate was only 13 percent in England (Joshi, Layard, and Owen 1985) and less than five percent in the United States (Goldin 1990). In both countries, formal employment became a mass phenomenon for married women only after World War II. Moreover, female labor-force participation rates do not correlate systematically with women's rights in U.S. state data (Roberts 2006).<sup>43</sup>

Even so, it is straightforward to analyze the implications of a rising demand for female labor in the context of our model. For this purpose, we re-interpret the household production function (2) as a market production function, so that both women and men work in the market. Defining the effective units of labor as  $l_i = t_i H_i$  for gender  $i \in \{m, f\}$ , we denote wages per effective unit of labor as  $w_m$  and  $w_f$ . The family budget constraint is then given by:

$$c_m + c_f = w_m l_m + w_f l_f.$$

The aggregate production function is:

$$Y = A(l_f)^\alpha (l_m)^{1-\alpha}.$$

Assuming a competitive labor market, equilibrium wages are equal to marginal products:

$$w_f = \alpha A(l_f)^{\alpha-1} (l_m)^{1-\alpha}, \quad w_m = (1 - \alpha) A(l_f)^\alpha (l_m)^{-\alpha}.$$

We can now interpret an increase in  $\alpha$  as technological progress that leads to more

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<sup>42</sup>Less than ten percent of the white female workforce in the United States in 1890 was married (Goldin 1990, Table 2.4).

<sup>43</sup>In addition, during the late nineteenth century many new restrictions on women's employment were introduced, such as legislation regulating hours, wages, and work conditions for women. Such changes lead to a decrease, rather than an increase, in female labor market opportunities (Goldin 1990).

demand for women in the labor market, for example due to a shift towards occupations that require less physical strength. How does the economy change if  $\alpha$  increases, and how are men's incentives for sharing power with women affected?

With the appropriate change in variables, it can be shown that the value functions and decision rules in the market-production model are unchanged from the home-production model. We can therefore rely on our previous results. First, a higher  $\alpha$  leads to a lower education gap between men and women. The relative human capital of women and relative female wages per unit of time therefore increase with  $\alpha$ . The higher opportunity cost of time leads women to spend less time in child-bearing and more time working. As a consequence, fertility is decreasing in  $\alpha$ . In sum, according to many variables that are conventionally used to measure the status of women (relative education, relative wages, fertility), an increase in  $\alpha$  improves the status of women. We summarize these results in the next proposition.

**Proposition 8** *Consider two economies,  $L$  and  $H$ , with different  $\alpha$ :  $\alpha_H > \alpha_L$ . Then, equilibrium quantities compare as follows:*

1. *Female and male education:  $e_f^H > e_f^L$  and  $e_m^H < e_m^L$ ; average education  $\frac{1}{2}[e_f + e_m]$  is identical.*
2. *Women's labor supply:  $t_f^H > t_f^L$ .*
3. *Gender wage ratio (per unit of time):  $\frac{w_f^H H_f^H}{w_m^H H_m^H} > \frac{w_f^L H_f^L}{w_m^L H_m^L}$ .*
4. *Fertility:  $n_H < n_L$ .*

Does the increased economic status also lead to more rights for women? In the context of our model the answer to this question is no. That is, even though women work more and have fewer children, the incentives for men to involve women in the family decision-making process are unchanged.<sup>44</sup> The reason is that

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<sup>44</sup>It is sometimes argued that education improves women's marital bargaining position (see for example Chiappori, Iyigun, and Weiss 2009). Through this channel, better labor market opportunities may have indeed improved the bargaining position of women. Such feedback loops are not considered in our model, mainly because the object of analysis are legal changes regarding the position of married women, not improvements in bargaining power more generally.

a shift in  $\alpha$  changes the relative education of girls and boys, but it has no effect on average education per child. With no increase in desired average education, neither the time inconsistency problem nor the marriage market externality gets any worse as  $\alpha$  increases. Thus, incentives for men to vote for empowerment remain unchanged. This result is summarized in the next proposition.<sup>45</sup>

**Proposition 9** *The optimal regime choice is independent of  $\alpha$ .*

Thus, we conclude that the involvement of married women in the formal labor market does not affect men's incentives for expanding women's rights. Note, however, that this result does not imply that the formal labor market does not matter at all in our theory. Granting power to women increases the education of sons, and educating sons is valued because of the return to skill in the formal labor market. The demand for skill in the labor market is therefore an important driving force of political change in our model, but the mechanism works through the employment of sons rather than that of married women.

Another possible extension would be to model a labor market with additional factors of production, in particular capital. In such a model, owners of factors that are complementary to skilled workers would have a motive to support women's rights, because a higher supply of educated workers would raise the return on their factor of production. Galor and Moav (2006) argue that complementarity between capital and skilled labor led capitalists to support the introduction of public education in the second phase of the industrial revolution. An analogous argument could be made that an increase in capital-skill complementarity should lead capitalists to also support women's rights. To the extent that in each case the support for women's rights derives from an increased importance of human capital, we view this mechanism as complementary to ours.

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<sup>45</sup>Of course, there might be other channels through which increased labor market opportunities for women can lead to more legal rights. In particular, we abstract from the moral hazard problem that is a crucial ingredient in Geddes and Lueck (2002).

## 6 Historical Evidence from the Expansion of Women's Rights in England and the United States

In this section, we compare the predictions of our theory to historical evidence from England and the United States. We start by examining trends of fertility and education relative to the timing of the major reforms affecting the legal status of women. We then document that the extension of women's economic rights coincided with a more general transformation of the role of families, in which investments in children held increasing importance. Finally, we present evidence from the political debates over women's rights to show that the main arguments of the supporters of reform were closely related to the forces featuring in our theory.

### 6.1 Fertility and Education

We argue that the expansion of women's rights was triggered by a rise in the demand for human capital, as reflected by rising education levels and declining fertility rates. Further, once these legal reforms were carried out, they should have reinforced the trends towards higher education and lower fertility. Hence, in terms of aggregate time series the main prediction of our theory is that the expansion of women's rights should have taken place after the onset, but before the completion, of the demographic transition, and should have coincided with increasing investments in human capital.<sup>46</sup> The extended model of Section 5.2 also suggests that the expansion of women's rights should be accompanied by

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<sup>46</sup>In the data we look at changes in education levels, because direct evidence on returns to education for this time period is scarce. Goldin and Katz (2008) document that the returns to education were very high around 1900 and may have been lower prior to that. The authors find that the ratio of clerk earnings to laborer earnings rose from 1.93 in the 1830s to 2.50 in 1895. However, as the authors point out, "because we do not know precisely how the skill ratio changed across the nineteenth century . . . we must remain somewhat agnostic. It seems clear that the ratio did not rise by much and even more obvious that it did not decline. . . . Thus the relative quantity of skills expanded rapidly while relative wages were increasing slightly or were stable." For the purpose of our theory, it is immaterial whether the increase in education was driven by a rise in the return to education or a fall in the cost of acquiring education. What matters is that educating children grew in importance as a task for families. The dramatic increase in school enrollment rates in both England and the United States over the nineteenth century indicates that schooling became more desirable. Skill-biased technological change is only one potential explanation for this change. Other factors that indirectly raised the private return to education

the spread of public education. The data for England and the United States are consistent with these predictions.

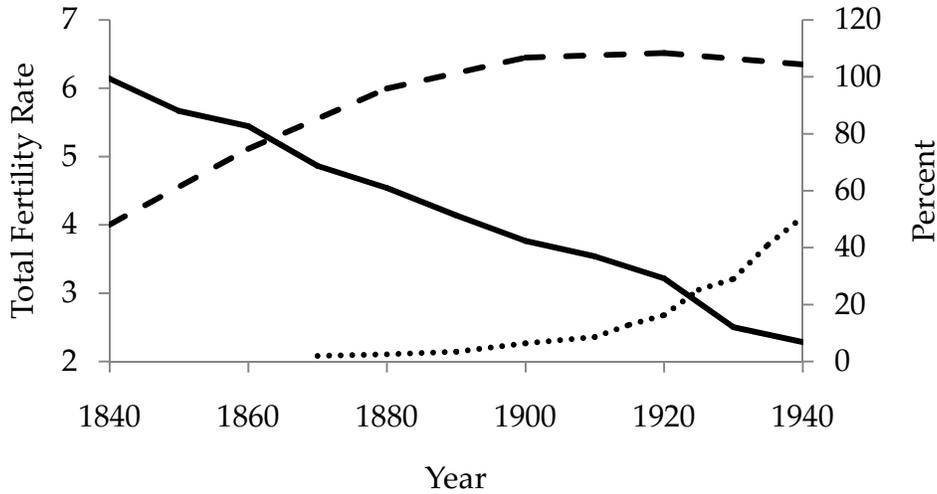


Figure 3: Fertility and Schooling in the United States. Solid: Total Fertility Rate (Left Axis. Source: Haines 1994, Table 3, whites only). Dashed: Elementary Enrollment Rate (Right Axis. Source: Turner et al. 2007, Table A1). Dotted: Graduation Rate at 17 years (Right Axis. Source: Goldin 2006, Table Bc264).

In both England and the United States, the most important reforms of women’s rights were carried out in the second half of the nineteenth century. During this period, married women in England and most U.S. states obtained rights to own and bequeath property, to obtain divorce, and to receive custody of their children in the case of separation or divorce. Figures 3 and 4 display the aggregate trends in fertility and education during this period.

In the United States, at the beginning of the nineteenth century the average woman had almost seven children. The total fertility rate<sup>47</sup> (TFR) declined gradually over the course of the century, and reached about 3.5 by 1900. Throughout the same period, the United States underwent a transformation toward mass education. Primary enrollment rates increased from under 50 in 1840 to more than 100 per-

include the complementary public provision of education (see Section 5.2), laws prohibiting child labor (by decreasing the opportunity cost of education), as well as increases in life expectancy.

<sup>47</sup>The total fertility rate in a given year is the sum of age-specific fertility rates over all ages. It can be interpreted as the total number of children an average woman will have over her lifetime if age-specific fertility rates stay constant over time.

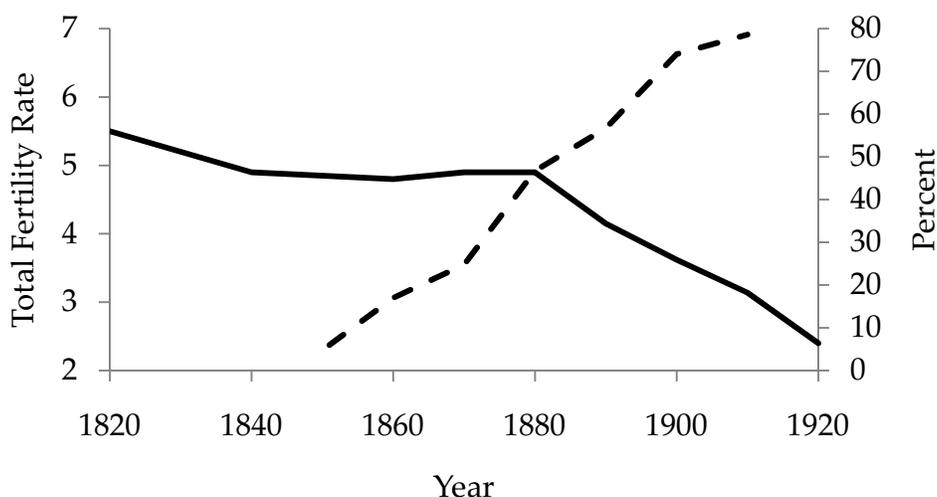


Figure 4: Fertility and Schooling in England. Solid: Total Fertility Rate (Left Axis. Source: Lee and Schofield 1981 and Chesnais 1992). Dashed: School Enrollment Rate (Fraction of Children in School) for Ages 5–14 (Right Axis. Source: Flora et al. 1983).

cent in 1900,<sup>48</sup> and already in 1880 almost all children received at least some primary schooling (Turner et al. 2007).<sup>49</sup> The rise of mass education was accompanied by a number of institutional changes. Public education in the form of the common school spread in the United States from the beginning of the Republic (see Goldin and Katz 2008, Chapter 4, for an overview of the early history of the American education system). Initially, most schools were financed by a mix of public funding and tuition fees. Free provision of primary education was introduced in Maine in 1820, in Massachusetts in 1826, and in all other Northern and Midwestern states by 1871. The first compulsory education law was passed in 1852 in Massachusetts. Vermont followed in 1867, and by 1900 most Northern and Midwestern states had similar laws in place. Shortly after the main phase of the expansion of women’s rights, the high school movement continued the expansion of education at the secondary level (Goldin and Katz 2008, Chapter 6). Whereas until 1910 fewer than 10 percent of each cohort graduated high school,

<sup>48</sup>Enrollment rates can exceed 100 percent because of grade repetition.

<sup>49</sup>Even though data on elementary school enrollment are constructed from Census data and the exact numbers are somewhat controversial, there is a consensus that the transformation to mass primary education happened throughout the nineteenth century (Goldin 2006, Fishlow 1966 and Kaestle and Vinovskis 1980).

by 1940 graduation rates were around 50 percent.

In England, total fertility rates reached a peak of about 5.5 during the first half of the nineteenth century. Fertility decline proceeded slowly at first, but picked up speed after 1880, right when the major reforms of women's rights were implemented. By 1920, the total fertility rate had fallen to 2.4. Average school attendance of children aged 5 to 14 was still under 10 percent in 1850, but then increased dramatically to about 70 percent by the turn of the century. These changes are aligned with the main milestones of the history of public education in England. The state first became involved in education by funding the construction of schools for poor children starting in 1833. However, education remained a largely private affair until the second half of the nineteenth century. The Elementary Education Act 1870 put primary education in England and Wales under public control. In 1880, compulsory schooling was introduced, and from 1891 public primary education was free. Secondary education (up to the age of 14) was made compulsory with the Education Act of 1918.

In sum, we find that the data confirm the prediction that changes in women's rights should be preceded by modest fertility decline and a rise in the demand for and public provision of education, and followed by accelerated changes in the same direction.

## **6.2 The Changing Role of the Family**

Our theory posits that the expansion of women's rights goes hand in hand with a shift in the role and function of families. In particular, we argue that the nurturing and education of children in the household steadily gained in importance, with mothers taking an increasingly central role in these duties. These changes are reflected not only in aggregate data on fertility and education, but also in observations by social historians on the reorganization of family life, changes in attitudes towards children, and shifts in the expected role of mothers.

Indeed, the nineteenth century brought a new view of the nature of childhood. Commenting on earlier perceptions of childhood in the United States, Kaestle and Vinovskis (1980) report that the "early Puritans had stressed that children

were innately evil . . . . The only proper response for parents was to watch their children closely and to discipline them at very young ages.” In contrast, by the nineteenth century “children were viewed as innocent beings that had to be protected and nurtured,” and childhood came to be regarded as a “distinct phase of human development that required special attention and training” (p. 192). Following this change in attitudes, the nurturing of children took on greater significance in family life.

Mothers were viewed as particularly qualified for raising children in nurturing ways.<sup>50</sup> Another reason why most of the burden of raising children fell on mothers was a increasing separation between the work and home spheres that deepened the division of labor between husbands and wives. In the pre-industrial period, men and women often worked alongside each other, and husband and wife shared responsibilities in child raising.<sup>51</sup> This practice applied not only to family-based agriculture, but also to many of the skilled professions.<sup>52</sup> The links between working fathers and their children weakened throughout the industrialization period. “During the early nineteenth century, family roles were reorganized around the idea of sexual difference, with men and women increasingly occupying separate spheres . . . Many middle-class women began to define themselves consciously as nurturers and full-time mothers, whereas the father was viewed as protector, provider and the representative of public authority.” (Ross 2006, p. 18).<sup>53</sup> The shift towards separate spheres and a larger role for mothers

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<sup>50</sup>“The mood was shifting away from beating as a routine punishment (except in schools) toward the application of moral and emotional pressures developing in children a capacity for self-government. . . . insistence on this type of moral education, which was widely assumed to be beyond the capacity of a father-provider, contributed to valorizing the mother’s moral role” (Guttormsson 2002, p. 268).

<sup>51</sup>The care of infants and the youngest children was generally the mother’s domain, but from fairly young ages many children (and especially boys) would start working with their fathers, who would then be responsible for much of their further education.

<sup>52</sup>“Women have been active participants in commerce, farming, and many business pursuits, assisting their husbands, keeping books, overseeing apprentices and journeymen, and manufacturing many goods for sales. Not only artisans but also lawyers and doctors practiced in a room in their house, so women tended to have a direct relationship with their husband’s business affairs” (Ross 2006, p. 18–19).

<sup>53</sup>The separation between the spheres of husbands and wives was particularly pronounced for the families of middle-class men who commuted to work. A “husband might well catch an early train to a job in the city and not return until evening. Thus while pre-Victorian texts . . . show middle-class men playing an active domestic part, particularly parenting, later in the century

in the lives of children was also reflected in the child-rearing advice literature of the period.<sup>54</sup>

### 6.3 The Political Debate Over Women's Rights

We now turn to evidence from the political debates that accompanied the expansion of women's rights during the nineteenth century. If we are correct in asserting that women's role in the education of children was central to the process of female empowerment, this view should be reflected in the arguments put forward by the supporters of reform. The campaigners for women's rights made a number of different arguments, not all of which are represented in our theory. However, in both England and the United States we see a gradual shift in the course of the nineteenth century from arguments that focus on the rights of men towards a view that gave priority to the needs of children.

The emphasis on children's welfare is especially clear in the debates regarding child custody laws. In 1837, Thomas Talfourd proposed a bill in England that would have enabled separated or divorced women to apply to a court for visitation rights to their children under the age of seven. In the discussion of the bill in the House of Commons, Talfourd argued that "... to deprive the mother of any contact was cruel and against nature both to her and the child" (Wroath 1998, p. 98). The central argument of the MPs opposing the bill was that it would undermine marriages. Much was made of the fact that given that the bill was to apply to divorced women, it would in particular apply to adulteresses.

From a modern perspective, the Custody of Infants Act of 1839 was a rather moderate advance for women's rights. It merely made it possible to apply to a court in

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the typical middle-class husband's principal function was to provide economic support for the family" (Nelson 2007, p. 31).

<sup>54</sup>"The most striking change, centrally illustrated by the works of Pestalozzi, was the shift from father-centered to mother-centered theories of child raising" (Maynes 2002, p. 198). Kaestle and Vinovskis (1980) emphasize the role that mothers—as opposed to teachers—played in this transformation. "In the early 1820's and 1830's ... there was a strong revival of the idea that young children should be educated at home ... Accompanying the emphasis on early child development within the home was the increasing focus on the role of mothers in childhood education" (p. 205).

case of hardship; the courts still could, and often would, decide against awarding custody to the mother. Nevertheless, what is significant is that this first advance in women's rights was directly related to the new emphasis on women's role in the upbringing of their children. In an 1849 decision applying the act, the Lord Chancellor argued that the courts should "apply a course which seems best for the interests of the children, without regard . . . to the pain which may be inflicted on those who are authors of the difficulty" (cited in Wroath 1998, p. 115). Wroath comments that this "must be one of the earliest court decisions where the welfare of the children was considered as overriding the interests of the father."

After child custody, the debate shifted to marital property law.<sup>55</sup> In both the United States and England, the main argument of the opponents of reform was once again that extending rights to married women would endanger the institution of marriage.<sup>56</sup> Supporters of the reforms, on the other hand, made a number of arguments that linked property rights for married women to children's welfare. In the United States, a central stated goal of the reformers was to protect women and their children from a husband's creditors.<sup>57</sup> In England, in July 1868 a Select Committee in the House of Commons issued a favorable report on a proposed marital property bill. Much of the testimony received by the committee suggested that reform would be particularly beneficial to women from the lower classes and their children.<sup>58</sup> The experience of the United States with women's property laws played a considerable role in the debate. A New York merchant, serving as a witness to the Select Committee, stated that one of the reasons for reforming the law in that state was "to furnish mothers with power to supply

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<sup>55</sup>Changes to divorce law were less contentious and were partially driven by a widely supported desire for administrative streamlining of the divorce process.

<sup>56</sup>In 1868, an editorial writer for the London Times claimed that "the proposed change would totally destroy the existing relation between husband and wife. . . . If a woman has her own property, and can apply to her separate use her own earnings, . . . what is to prevent her from going where she likes and doing what she pleases?" (London Times, April 23, 1868, p. 8).

<sup>57</sup>In a debate about Oregon's Married Women's Property Act, a Mr. Logan argued that "If he [the husband] was prudent and thrifty she would give him control of her property. And if he was not, it was better that she should have the power to preserve her property to support herself and educate her children" (Chused 1985, p. 18).

<sup>58</sup>When asked whether the bill would have "generally a good effect upon the moral condition of the women," a witness from Belfast replied: "I think it would; and perhaps it would be even more advantageous as regards the children, for they often cannot get an education under present circumstances" (British Parliamentary Papers 1970, p. 99).

the wants of their children when the husband neglects to do so" (p. 14). Asked whether he had "seen any alteration in the condition of married women [...] since the alteration of the law," the witness replied: "I have noticed the women are being more educated, and are more desirous to educate their children. They send their children almost universally to school" (p. 77).

Regarding the issue of public education, recall that women gained active and passive election rights for school boards long before general voting rights were extended. This expansion of rights was motivated by an increasing public recognition of women's role in the organization of education. Most pro-reform arguments were once again centered around women's expertise with children.<sup>59</sup>

Beyond the specific examples and quotes mentioned so far, the shift in the political debate is also reflected in the changing frequency of newspaper articles and editorials on women's rights that also discuss the issues of children and education. The term "women's rights" (or "woman's rights") first starts appearing in the Times of London in the 1840s. Comparing the periods 1840–1869 and 1870–1899, we find that among articles mentioning "women's rights" the fraction that also mentions "children" increases from 28 to 36 percent, and the fraction that also mentions "education" increases from 23 to 41 percent.<sup>60</sup>

In summary, in both England and the United States the link between women's rights and the education and welfare of children was an important pro-reform argument in the political debates. Clearly, the theoretical mechanisms highlighted

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<sup>59</sup>The Times writes: "When Mr. Mill, again, urges the election of women on the Board, he will meet with more general assent than he often finds when he pleads for the rights of the sex. Women are, in point of fact, some of the principal managers of the existing girls' schools . . . and even in London women form the most active members of many School Committees. To elect them as members of the School Board would merely be to recognize their present influence" (London Times, November 12, 1870). Similarly, in the U.S. a public letter to the Mayor of Brooklyn with the goal of increasing the number of women on the Board of Education stated that "We would urge upon your consideration the fact that interest in the public schools belongs largely to women as educators and even more distinctively as mothers; that wherever the training of children is to be considered experience with child life gives value to the judgment of intelligent women" (New York Times, September 6, 1894).

<sup>60</sup>The appearance or absence of such terms does not guarantee that the articles in question discuss a particular argument for or against women's rights. Many articles that mention "women's rights" are either short news pieces on specific bills or articles on other topics that touch on women's rights only in passing. In these cases, arguments for or against women's rights are usually not discussed at all. Hence, this evidence should be taken with a grain of salt.

by our model and the arguments in the debates do not line up in every detail. Perhaps most importantly, we notice that in the debates, formal women's rights were often regarded as directly affecting only a small number of women with irresponsible husbands, whereas in our theory all families are identical and equally affected by the law. Despite these reservations, we believe that our theoretical model captures the main impetus behind the advances in the rights of women throughout the nineteenth century.

## 7 Conclusions and Outlook

In this paper we analyze men's incentives for sharing power with women. We show that men face a tradeoff between the rights they want for their own wives and the rights of other women in the economy. Men benefit from other women's rights for two reasons. First, men would like their own daughters to have rights, partly because they want their daughters to be treated well by their sons-in-law, but also because they would like their grandchildren to receive a good education. Second, improved rights for women in general improve the education of the next generation and thereby help offset a human-capital externality created by the marriage market. We show that an increase in the importance of education can alter men's preferences regarding women's rights. Hence, we argue that the ultimate cause of the expansions of married women's economic rights in England and the United States throughout the nineteenth century was technological change that increased the importance of human capital in the economy.

Our theory offers a new perspective on the relationship between traditional role models and the expansion of women's rights. Interestingly, in our model it is exactly the "traditional" role of women as nurturers and educators of their children that induces men to grant power to women. In contrast, women's participation in the formal labor market does not play any role. Our theory therefore suggests that the "glorification of motherhood" throughout the nineteenth century actually helped advance the cause of women's rights in its early phase.

The analysis could be extended in several directions. Whereas the model restricts attention to two polar regimes (patriarchy versus empowerment), in reality wo-

men's legal rights were expanded gradually over a period of several decades. Similarly, cross-country data suggest that there exist varying degrees of female empowerment around the world. A gradual extension of rights can be easily incorporated into our setup by analyzing a family decision problem with general weights and letting men vote on the weight held by women. The value functions for this more general case can be found in the same way as in the two polar cases considered here. Then, one can show numerically that the optimal weight assigned to the wife increases with the return to education. This finding can be interpreted as a gradual extension of rights over time in response to the growing importance of human capital.

Another limitation of our analysis is that we have restricted our attention to a framework with a homogeneous population. In reality, men differed tremendously in their opinions on women's rights at the time. Anecdotal evidence suggests that highly educated men were more likely to be in favor of women's rights than the less educated. Such diversity of opinion could be analyzed, for example, in a model with heterogeneity in the ability to educate one's children. It is also interesting to observe that most of the expansion of women's rights took place only after property requirements as a prerequisite for (male) voting were lifted.<sup>61</sup> While the evidence does not suggest that changes in the composition of the electorate were a key driver of the reforms,<sup>62</sup> one can think of reasons why wealthy men (who were the first to receive the vote) may have different views on women's rights than those of more limited means. For example, the wealthy had other means at their command to protect their daughters' and grand-children's

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<sup>61</sup>In the U.S., all white male adult property-owners had the right to vote dating back to the writing of the U.S. Constitution in 1787. Property and tax requirements were lifted in 1850, and in 1870 former slaves received the right to vote as well (see Keyssar 2000 for details). In England, wealth and tax requirements for voting were successively weakened with the First, Second, and Third Reform Acts of 1832, 1867, and 1884. The fraction of adult males that could vote increased to about 20 percent in 1832, 40 percent in 1867, and 60 percent in 1884. In 1918, all men aged 21 and above received the right to vote.

<sup>62</sup>The closest association between a franchise extension and a subsequent reform of women's rights is the passing of the Married Women's Property Act in 1870 in England soon after the Second Reform Act of 1867. However, the franchise extension appeared to have little immediate impact on the makeup of the political system (see Rallings and Thrasher 2000; the composition of the House of Commons after the general election of 1868 was barely changed relative to the pre-reform election of 1865, with a Liberal majority in both cases), and deliberations of the Property Act already began before the Reform Act came into force.

well-being (such as the use of marriage settlements and trust funds). In addition, the marriage market also functioned differently among the wealthy.

It would also be interesting to use our theoretical framework to analyze the expansion of women's political rights (in particular the right to vote) that followed the initial expansion of economic rights. Our dynamic setup in Section 4.3 suggests that giving women the right to vote may serve a useful purpose (from a man's perspective) as a commitment device. Women would never vote for patriarchy; thus, voting for female suffrage in addition to voting for empowerment would ensure that empowerment stays in place permanently. However, for a detailed analysis of political rights we would also have to consider the extent to which men and women disagree about other aspects of government policy. To this end, the extension in Section 5.2 suggests that there may be issues, such as public education, where men would actually prefer women to have a say on policy. Thus, the scope of government activities should also matter for political rights.

To further test the validity of our theory, cross-country evidence would be useful. For example, were the first countries to experience rising demand for human capital also the first to reform women's rights? In general, women's rights were expanded first in the richest countries and are still lacking in many developing countries. If rich countries are rich because skill-biased technological change led to high returns to schooling earlier on, this observation would support our theory. However, other factors also mattered in individual countries, such as legal origins and the extent of voting rights for men. We plan to carry out a detailed cross-country analysis of women's rights in future research.

Our analysis leaves open the issue of the enforcement of women's rights. Enforcement problems are likely to be particularly relevant if women's rights are imposed without widespread support among men. Turkey provides an interesting example. Turkish women have had a unique historical experience due to the sweeping modification of the legal system under Atatürk's reforms introduced shortly after the establishment of Republic of Turkey in 1923 (Kagitcibasi 1986). The laws affecting women's status were changed from the Sharia to a secular civil code (adapted from the Swiss civil law in 1926). Yet, this top-down approach did

not alter the position of women in Turkey as much as the legal change might have suggested. In rural areas, traditional family roles were upheld, so that women experienced little actual change after the reforms and fertility remained high (Abadan-Unat 1978). In contrast, in urban settings there was a marked improvement in women's position, and fertility rates fell quickly. These observations suggest that in the rural areas, the reforms occurred too early relative to the level of development. As a result, the average man did not benefit from the new laws, which limited men's incentive to enforce and obey the law.

An important direction for future research is to explore the implications of our analysis for developing countries today. A number of studies have identified the lack of women's rights as a hindrance to successful economic development.<sup>63</sup> One policy implication of our theory is that gender equality might be achieved more easily through, say, improving the public school system rather than imposing legal reforms through pressure from international organizations.<sup>64</sup> Public provision of inputs that are complementary to education within the family raises the private return to educating children, shifting men's preferences in favor of female empowerment and possibly leading to the endogenous expansion of women's rights. Our analysis also suggests that marriage market institutions (such as bride prices, dowries, or the possibility of polygyny) may play a key role in the political economy of women's rights.

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<sup>63</sup>See for example Udry (1996). Duflo (2005) provides a survey of the literature on gender equality and development.

<sup>64</sup>Development organizations such as the United Nations and the World Bank have explicitly stated improving the status of women as one of their missions.

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## A Proofs for Propositions and Lemmas

**Proof of Proposition 1:** We would like to derive a condition under which  $V_m^E > V_m^P$ , which in the no-education case is equivalent to:

$$\begin{aligned} u(c_m^E, c_f^E, n^E) + \frac{\gamma_m}{1 - \frac{\gamma_m + \gamma_f}{2}} \left[ \frac{u(c_m^E, c_f^E, n^E) + u(c_f^E, c_m^E, n^E)}{2} \right] \\ > u(c_m^P, c_f^P, n^P) + \frac{\gamma_m}{1 - \frac{\gamma_m + \gamma_f}{2}} \left[ \frac{u(c_m^P, c_f^P, n^P) + u(c_f^P, c_m^P, n^P)}{2} \right]. \end{aligned}$$

Plugging in the functional form for  $u(\cdot)$  and the solutions for  $c_m^E, c_m^P, c_f^E, c_f^P, n^E$ , and  $n^P$  yields:

$$\begin{aligned} (1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) + \frac{\gamma_m}{1 - \frac{\gamma_m + \gamma_f}{2}} (1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) \\ > \sigma \log(\sigma) + \frac{\gamma_m}{1 - \frac{\gamma_m + \gamma_f}{2}} \frac{1 + \sigma}{2} \log(\sigma) \end{aligned}$$

or:

$$[2 - \gamma_f + \gamma_m](1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) > [(2 - \gamma_f)\sigma + \gamma_m] \log(\sigma). \quad (17)$$

Isolating the terms involving  $\gamma_m$  on the left-hand side gives:

$$\gamma_m \left( (1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) - \log(\sigma) \right) > (2 - \gamma_f) \left( \sigma \log(\sigma) - (1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) \right).$$

For  $\sigma = 1$ , both sides are equal to zero, so that men are indifferent between the two regimes. For  $0 < \sigma < 1$ , both sides are strictly positive. Moreover, the left-hand side is strictly increasing in  $\gamma_m$ . Thus, if we define:

$$\bar{\gamma}_m = \frac{(2 - \gamma_f) \left( \sigma \log(\sigma) - (1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) \right)}{(1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) - \log(\sigma)},$$

we have that for all  $\gamma_m > \bar{\gamma}_m$  inequality (17) is satisfied, implying that men prefer the empowerment regime  $E$ . Turning to the role of  $\sigma$ , note that both sides of (17) are strictly increasing in  $\sigma$ . However, as  $\sigma$  approaches zero the left-hand side converges to  $-[2 - \gamma_f + \gamma_m] \log(2)$ , whereas the right-hand side approaches minus infinity. Therefore, there exists a  $\bar{\sigma}$  such that (17) is satisfied for all  $\sigma$  satisfying  $0 < \sigma < \bar{\sigma}$ .  $\square$

**Proof of Lemma 1:** We want to derive the equilibrium value functions for the case of positive education under the patriarchy and empowerment regimes. The proof is by

guess and verify. We guess that the value functions take the form:

$$\begin{aligned}
V_m^P(H_m, H_f, \bar{H}) &= a_1^P + a_2 \log(H_m) + a_3 \log(H_f) + a_4 \log(\bar{H}_m) + a_5 \log(\bar{H}_f), \\
V_f^P(H_m, H_f, \bar{H}) &= b_1^P + b_2 \log(H_m) + b_3 \log(H_f) + b_4 \log(\bar{H}_m) + b_5 \log(\bar{H}_f), \\
V_m^E(H_m, H_f, \bar{H}) &= a_1^E + a_2 \log(H_m) + a_3 \log(H_f) + a_4 \log(\bar{H}_m) + a_5 \log(\bar{H}_f), \\
V_f^E(H_m, H_f, \bar{H}) &= b_1^E + b_2 \log(H_m) + b_3 \log(H_f) + b_4 \log(\bar{H}_m) + b_5 \log(\bar{H}_f).
\end{aligned}$$

By plugging these parameterized value functions into the right-hand sides of (6) and (7), we can derive explicit solutions for the individual choices, which are given in (15) and (16) in the text. Then, plugging the functional forms for the value functions, the optimal individual choices, and the laws of motion for human capital into both sides of the functional equation (8) yields a system of equations that can be solved for the value-function coefficients. The solutions for the slope coefficients (which are identical in the two political regimes) are:<sup>65</sup>

$$\begin{aligned}
a_2 &= \frac{(1 + \sigma)[2(1 - \alpha) - (1 - \alpha)\beta\gamma_f + \alpha(1 - \beta)\gamma_m]}{2 - (1 - \beta)\gamma_m - \beta\gamma_f}, \\
a_3 &= (1 + \sigma) \left( \alpha + \frac{\beta\gamma_m}{2 - (1 - \beta)\gamma_m - \beta\gamma_f} \right), \\
a_4 &= \left( \frac{(1 - \beta)\frac{\gamma_m}{2}}{1 - \gamma_m/2 - \gamma_f/2} \right) \left( \frac{(1 + \sigma)[2 + (1 - 2\beta)(\gamma_f - \gamma_m)]}{2 - (1 - \beta)\gamma_m - \beta\gamma_f} \right), \\
a_5 &= \left( \frac{\beta\frac{\gamma_m}{2}}{1 - \gamma_m/2 - \gamma_f/2} \right) \left( \frac{(1 + \sigma)[2 + (1 - 2\beta)(\gamma_f - \gamma_m)]}{2 - (1 - \beta)\gamma_m - \beta\gamma_f} \right), \\
b_2 &= (1 + \sigma) \left( (1 - \alpha) + \frac{(1 - \beta)\gamma_f}{2 - (1 - \beta)\gamma_m - \beta\gamma_f} \right), \\
b_3 &= \frac{(1 + \sigma)(2\alpha + (1 - \alpha)\beta\gamma_f - \alpha(1 - \beta)\gamma_m)}{2 - (1 - \beta)\gamma_m - \beta\gamma_f}, \\
b_4 &= \left( \frac{(1 - \beta)\frac{\gamma_f}{2}}{1 - \gamma_m/2 - \gamma_f/2} \right) \left( \frac{(1 + \sigma)[2 + (1 - 2\beta)(\gamma_f - \gamma_m)]}{2 - (1 - \beta)\gamma_m - \beta\gamma_f} \right), \\
b_5 &= \left( \frac{\beta\frac{\gamma_f}{2}}{1 - \gamma_m/2 - \gamma_f/2} \right) \left( \frac{(1 + \sigma)[2 + (1 - 2\beta)(\gamma_f - \gamma_m)]}{2 - (1 - \beta)\gamma_m - \beta\gamma_f} \right).
\end{aligned}$$

The level coefficients in the two political regimes  $j \in \{P, E\}$  can be expressed as:

$$\begin{aligned}
a_1^j &= \frac{2 - \gamma_f}{2 - (\gamma_m + \gamma_f)}(M_1^j + M_2^j) + \frac{\gamma_m}{2 - (\gamma_f + \gamma_m)}(F_1^j + F_2^j), \\
b_1^j &= \frac{\gamma_f}{2 - (\gamma_f + \gamma_m)}(M_1^j + M_2^j) + \frac{2 - \gamma_m}{2 - (\gamma_m + \gamma_f)}(F_1^j + F_2^j),
\end{aligned}$$

<sup>65</sup>Step-by-step derivations are available on request.

where:

$$\begin{aligned}
M_1^P &= \sigma \log(\sigma) + (1 + \sigma) \log \left( \frac{A}{1 + \sigma} \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} \right)^\alpha \right) + \delta \log \left( \frac{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta}{\phi(\alpha(1 + \sigma) + \delta)} \right), \\
M_2^P &= \frac{\gamma_m}{2} \theta \log(a_2)[a_2 + a_4 + b_2 + b_4] + \frac{\gamma_m}{2} \theta \log(b_3)[a_3 + a_5 + b_3 + b_5] \\
&\quad + \frac{\gamma_m}{2} \theta [a_2 + a_3 + a_4 + a_5 + b_2 + b_3 + b_4 + b_5] \log \left( B \left( \frac{\phi \frac{\gamma_m}{2} \theta}{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta} \right) \right), \\
F_1^P &= \log(\sigma) + (1 + \sigma) \log \left( \frac{A}{1 + \sigma} \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} \right)^\alpha \right) + \delta \log \left( \frac{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta}{\phi(\alpha(1 + \sigma) + \delta)} \right), \\
F_2^P &= \frac{\gamma_f}{2} \theta \log(a_2)[a_2 + a_4 + b_2 + b_4] + \frac{\gamma_f}{2} \theta \log(b_3)[a_3 + a_5 + b_3 + b_5] \\
&\quad + \frac{\gamma_f}{2} \theta [a_2 + a_3 + a_4 + a_5 + b_2 + b_3 + b_4 + b_5] \log \left( B \left( \frac{\phi \frac{\gamma_m}{2} \theta}{\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta} \right) \right), \\
M_1^E &= (1 + \sigma) \log \left( \frac{A}{2} \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} \right)^\alpha \right) + \delta \log \left( \frac{\delta - \frac{\gamma_m + \gamma_f}{4}(a_2 + b_3)\theta}{\phi(\alpha(1 + \sigma) + \delta)} \right), \\
M_2^E &= \frac{\gamma_m}{2} \theta \log(a_2)[a_2 + a_4 + b_2 + b_4] + \frac{\gamma_m}{2} \theta \log(b_3)[a_3 + a_5 + b_3 + b_5] \\
&\quad + \frac{\gamma_m}{2} \theta [a_2 + a_3 + a_4 + a_5 + b_2 + b_3 + b_4 + b_5] \log \left( \frac{B \phi \frac{\gamma_m + \gamma_f}{4} \theta}{\delta - \frac{\gamma_m + \gamma_f}{4}(a_2 + b_3)\theta} \right), \\
F_1^E &= (1 + \sigma) \log \left( \frac{A}{2} \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} \right)^\alpha \right) + \delta \log \left( \frac{\delta - \frac{\gamma_m + \gamma_f}{4}(a_2 + b_3)\theta}{\phi(\alpha(1 + \sigma) + \delta)} \right), \\
F_2^E &= \frac{\gamma_f}{2} \theta \log(a_2)[a_2 + a_4 + b_2 + b_4] + \frac{\gamma_f}{2} \theta \log(b_3)[a_3 + a_5 + b_3 + b_5] \\
&\quad + \frac{\gamma_f}{2} \theta [a_2 + a_3 + a_4 + a_5 + b_2 + b_3 + b_4 + b_5] \log \left( \frac{B \phi \frac{\gamma_m + \gamma_f}{4} \theta}{\delta - \frac{\gamma_m + \gamma_f}{4}(a_2 + b_3)\theta} \right).
\end{aligned}$$

□

**Proof of Proposition 2:** All parts of the proposition follow from comparing the closed-form solutions for consumption, education, and fertility in both regimes (see (15) and (16)) under the condition  $\gamma_f > \gamma_m$ . Aggregate consumption is:

$$C^P = C^E = A \left( \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta} H_f \right)^\alpha H_m^{1 - \alpha}.$$

The fraction of time women spend on production is  $t_f^P = t_f^E = \frac{\alpha(1 + \sigma)}{\alpha(1 + \sigma) + \delta}$ . Since the remaining time is spent on child care, total child care time is independent of the regime. That fertility is lower and education is higher under empowerment and that both of these choices are independent of state variables follows directly from the closed-form solutions given in (15) and (16). One implication of these findings is that the total time women devote to educating children is higher under empowerment, even though they have fewer

children in this regime. Total female education time under patriarchy is  $n^P(e_m^P + e_f^P) = \frac{\theta\gamma_m(1+\sigma)}{(\alpha(1+\sigma)+\delta)[2-(1-\beta)\gamma_m-\beta\gamma_f]}$ , compared to  $n^E(e_m^E + e_f^E) = \frac{\theta\gamma(1+\sigma)}{(\alpha(1+\sigma)+\delta)[2-(1-\beta)\gamma_m-\beta\gamma_f]}$  under empowerment. The gender education gap is given by  $\frac{e_f}{e_m} = \frac{2\alpha+(1-\alpha)\beta\gamma_f-\alpha(1-\beta)\gamma_m}{2(1-\alpha)-(1-\alpha)\beta\gamma_f+\alpha(1-\beta)\gamma_m}$  in both regimes. Finally, the growth rate of aggregate consumption (and output and human capital) is given by  $B^\theta(e_f^j)^{\theta\beta}(e_m^j)^{\theta(1-\beta)}$ . Since, as argued above,  $e_f^E > e_f^P$  and  $e_m^E > e_m^P$ , it follows that the growth rate is higher under empowerment.  $\square$

**Proof of Proposition 3:** Men will vote for empowerment if and only if their utility under empowerment exceeds the utility under patriarchy:

$$V_m^E(H_m, H_f, \bar{H}) > V_m^P(H_m, H_f, \bar{H}).$$

We have already determined that  $V_m^E(H_m, H_f, \bar{H})$  and  $V_m^P(H_m, H_f, \bar{H})$  differ only in the constant term, so that the inequality can be written as  $a_1^E > a_1^P$ . Writing out this condition and simplifying gives:

$$\begin{aligned} & (2 - \gamma_f + \gamma_m)(1 + \sigma) \log\left(\frac{1 + \sigma}{2}\right) - [(2 - \gamma_f)\sigma + \gamma_m] \log(\sigma) \\ & + \theta\gamma_m \frac{2(1 + \sigma)}{(1 - \gamma)} \log\left(\frac{\gamma}{\gamma_m}\right) + \left[\theta\gamma_m \frac{2(1 + \sigma)}{(1 - \gamma)} - (2 - \gamma_f + \gamma_m)\delta\right] \\ & \times \log\left(\frac{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f] - \gamma_m(1 + \sigma)\theta}{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f] - \gamma(1 + \sigma)\theta}\right) > 0. \end{aligned} \quad (18)$$

The first line of this expression reflects the preference for equality in future generations that was already present in the no-education case (compare to inequality (17) in the proof of Proposition 1 above). The remaining terms reflect the role of education. As one would expect, setting  $\theta = 0$  reduces the expression to the no-education case. Define  $\theta^*$  as:

$$\theta^* = \frac{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f]}{\gamma(1 + \sigma)}. \quad (19)$$

Note that as  $\theta$  approaches  $\theta^*$  from below, the denominator in the log term goes to zero and, hence, the log term goes to infinity. Further, the assumption  $\gamma_m > \frac{\gamma_f}{3}$  assures that for  $\theta$  sufficiently close to  $\theta^*$  the term in square brackets is strictly positive, so that the overall expression goes to plus infinity. Intuitively, if  $\theta = \theta^*$ , parents can achieve any positive utility level by choosing a sufficiently small number of children with a sufficiently high level of education. Given that the left-hand side of (18) approaches plus infinity for  $\theta$  sufficiently close to  $\theta^*$ , there has to be a threshold  $\bar{\theta}$  such that (18) is satisfied for all  $\theta$  that satisfy  $\bar{\theta} < \theta < \theta^*$ . Hence, for sufficiently high  $\theta$  men will prefer empowerment over patriarchy.  $\square$

**Proof of Proposition 4:** After plugging  $\gamma_m = \gamma_f$  into (18), the condition for preferring

equal rights reduces to

$$(2 - \gamma_f + \gamma_m)(1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) > [(2 - \gamma_f)\sigma + \gamma_m] \log(\sigma),$$

which is independent of  $\theta$  and in fact identical to the condition for the no-education case. To show that the human capital externality is crucial for our results, we solve a version of the model without this externality, which is equivalent to assuming that sons and daughters marry each other. Since in this setup different dynasties do not interact, average human capital is no longer a state variable. The male and female value functions  $i \in \{m, f\}$  in the two regimes  $j \in \{P, E\}$  satisfy the following recursive relationship:

$$V_i^j(H_m, H_f) = u_i(c_m, c_f, n) + \frac{\gamma_i}{2} \left[ V_m^j(H'_m, H'_f) + V_f^j(H'_m, H'_f) \right].$$

As before, choices are determined either by maximizing the male value function (patriarchy) or the average value function (empowerment). The value functions can be solved explicitly, and the condition under which men prefer empowerment is:

$$(2 - \gamma_f + \gamma_m)(1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) - [(2 - \gamma_f)\sigma + \gamma_m] \log(\sigma) + \gamma_m \frac{2(1 + \sigma)}{1 - \gamma} \theta \log \left( \frac{\gamma}{\gamma_m} \right) + \left[ \gamma_m \frac{2(1 + \sigma)}{1 - \gamma} \theta - \delta(2 - \gamma_f + \gamma_m) \right] \log \left( \frac{\delta[1 - \gamma] - \gamma_m(1 + \sigma)\theta}{\delta[1 - \gamma] - \gamma(1 + \sigma)\theta} \right) > 0. \quad (20)$$

The maximum  $\theta$  for which the problem is well defined is  $\frac{\delta(1 - \gamma)}{\gamma(1 + \sigma)}$ . Analogously to the proof of Proposition 3, the last logarithmic term goes to infinity in the limit. However, the expression multiplying the log term is negative for all  $\theta$  less or equal to the limit. Since all other terms are finite, it follows that for large enough  $\theta$  the expression is negative. Hence, men prefer the patriarchy regime for sufficiently large  $\theta$ .  $\square$

**Proof of Proposition 5:** Under dynamic voting, a vote for empowerment in a given period  $T$  shifts the consumption allocation between husbands and wives at time  $T$  in favor of the wives, it lowers the fertility rate at time  $T$ , and it leads to an increase in all future human capital levels by the factor:

$$\left( \frac{e_{m,T}^E}{e_{m,T}^P} \right)^{\theta_T} = \left( \frac{e_{f,T}^E}{e_{f,T}^P} \right)^{\theta_T} = \frac{\gamma[\delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta_T]}{\gamma_m[\delta - \frac{\gamma}{2}(a_2 + b_3)\theta_T]}.$$

Future decisions on the relative consumption allocation, fertility, and education are not affected by the vote. By plugging the decisions under votes for empowerment and patriarchy, respectively, into the male utility function and taking the difference (where most

terms drop out), we find that men will vote for empowerment in period  $T$  if:

$$\begin{aligned}
& 2(1 + \sigma) \log\left(\frac{1 + \sigma}{2}\right) - 2\sigma \log(\sigma) \\
& + 2\theta_T \gamma_m \frac{(1 + \sigma)}{1 - \gamma} \log\left(\frac{\gamma}{\gamma_m}\right) + 2 \left[ \theta_T \gamma_m \frac{(1 + \sigma)}{1 - \gamma} - \delta \right] \\
& \times \log\left(\frac{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f] - \gamma_m(1 + \sigma)\theta_T}{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f] - \gamma(1 + \sigma)\theta_T}\right) > 0. \quad (21)
\end{aligned}$$

This condition is similar to inequality (18) that was derived in the proof of Proposition 3, and the arguments of that proposition can also be applied here to show that there exists a threshold  $\tilde{\theta}$  such that (21) is met for all  $\theta_T$  that satisfy  $\tilde{\theta} < \theta_T < \theta^*$ , where  $\theta^*$  is defined in equation (19). Hence, for sufficiently high  $\theta_T$  men will vote for empowerment. Moreover, comparing condition (18) in Proposition 3 with condition (21) above, we find that in (21) the constant term (i.e., the first line) as well as the factor multiplying the logarithmic term in the last line are lower than in condition (18), which implies that the threshold  $\tilde{\theta}$  is higher than the threshold  $\bar{\theta}$  derived in Proposition 3, i.e.,  $\tilde{\theta} > \bar{\theta}$ .  $\square$

**Proof of Proposition 6:** Recall that the male utility can be expressed as:

$$\begin{aligned}
& u(c_m, c_f, n) + \frac{\gamma_m}{2} [a_1 + a_2 \log(H'_m) + a_3 \log(\bar{H}'_f) + a_4 \log(\bar{H}'_m) + a_5 \log(\bar{H}'_f)] \\
& + \frac{\gamma_m}{2} [b_1 + b_2 \log(\bar{H}'_m) + b_3 \log(H'_f) + b_4 \log(\bar{H}'_m) + b_5 \log(\bar{H}'_f)]. \quad (22)
\end{aligned}$$

Dropping all constants (i.e., additive terms that do not depend on the policy variables  $\tau$  and  $s$ ), the political objective function is:

$$(1 + \sigma)(1 - \alpha) \log(1 - \tau) + \frac{\gamma_m}{2} \sum_{i=2}^5 (a_i + b_i)(1 - \eta) \hat{\theta} \log(s).$$

Plugging in the budget constraint of the education system, this is:

$$(1 + \sigma)(1 - \alpha) \log(1 - \tau) + \frac{\gamma_m}{2} \sum_{i=2}^5 (a_i + b_i)(1 - \eta) \hat{\theta} \log\left(\frac{S\tau}{2n}\right).$$

The first-order condition for choosing  $\tau$  gives:

$$\frac{(1 + \sigma)(1 - \alpha)}{1 - \tau} = \frac{\gamma_m}{2} \sum_{i=2}^5 (a_i + b_i) \frac{(1 - \eta) \hat{\theta}}{\tau}$$

The optimal tax rate therefore is:

$$\tau = \frac{\frac{\gamma_m}{2} \sum_{i=2}^5 (a_i + b_i)(1 - \eta)\hat{\theta}}{\frac{\gamma_m}{2} \sum_{i=2}^5 (a_i + b_i)(1 - \eta)\hat{\theta} + (1 + \sigma)(1 - \alpha)}.$$

Plugging in the solutions for the coefficients  $a_2$  to  $a_5$  and  $b_2$  to  $b_5$  gives the tax rate stated in the proposition. This tax rate applies in either political regime. Notice, however, that  $n$  depends on the regime, thus, through the effect on  $n$ , schooling per student  $s$  is higher under empowerment.  $\square$

**Proof of Proposition 7:** Men will vote for empowerment if and only if their utility under empowerment exceeds the utility under patriarchy:

$$V_m^E(H_m, H_f, \bar{H}) > V_m^P(H_m, H_f, \bar{H}).$$

We have already determined that  $V_m^E(H_m, H_f, \bar{H})$  and  $V_m^P(H_m, H_f, \bar{H})$  differ only in the constant term, so that the inequality can be written as  $a_1^E > a_1^P$ . Writing out this condition and simplifying gives:

$$\begin{aligned} & \frac{\gamma_m}{2 - (\gamma_m + \gamma_f)} \hat{\theta}(1 - \eta)[a_2 + a_3 + a_4 + a_5 + b_2 + b_3 + b_4 + b_5] \\ & \left( \log \left( \delta - \frac{\gamma_m}{2}(a_2 + b_3)\theta \right) - \log \left( \delta - \frac{\gamma_m + \gamma_f}{4}(a_2 + b_3)\theta \right) \right) \\ & + (2 - \gamma_f + \gamma_m)(1 + \sigma) \log \left( \frac{1 + \sigma}{2} \right) - [(2 - \gamma_f)\sigma + \gamma_m] \log(\sigma) \\ & + \theta \gamma_m \frac{2(1 + \sigma)}{(1 - \gamma)} \log \left( \frac{\gamma}{\gamma_m} \right) + \left[ \theta \gamma_m \frac{2(1 + \sigma)}{(1 - \gamma)} - (2 - \gamma_f + \gamma_m)\delta \right] \\ & \quad \times \log \left( \frac{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f] - \gamma_m(1 + \sigma)\theta}{\delta[2 - (1 - \beta)\gamma_m - \beta\gamma_f] - \gamma(1 + \sigma)\theta} \right) > 0. \end{aligned}$$

This expression is identical to the condition given in Proposition 3 except for the first term (the first two lines). The new term is non-negative, and thus unambiguously increases the incentive to introduce empowerment relative to the case without public schooling. Moreover, the term is monotonically increasing in  $\theta$ , and converges to zero as  $\theta$  approaches zero from above. Thus, for sufficiently low  $\theta$  patriarchy is still preferred, as long as it is preferred for low  $\theta$  without public schooling.  $\square$

**Proof of Proposition 8:** Female education is:  $e_f^i = \frac{\phi \frac{\gamma_m}{2} b_{3i} \theta}{\delta - \frac{\gamma_m}{2}(a_{2i} + b_{3i})\theta}$  where  $i = H, L$  refers to two economies with high and low  $\alpha$ . Using the expressions from the proof of Lemma 1,  $a_{2i} + b_{3i}$  reduces to  $\frac{2(1 + \sigma)}{2 - (1 - \beta)\gamma_m - \beta\gamma_f}$ , which does not depend on  $\alpha$ . Hence, the ratio reduces to  $\frac{e_f^H}{e_f^L} = \frac{b_{3H}}{b_{3L}}$ . Plugging in for  $b_3$  and simplifying we have:  $\frac{e_f^H}{e_f^L} = \frac{\alpha_H[2 - \beta\gamma_f - (1 - \beta)\gamma_m] + \beta\gamma_f}{\alpha_L[2 - \beta\gamma_f - (1 - \beta)\gamma_m] + \beta\gamma_f}$ . The numerator is larger than the denominator and thus  $e_f^H > e_f^L$ . Using the same logic, it is easy to show that  $e_m^H < e_m^L$ . Average education time per child is equal to  $\frac{1}{2}(e_f + e_m) =$

$\frac{\phi\gamma_m\theta(b_3+a_2)}{\delta-\frac{\gamma m}{2}(a_2+b_3)\theta}$  which does not depend on  $\alpha$ . The time that women devote to market work is  $t_f = 1 - n(\phi + e_f + e_m) = \frac{\alpha(1+\sigma)}{\alpha(1+\sigma)+\delta}$ , which increases in  $\alpha$ . The wage per unit of time is  $w_f H_f$  for female and  $w_m H_m$  for males. Using the fact that wages equal the marginal product of (each type of) labor and plugging in the optimal time spent working, the wage ratio is:  $\frac{w_f H_f}{w_m H_m} = \frac{\alpha(1+\sigma)+\delta}{(1-\alpha)(1+\sigma)}$ , which is increasing in  $\alpha$ . Optimal fertility is  $n_i = \frac{\delta-\frac{\gamma m}{2}(a_{2i}+b_{3i})\theta}{\phi(\alpha_i(1+\sigma)+\delta)}$  where as above  $i = H, L$  indicates whether variables relate to an economy with a high or low  $\alpha$ . Noting again that  $a_{2i} + b_{3i}$  is independent of  $\alpha$ , the fertility ratio simplifies to  $\frac{n_H}{n_L} = \frac{\alpha_L(1+\sigma)+\delta}{\alpha_H(1+\sigma)+\delta}$ . Therefore  $n_H < n_L$ .  $\square$

**Proof of Proposition 9:** The result that the optimal regime is independent of  $\alpha$  follows from condition (18), in which  $\alpha$  does not appear.  $\square$