Gender Discrimination, Human Capital, and Marriage

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Abstract

We use a bargaining model of household behavior to study the forces behind the emergence and the disappearance of gender discrimination on the labor market. We also revisit the prediction in the economic literature that gender differences in education ought to prevail in a world with such gender discrimination.

Key words: Marriage, endogenous fertility, education, discrimination, voting

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1 Introduction

It is widely recognized that in many societies, women face discrimination on the labor market. Gender pay differences vary across space and across time. Not so long ago, discrimination against women was complete under the Taliban regime in Afghanistan: regardless of their education level, women were barred from working outside of their home. In the United States, Goldin (2002) documents a significant rise in gender pay differences at the dawn of the twentieth century and a

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considerable decline in the last two decades. In this paper, we propose a theory of why gender discrimination may come to be, and why it may come to disappear.

We work within a simple model of men and women. Men and women value leisure, private consumption, commercial sex, if they are single, and the quality of their offspring, if they are married. The quality of children requires a time investment on behalf of mothers and is affected positively by their educational attainment. Marriage, if it materializes, is the result of a negociation between spouses on the appropriate level of a transfer, partially compensating women for their loss on the labor market, and, as in Edlund (2001), giving the father the right to share custody of children. Agents in our model have two career choices: they can work in the formal market, producing a consumption good, and earning a salary depending on their skill and their gender; they can also work in an informal sector, selling commercial sex. We argue as in Edlund & Korn (2002) that the existence of this sex sector is an important outside option, whose understanding is key in the determination of the optimal transfer between spouses. Any policy that improves the condition of women in that sector may have important positive spillovers on the condition of married women.

Our model also allows us to reassess the issue of gender differences in educational attainment first studied in Becker (1991) and Echevarria & Merlo (1999). Both these models predict the persistence of systematic gender differences in human capital investment as a response to biological differences between men and women. Women have a comparative advantage at childbearing. Childbearing, however, lowers the returns from education of women, which parents take into account when choosing to educate boys or girls in Becker (1991). Anticipating the additional fact that husbands will transfer resources to their wives, parents in Echevarria & Merlo (1999) also choose to favor their sons over their daughters when it comes to education choices. Yet, despite these biological differences, over the years, fertility rates have been steadily declining and more women have been gaining education. In many cases, the gender gap has been declining, and catching up has even taken place in some developing countries. This raises significant doubts about the persistence prediction prevalent in the existing literature. In our model, gender differences in educational attainment can disappear even in the presence of gender discrimination in the labor market. If women value the quality of their children, and if that quality is — as the data suggest — dependent on the education attainment of mothers, women planning to marry have an incentive to acquire skills through schooling, even though they anticipate a substantially lower wage than educated males. We also show that removing wage discrimination often raises the negociated transfer between men and women. Indeed, in absence of wage discrimination, the opportunity cost of raising children is high. Our results therefore suggest that, in a society politically dominated by men, gender discrimination on the labor market will not disappear easily. Once women acquire political rights, a process we model as a move from individual bargaining towards collective bargaining, the end of discrimination may be part of an equilibrium settlement between gender groups.

Our paper views the family as a bipolar entity. In that, we follow a large literature on household behavior, which challenged the original model of Becker (1965), in which the household was in essence monolithic. Contributions in this literature include Manser & Brown (1980), McElroy & Horney (1981), Chiappori (1992), Echevarria & Merlo (1999) and Basu (2001).

2 Model

The model economy is populated by a homogenous population of female agents of size N normalized to unity and, for simplicity, of a homogenous male population of equal size. Each agent has two periods left to live. In the first period, agents are young adults, each endowed with one unit of time which can be allocated to skill acquisition or to leisure. In the second period, agents are workers who are either married or single. A worker is endowed with one unit of labor time. Marriage is monogamous, and exclusivity of sexual relations within marriage is perfectly enforced. For simplicity each woman bears one child of quality q and there is no out-of-wedlock child birth. A married woman receives a transfer $\theta \geq 0$ from her husband which enables him to derive utility from sharing the custody of the child.

We assume that agents (both male and female) obtain utility from their own consumption c of a numeraire good, from child quality, q, conditional upon marriage, and from commercial sex, x, conditional upon singleness. Agent i's lifetime utility V_i is given by:

$$V_i = l_i + \beta E\left[U\left(q(m); x_i(m); c_i(m)\right)\right], \qquad \beta \in (0,1) \tag{1}$$

where β is the intertemporal time-discount factor; m is an index of marital status; l_i is time allocated to leisure in the first period; E is the expectation operator conditional upon current period information, the function U is strictly increasing and concave in all its arguments. The above formulation of the lifetime utility displays the following features: (i) as in Edlund & Korn (2002) a child is a public good in the usual sense, hence the absence of a subscript i; (ii) both genders may enjoy commercial sex when single, provided they can afford it.

Agent i's budget constraint is described as follows:

$$c_i(m) \leq \begin{cases} y_F(m) + I_m\theta - (1 - I_m) p_x x_F & \text{if female} \\ y_M(m) - I_m\theta - (1 - I_m) p_x x_M & \text{if male} \end{cases} \tag{2}$$

where $y_i(m)$ denotes the income of an agent of gender i which depends on his or her marital status to be specified further below, p_x is the price of commercial sex, and I_m is the index function:

$$I_m = \begin{cases} 1 & \text{if married} \\ 0 & \text{If single} \end{cases} . \tag{3}$$

The above formulation of the budget constraint is consistent with the assumption that married individuals do not purchase commercial sex. This is just a simplifying assumption.

2.1 Skill Acquisition

In the first period, each agent of gender i ($i = F, M$) must decide whether or not to acquire productive skills, which may enable her or him to work as a skilled worker in the numeraire good sector. For simplicity, we model skill acquisition as binary decision. In other words, either $l_i = 0$ if agent i chooses to invest time in becoming a skilled worker, or $l_i = 1$ if he or she does not.

We assume that agents make their leisure-skill acquisition decision by anticipating the impact this decision will have on their other decisions in the later stage of their life, in particular the decision on whether or not to get married and in which sector (numeraire good sector or sex sector) to work.

2.2 Gender Discrimination in the Labor Market

The numeraire good can be produced by two types of perfectly competitive firms: those that use skilled labor (L_s) only and those that use unskilled labor (L_u) only. Both types of firms use a production technology that has constant returns to labor. Aggregate output in that sector is thus given by:

$$Y = A_s L_s + A_u L_u \qquad A_s, A_u > 0 \tag{4}$$

where A_j is a productivity parameter for a type j firm ($j = s, u$), with $A_s > A_u$, implying that skilled labor is always more productive than unskilled labor.

An important feature of the environment under study is that the market for skilled labor exhibits gender discrimination:

$$L_s = L_{Ms} + \lambda L_{Fs}, \qquad \lambda \in [0,1] \tag{5}$$

where L_{is} denotes the total amount of skilled labor supplied by the aggregate of gender i workers ($i = F, M$); and λ is a measure of the number of high skill job openings of equal opportunity for both male and female, relative to the total number of high skill job openings.[1] λ *can be interpreted as the inverse of the degree of workplace harassment faced by skilled female agents.)* In other words, $\lambda = 1$ means all high skill jobs in the consumption good sector are of equal opportunity employment type; as long as $\lambda < 1$ there is labor discrimination against female workers.

To keep the analysis simple, we assume that there is no gender discrimination in the unskilled labor market:

$$L_u = L_{Mu} + L_{Fu} \tag{6}$$

Male workers allocate their entire endowment of labor time to work: $L_M = 1$. In contrast, labor supply, L_F, for female workers in that sector depends upon marital status. A married woman allocates a fixed proportion $1 - \nu$ of her time to labor, whereas a single woman who chooses to work in that sector allocates her entire endowment of labor time. This means that marriage entails a cost for women, since it involves investing time and skill to rearing a child of quality $q_j = \nu A_j$, where ν denotes the (fixed) proportion of the mother's time allocated to child-rearing, and A_j is the productivity of that time which depends upon the skill/education status of the mother. Since $A_s > A_u$, as long as $\nu > 0$, skilled/educated mothers raise children of better quality than their unskilled/uneducated counterparts.

Profit-maximization by perfectly competitive firms implies the following market wage profile across genders:

$$w_{Fs} = \lambda A_s \tag{7}$$

$$w_{Ms} = A_s \tag{8}$$

for the skilled labor market and

$$w_u = A_u \tag{9}$$

[1] Alternatively, we can think of discrimination as taking the form of harassment by male co-workers which cause female productivity to drop relatively to that of males. Harassment is harmful to its victims, and the harm caused takes the form of a decline in productivity. In that case,

in the unskilled labor market. Gender discrimination in the labor market implies that a woman always earns less than a man with similar qualification, as measured by their level of skill, for example. In this paper, we are concerned with both the motive for, and the incentive to end, gender discrimination. We address this question in an environment where discrimination is restricted to the numeraire good sector (also referred to as sector C) and to the skilled labor market in that sector. We assume that male agents vote, in the beginning of the first period, on the level of λ that would apply in the second period.

2.3 The Sex Sector

Agents in this economy can seek employment either in the numeraire good sector described above or in the sex sector (also referred to as sector X). Work in this sector essentially involves prostituting oneself in exchange for an income. In addition to the population of male and female workers, we assume that there is an infinite number of entrepreneurs who differ in their type (good or bad). Of course it is hard to come up with a good definition of what is exactly a "good" or a "bad" entrepreneur in the sex sector. In keeping up with the litterature on the sex industry (e.g., Lim, 1998), we assume that a good entrepreneur is essentially one that is fair in his business relations with the sex worker under her or his management, while the bad entrepreneur is one that is exploitative. We do not discuss, however, the reasons why some entrepreneurs are bad and others good.

Selling sex

We assume that sex workers are each randomly matched with an entrepreneur with whom they share the surplus from the match.[2] A sex worker inelastically supplies one unit of labor time which allows him or her to produce one unit of sex which is sold in the market, at a competitive price, p_x. We normalize the sex production technology such that p_x is also the surplus from the match. Let α denote the share of the surplus from the match accrued to the sex worker. The entrepreneur keeps the other share $1 - \alpha$. If a sex worker is lucky enough to be matched with a good entrepreneur, he or she earns $\bar{\alpha} p_x$; if unlucky, however, he or she will only earn $\underline{\alpha} p_x$, where $0 < \underline{\alpha} < \bar{\alpha} < 1$.

Since each sex worker is matched at random with one entrepreneur, we assume that all sex workers have an equal probability $\pi \in (0, 1)$ of having a bad match. In other words, the sex

[2] This includes the case where one entrepreneur is matched with more than one sex worker.

worker's income, ω_x, is a random variable defined by:

$$\omega_x = \begin{cases} \underline{\alpha} p_x & \text{with probability } \pi \\ \bar{\alpha} p_x & \text{with probability } 1-\pi \end{cases} \tag{10}$$

Buying Sex

Buying sex in this environment involves no risk, and is a decision restricted to single agents. This is just a simplifiying assumption. Sex is sold in indivisible units. Either an agent purchase 1 unit of sex or he or she purchases nothing. Hence,

$$x_i = \begin{cases} 1 & \text{if one buys} \\ 0 & \text{if not} \end{cases} \tag{11}$$

An important question of analysis in this study concerns the gender of the buyer and seller of sex. To address this question, we assume without loss of generality that both marriage and sex link only individuals of opposite sex. This assumption allows us to keep the focus on gender differences in skill/education. Therefore we will study conditions under which an agent of a given gender i can sell or buy sex. We link this decision to (i) the decision of whether or not to get married and (ii) the decision of whether or not to acquire skill via schooling. This latter exercise is one of the analytical features that distinguishes our model from the existing literature on marriage and prostitution (e.g. Edlund and Korn, 2002).

3 A Benchmark Case

In this section, we explore the forces behind gender discrimination in the labor market. We specialize the analysis to the simple case of linear utility, where an agent's life-time utility V_i is given by:

$$V_i = l_i + \beta E \left[U \left(q(m); x_i(m); c_i \right) \right],$$

where

$$U \left(q(m); x_i(m); c_i \right) = \delta_q I_m q + \delta_x (1 - I_m) x_i + \delta_c c_i \tag{12}$$

with $\sum \delta_g = 1$; δ_g denotes the utility weight of good $g = c, q, x$.

Let $V(I_m, x_i, i, j, \sigma)$ denote the expected value for being a agent of gender i with marital status I_m and skill status j ($j = s, u$), who chooses to work in sector $\sigma = X, C$. We can define the marriage premium for agent i as the difference: $V(1, x_i, i, j, \sigma) - V(0, x_i, i, j, \sigma)$. We want to show that given the above utility and budget constraint specifications, the level of the marriage premium will depend upon two important parameters: the level of gender discrimination λ in the skilled labor market and the risk faced by agents who elect to sell sex , as this risk is measured by the parameter π.

3.1 Singleness and Gender Differences in Human Capital

In this subsection we investigate the effect of labor market discrimination on the distribution of skills across gender groups. We characterize the equilibrium distribution of agents across sectors and across skill groups, when marriage is not an option. The main purpose of this excercise is to characterize each agent's highest attainable value outside marriage. In other words, we look for the equilibrium level of $V(0, x_i, i, j, \sigma)$. This equilibrium value will serve as each agent's threat-point in the bargaining game over the benefits of marriage. For that purpose, we ask what employment choices single agents make in an equilibrium.

An agent's employment decision is determined by her or his decision on leisure versus skill acquisition in the first period. All single agents must choose an employment option. They can work in the numeraire good sector as either (i) skilled workers if they are skilled or (ii) as unskilled workers if not, or (iii) they can work as a prostitute in the sex sector.

Since education is not essential for the production of sex, and since working in the sex sector in one's second period of life is an available option, each agent of gender i in deciding in the first period whether or not to forgo leisure in order to obtain skill-enhancing education, must carefully weigh all future employment options. This includes the possibility of working as a sex worker if the price is right and there are high chances of drawing a good entrepreneur — one who is not exploitative. Of course all this will not be known until the agent enters the second period of his or her lifetime. As a result, we impose the condition that when marriage is not an option, all agents have identical and rational expectations over the price of sex in the second period. We denote this anticipated price as $\tilde{p}$.

Let $\bar{V}(x_i; \tilde{p}, \pi, i, X) \equiv V(0, x_i, i, u, X)$ denote the expected value of being a gender i agent who elects to work as a prostitute in the sex sector (sector X), when the probability of drawing a bad match is π, and the market price for sex is p_x. Since work in this sector does not require school-acquired skills, $l = 1$ for all sex workers. Note that since agents are single, the index function I_m takes the value 0. Therefore the budget constraint faced by a single agent of gender i is:

$$c_i + \tilde{p}x_i \leq \omega_x \tag{13}$$

Given the utility specification above, agents are necessarily risk neutral, and in the optimum the budget constraint will be saturated:

$$\bar{V}\left(x_i; \tilde{p}, \pi, i, X\right) = 1 + \beta\left(\delta x_i + (1-\delta)\left[y\left(\pi, k, \tilde{p}\right) - x_i\tilde{p}\right]\right) \tag{14}$$

where

$$y\left(\pi, k, \tilde{p}\right) = \bar{\alpha}\tilde{p} - \pi k\tilde{p} \tag{15}$$

denotes the expected income of a sex worker, $k \equiv \bar{\alpha} - \underline{\alpha}$, and $\pi k\tilde{p}$ is a measure of the anticipated risk premium. Clearly, the value of being a sex worker is lower, the higher the risk of falling victim to exploitative prostitution (as this risk is measured by π). When a sex worker draws a bad sex-entrepreneur, he or she loses the entire premium k to this exploitative sex-entrepreneur. In other words, the decision to become a sex worker entails a risk; and each potential sex worker must weigh this risk against other employment options. We will return to this issue below.

At this point, an important question is whether sex workers will be interested in buying sex themselves. We denote the expected value of being a sex worker who buys commercial sex by $\bar{V}\left(1; \tilde{p}, \pi, i, X\right)$ and that of one who does not buy as $\bar{V}\left(0; \tilde{p}, \pi, i, X\right)$. The decision of whether or not to buy sex is determined by the difference $\bar{V}\left(1; \tilde{p}, \pi, i, X\right) - \bar{V}\left(0; \tilde{p}, \pi, i, X\right)$. Since $\delta > 0$ implying that all single agents enjoy commercial sex, whether or not a sex worker will buy sex or not depends upon two conditions: (i) feasibility (commercial sex has to be affordable); (ii) optimality (the utility of bying it must exceed that of not buying it). Since we impose indivisibilities in both the production and the consumption of sex, meaning that each match produces one unit of sex and each agent can only purchase one unit of sex, if any, the question of whether or not sex workers buy sex themselves has an obvious answer:

Proposition 1 *It is never optimal for a sex worker of any gender to buy sex, irrespective of the market price for sex.*

Proof. It suffices to show that since the condition $c_i \geq 0$ must be satisfied regardless of the future state of nature, and $\bar{\alpha} < 1$ by definition, the budget constraint will be violated by any purchase of commercial sex, even in the best state of nature, i.e., a good match. The assumption that $\bar{\alpha} < 1$ is consitent with most empirical evidence that economic survival is the main motive behind prostitution. ■

Proposition 1 states that the expected value $\bar{V}(1; \tilde{p}, \pi, i, X)$ is unattainable for all $i = F, M$. Therefore when employed as a sex worker, the highest attainable expected value for each agent (male or female) is $\bar{V}(0; \tilde{p}, \pi, i, X)$. As agents in each gender group are homogenous, proposition 1 implies that there is no demand for commercial sex unless it is optimal for members of at least one gender group to work outside the sex sector. Indeed, in order for there to be a demand for commercial sex, members of at least one gender must be willing to buy.

Let us then consider the option, for an unmarried agent of gender i, of working in the numeraire good sector (sector C) as either a skilled or an unskilled worker. Note that, by assumption, no agent can combine work in the numeraire good sector with work in the sex sector (selling sex is a full-time job). The expected value of being a single agent i with skill status j who works in sector C is defined by

$$V(0, x_i, i, j, C) = l_i + \beta [\delta x_i + (1 - \delta)(w_{ij} - \tilde{p} x_i)] \quad (16)$$

where w_{ij} is as defined in (7) - (9). For this agent, his or her decisions are twofold: (i) whether or not to acquire skill and (ii) whether or not to buy commercial sex.

With respect to the first of the two decisions mentioned above, the interested reader can easily verify that a sufficient condition for an unmarried agent of gender i to elect to become skilled is that the skill premium, as measured for example by the wage differential $w_{is} - w_{iu}$, be sufficiently high:

$$w_{is} - w_{iu} > \frac{1}{\beta(1 - \delta)}. \quad (17)$$

Hence the following proposition.

Proposition 2 *Suppose the following conditions hold simultaneously:*

$$\lambda = \frac{A_u}{A_s} \quad (18)$$

$$A_s - A_u > \frac{1}{\beta(1 - \delta)}. \quad (19)$$

Then all unmarried women who work in sector C are unskilled, while their male counterparts are all skilled.

Proof. It is straightforward to show that under condition (18), inequality (17) is violated for female sector C workers, while it is satisfied for their male counterparts under condition (19). ■

Proposition 2 formalizes gender differences in human capital in an environment where marriage is not an option. It implies that discrimination against women in the skilled labor market discourages single women acquiring skills. Condition (18) states that the level of gender discrimination in the skilled labor market is so high that it wipes out all the skill premium for skilled women. Condition (19) in contrast states that the skill premium for male sector C is sufficiently high. Proposition 2 therefore implies that discrimination discourages unmarried women from seeking skilled employment.

Now let us turn to the decision of whether or not to buy sex for a sector C worker. On the one hand, due to indivisibilities in the consumption of sex (either $x_i = 1$ or $x_i = 0$), unless $w_{ij} - \tilde{p} \geq 0$, no sector C worker will be willing to buy commercial sex. On the other hand, since most empirical evidence suggests that men buy sex and women supply it (see Edlund and Korn, 2002, for a detailed summary of the empirical evidence on this subject), we look for a rational expectations equilibrium sex market price that can support this conjecture.

Recall from proposition 2 above that all women who choose to work in sector C are unskilled workers, while all males in that sector are skilled workers. Important questions to address are the following: are skilled unmarried males (respectively, unskilled married women) willing to buy sex when the aggregate of the agents anticipate that the price for sex will be $\tilde{p}$? The following proposition gives an answer to these questions.

Proposition 3 *Let condtions (18) and (19) hold simultaneously and assume that the aggregate of the agents predict a price for sex, $\tilde{p}$, that satisfies:*

$$\frac{A_u}{\bar{\alpha} - \pi k} < \tilde{p} < \frac{\delta}{(1-\delta)} \leq A_s. \tag{20}$$

Then it is optimal for single men to acquire skill and to buy commercial sex, while it is optimal for single women to be sex workers.

Proof. The proof consists of showing that, for male workers, the difference $V(0,1,M,s,C) - V(0,0,M,s,C)$ is strictly positive under condition (20), while for women, sex is not affordable at the anticipated price, since $w_{Fu} = A_u < \tilde{p}$. ■

Proposition 3 therefore formalizes the general observation that when it comes to commercial sex, men buy and women sell (Edlund and Korn, 2002). This difference in sexual behavior has nothing to do with differences in preferences. It is in fact driven by differences in economic opportunities between genders, with women struggling to survive economically.

It is clear that since A_s is the highest possible income one can earn from employment in sector C, all agents know that if the price is above that income level, no one would want to buy sex. Hence no one will predict a price for sex above A_s. Likewise, since A_u is the lowest possible income an unmarried agent can earn in sector C, all agents know that no one would want to work in the sex sector if the price for sex is less or equal to that level. Hence no one will predict a market price for sex less than or equal to A_u. Furthermore, it is possible to normalize δ and A_s such that $A_s = \delta / (1 - \delta)$. This latter normalization ensures that agents' expectations as described by condition (20) are rational and thus will certainly materialize in equilibrium.

Since the production technology in sector C has constant returns to scale, we define a *rational expectations equilibrium* in an environment with unmarried agents as a sex market price, p^*, such that (i) demand equals supply in the sex market, (ii) all agents' skill acquisition and employment choices are optimal, and (iii) agents' expectations are rational: $p^* = \bar{p}$.

Since $\bar{p}$ satisfies condition (20), clearly a property of the rational expectations equilibrium is that all single women supply sex and thus work in sector X, while all single men are skilled workers in sector C and buy sex. Again, this distribution of employments across gender materializes because of discrimination against women in the skilled labor market. Under such a scenario, one may ask why men or women would want to marry. In particular, since labor market discrimination against skilled women allows single men to enjoy commercial sex at an affordable price, which otherwise may not be possible, why would men give up bachelorhood to pursue marriage? One possible explanation is that they may expect the level of the transfer, θ, paid to women in exchange for the benefit of sharing the custody of a child of quality q to be less that the cost of enjoying commercial sex, given that the benefits of sharing custody of the child are equal to or higher than those provided by the consumption of commercial sex. For women, since working in the sex sector is a survival mechanism in the face of labor market discrimination one may argue that they see marriage as offering better welfare prospects. Of course, all that is up for bargaining with men.

3.2 Marriage and Investment in Human capital

In the above section, we have established through Proposition 3 that if a woman elects to remain single, the maximum expected value she can expect from this choice is given by:

$$\bar{V}\left(0;\tilde{p},\pi,F,X\right)=1+\beta\left(1-\delta\right)y\left(\pi,k,\tilde{p}\right). \tag{21}$$

She expects to achieve this value by choosing leisure over human capital investment in the first period, and by electing to work in the sex sector in the second. Likewise, for a single male this maximum expected value is $\bar{V}\left(1;\pi,\bar{p},M,C\right)\equiv V(0,1,M,s,C)$ which is given by

$$\bar{V}\left(1;\pi,\bar{p},M,C\right)=\beta\left[\delta+\left(1-\delta\right)\left(A_s-\bar{p}\right)\right]. \tag{22}$$

He expects to achieve this value by investing in human capital in the first period in order to work as a skilled worker in sector C in the second period.

In this section, we want to formalize agents' choice of marriage over celibacy as a strategy to improve their well-being. In an environment whose main features are captured by conditions (18), (19), and (20), we ask whether a woman who plans to marry can have an incentive to invest in skill-enhancing education.

The expected value of being a married agent of gender i is given by:

$$V(1,0,F,j,C) = l_F+\beta\left[\delta q_j+\left(1-\delta\right)\left(w_{Fj}+\theta\right)\right] \tag{23}$$

$$V(1,0,M,j,C) = l_M+\beta\left[\delta q_j+\left(1-\delta\right)\left(w_{Mj}-\theta\right)\right] \tag{24}$$

for female and male respectively. Since agents who plan to marry later in their lifetime choose their skill investment strategy by anticipating the effect this strategy will have on the value of being married, we assume that agents first bargain over the transfer θ; then, based on the agreed upon value of θ, agents decide whether or not to invest in education in the first stage of their lifetime.

We model the agreed upon transfer θ as the unique solution to the following Nash-bargaining problem:

$$\max_{\theta}\left\{\left[V(1,0,F,j,C)-\bar{V}\left(0;\tilde{p},\pi,F,X\right)\right]\cdot\left[V(1,0,M,j,C)-\bar{V}\left(0;\tilde{p},\pi,M,C\right)\right]\right\}. \tag{25}$$

The interested reader can verify that given the assumption of linear utility, the above problem is well-defined and concave. An interior solution solves:

$$V(1,0,F,j,C)-V(1,0,M,j,C)=\bar{V}\left(0;\tilde{p},\pi,F,X\right)-\bar{V}\left(0;\tilde{p},\pi,M,C\right). \tag{26}$$

Using (21), (22), (23), and (24), we can characterize this solution as follows:

$$\theta\left(l_F, l_M\right) = \phi\left(l_F, l_M\right) + \frac{1}{2}\left[w_{Mj} + \bar{p} + y\left(\pi, k, \tilde{p}\right) - w_{Fj} - A_s\right] \tag{27}$$

where

$$\phi\left(l_F, l_M\right) = \frac{1 - \beta\delta + l_M - l_F}{2\beta\left(1-\delta\right)}. \tag{28}$$

Remark 1 *Irrespective of the skill status of his marriage partner, a skilled man always pays a higher transfer than an unskilled man:*

$$\theta\left(l_F, 0\right) - \theta\left(l_F, 1\right) = \frac{1}{2\beta\left(1-\delta\right)}\left[\beta\left(1-\delta\right)\left(A_s - A_u\right) - 1\right] > 0 \quad \forall l_F \tag{29}$$

Remark 2 *A skilled woman married to a skilled man always earns a higher transfer than an unskilled woman:*

$$\theta\left(0,0\right) - \theta\left(1,0\right) = \frac{1}{2\beta\left(1-\delta\right)} > 0. \tag{30}$$

Remark 1 implies that a typical skilled man is more impatient in the negotiation than an unskilled man. This is purely a wealth effect. Remark 2 implies that a skilled woman has a higher bargaining power than an unskilled one, and thus is able to extract a higher transfer. This result follows from the assumption that compared to an unskilled woman, a skilled woman raises a child of better quality: $q_s - q_u > 0$. This assumption combines with the assumption that women in general care about the quality of the child they raise, and have therefore an incentive to become skilled, even in an environment characterized by labor market discrimination against skilled women. If this result materializes as a rational expectations equilibrium, it will be at odds with the existing literature which suggests that marriage is a cause of gender differences in human capital (e.g. Echevarria and Merlo, 1999).

Let $\bar{W}\left(i, j, j'; \pi, \lambda, \tilde{p}\right)$ denote the value of being a married agent of gender i and skill status $j = s, u$, when the marriage partner has skill status $j' = s, u$. We ask whether a female agent (respectively a male agent) who considers marriage will invest to become a skilled worker.

Consider first a young female agent who wants to marry in the second period. The expected value of that decision depends upon her skill status j which in turn depends upon whether or not she invested in skill acquisition in the first period. If she chooses to invest, $l_F = 0$ and the value of making this choice is thus:

$$\bar{W}\left(F, s, j'; \pi, \lambda, \tilde{p}\right) = \beta\left(\delta q_s + \left(1-\delta\right)\left[\lambda A_s + \theta\left(0, l_M\right)\right]\right). \tag{31}$$

Likewise, the value of being an unskilled mother is:

$$\bar{W}\left(F,u,j';\pi,\lambda,\tilde{p}\right)=1+\beta\left(\delta q_u+\left(1-\delta\right)\left[A_u+\theta\left(1,l_M\right)\right]\right). \tag{32}$$

Proposition 4 *Let condition (18) holds. If*

$$q_s-q_u>\left(\beta\delta\right)^{-1}, \tag{33}$$

then a woman who plans to marry will always invest in skill despite gender discrimination in the labor market.

Proof. It suffices to show that $\forall j'$, $\Delta F\equiv\bar{W}\left(F,s,j';\pi,\lambda,\tilde{p}\right)-\bar{W}\left(F,u,j';\pi,\lambda,\tilde{p}\right)>0$. Using (31) and (32), the difference ΔF reduces to

$$\Delta F=\beta\delta\left(q_s-q_u\right)-1+\beta\left(1-\delta\right)\left[\theta\left(0,l_M\right)-\theta\left(1,l_M\right)\right] \tag{34}$$

owing to condition (18). Furthermore, when that condition holds, one can easily verify that $\theta\left(0,l_M\right)-\theta\left(1,l_M\right)>0$ for all l_M. Therefore condition (33) is sufficient to establish that $\Delta F>0$. Hence the result. ■

We already discuss condition (18) above. Condition (33) states that either skilled/educated mothers raise significantly better quality children, or agents in this environment put a sufficiently high utility weight on the quality of the child they have custody of. Where such a condition fails to hold, being an unskilled/uneducated wife and mother may be a better option for women given the state of gender discrimination in the skilled labor market. But what about male agents who plan to marry? We turn to this question in what follows.

For the male agent, the values for the respective options for skill status are the following:

$$\bar{W}\left(M,s,j';\pi,\lambda,\tilde{p}\right)=\beta\left(\delta q_{j'}+\left(1-\delta\right)\left[A_s-\theta\left(l_F,0\right)\right]\right) \tag{35}$$

$$\bar{W}\left(M,u,j';\pi,\lambda,\tilde{p}\right)=1+\beta\left(\delta q_{j'}+\left(1-\delta\right)\left[A_u-\theta\left(l_F,1\right)\right]\right) \tag{36}$$

The agent makes his decision about whether or not to invest in becoming skilled by comparing the value of being a skilled married man with that of being an unskilled married man.

Proposition 5 *Let condition (19) holds. Then a man who plans to marry will always invest in becoming skilled.*

Proof. The proof consists of showing that the difference $\Delta M \equiv \bar{W}(M, s, j'; \pi, \lambda, \tilde{p}) - \bar{W}(M, u, j'; \pi, \lambda, \tilde{p})$ is positive for all $j' = s, u$. Using (**??**) and (36), this difference reduces to

$$\Delta M = \frac{1}{2}\left[\beta(1-\delta)(A_s - A_u) - 1\right] \tag{37}$$

which is obviously positive owing to condition (19). Hence the result. ■

Proposition 5 implies that in the absence of other individuals characteristics such as differences in the ability to learn, or in the ability to privately finance education costs, one should expect all male individuals to invest in becoming skilled, as this decision will earn them a sufficiently high return as measured by a condition such as (19).

Propositions 4 and 5 characterized the maximum value a female agent and a male agent can respectively achieve by opting for marriage rather than singleness.

Let $\bar{W}^*(i, \lambda) \equiv \bar{W}(i, s, s; \pi, \lambda, \tilde{p})$ denote the maximum value from being a skilled married agent of gender $i = F, M$. Then:

$$\bar{W}^*(F, \lambda, \pi) = \beta\delta q_s + \beta(1-\delta)\left[\lambda A_s + \bar{\theta}(\lambda, \tilde{p}, \pi)\right] \tag{38}$$

$$\bar{W}^*(M, \lambda, \pi) = \beta\delta q_s + \beta(1-\delta)\left[A_s - \bar{\theta}(\lambda, \tilde{p}, \pi)\right] \tag{39}$$

for a female and a male agent respectively, where

$$\bar{\theta}(\lambda, \tilde{p}, \pi) \equiv \theta(0, 0) = \frac{1-\beta\delta}{2\beta(1-\delta)} + \frac{1}{2}\left[\bar{p} + y(\pi, k, \tilde{p}) - \lambda A_s\right]. \tag{40}$$

Remark 3 *The higher the degree of labor market discrimination against skilled women, the lower the transfer a married woman is expected to extract from her husband:*

$$\frac{\partial\bar{\theta}}{\partial\lambda} < 0. \tag{41}$$

Remark 4 *In the presence of labor market discrimination against skilled women, better outside options will raise the level of transfer a skilled woman is able to extract in marriage:*

$$\frac{\partial\bar{\theta}}{\partial\bar{p}} > 0 \tag{42}$$

$$\frac{\partial\bar{\theta}}{\partial\pi} < 0. \tag{43}$$

3.3 The Rationale for Gender Discrimination

We can now ask the following question: in an environment characterized by conditions such as (18), (19), and (33) what incentive do men have to support discrimination against women in the skilled labor market? Recall that condition (18) states that the environment under study is one in which there is a sufficiently high skill premium. Condition (19) states that in this same environment, gender discrimination in the skilled labor market prevents women from earning this premium if they choose to become skilled. Finally, condition (33) states that both men and women derive a relatively high utility from having a high quality child, and there is a quality differential between a child born of an unskilled mother and one born of a skilled mother. An interesting question therefore is the following: if men were to vote on whether or not gender discrimination in the skilled labor market must be removed, what would be their most preferred choice and why? Suppose that men have the choice between either (i) $\lambda = 1$, i.e., removing gender discrimination, or (ii) $\lambda < 1$, i.e., maintaining it. We now state and prove the following proposition.

Proposition 6 *Let conditions (18), (19), and (33) hold simultaneously. Then maintaining gender discrimination is the most preferred choice for all men in this environment.*

Proof. It suffices to show that the difference $d \equiv \bar{W}^* (M, 1, \pi) - \bar{W}^* (M, \lambda, \pi)$ is negative for $\lambda < 1$. Note that using (40) this difference reduces to

$$d = -\frac{1}{2}\beta (1 - \delta) (1 - \lambda) A_s \tag{44}$$

which is clearly negative if $\lambda < 1$. Hence the result. ■

The intuition behind this result is that removing gender discrimination will lower men's utility from marriage because it raises the level of the transfer, θ, they would need to pay women in order to obtain the right to share the custody of the child. Proposition 6 states that men will always oppose the removal of labor market discrimination against women. Of course, if women were to take part of this, a simple inspection of (38) and condition (40) reveals that women's preferred choice will be to end discrimination, in which case they would earn the highest possible transfer thus raising the value of being married. This analysis therefore suggests that in societies where gender discrimination is on the wane, women's active participation in civil society is to be credited for it.

3.4 Prostitution and Gender Discrimination

We mention above that prostitution is an activity that involves a risk, measured by the probality π of falling victim to an abusive and exploitative pimp. But what if the prostitution market were to be regulated in a way that protects sex workers from exploitative forces, as is often argued in most public discussion of prostitution? The answer is that when discrimination exists, regulation mechanisms that reduce the income risk faced by sex workers might be an alternative way of improving the welfare of married women....

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