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The Male-Female Pay Gap Driven by Coupling between Labor Markets and Mating Markets

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Synopsis: Males often get paid more than females for the same work. This male-female pay gap has been observed throughout the world over many years. The most commonly cited explanations focus on gender oppression and workplace discrimination. We agree that discrimination contributes significantly to the pay gap; however, other factors may play important roles in how the sexes compete in the labor market. We use observations from psychology and concepts from biology to show how aspects of mate choice may influence labor markets. With a mathematical model, we analyze how mating preferences for partner wages affect the differences in wages between males and females, and in turn how wage differences affect mating preferences. If some extrinsic force, such as discrimination, creates an initial bias in wages, then coupled feedback between mating preferences and wages creates and maintains excess mating preference and wage biases. This model demonstrates how coupling between labor markets and mating markets can lead to outcomes that do not occur when analyzing either market in isolation from the other.

Key words: discrimination, gender bias, labor economics, mate choice, sexual selection, wage gap

1. Introduction

Males get paid on average significantly more than females, a labor-market reality that is global in scope (Anker & Hein 1986, Psacharopolos & Tzannatos 1992, Blau & Kahn 1997, DeNavas-Walt et al. 2003, Rose & Hartmann 2004), that cuts across occupational and ethnic groups (Anonymous 2003, Caiazza et al. 2003), and that has been measured for at least two centuries (Goldin 1989). Gender oppression and workplace discrimination provide the most widely cited explanation (Blau 1984, Cain 1986, Reskin & Hartmann 1986).

We agree that oppression and discrimination contribute significantly to the male-female pay gap, but this leaves open whether other factors also play important roles in how the sexes compete in the labor market. We use observations from psychology and concepts from biology to show how aspects of mate choice may

influence labor markets. Several empirical studies demonstrate that in mate choice decisions females give more weight to partner wages than do males (Perusse 1994, Pawlowski & Dunbar 1999, Buss 2003). Our theory couples mating markets and labor markets by allowing feedback between mating preferences and wage bias. For example, discrimination may cause an initial bias in wages, which in turn produces biases in mate choice. Those mate choice biases then feed back to the labor market, further increasing wage bias. Alternatively, the initial bias may come from mate choice, leading to the same sort of positive feedback and predicted association between sex-biased mating preferences and sex-biased wages.

2. The model

We begin with a classical economic approach to individual behavior in labor markets. We assume that each potential worker begins with constant resources that can be partitioned into job-related pursuits, such as education and labor, and other activities. Let x_i be the fraction of total resources invested in job-related pursuits by an individual, and 1-x_i be the fraction invested in other pursuits. The index $i = m, f$ denotes males and females, respectively. The market imposes static demand, paying wages $W_i(x_i)$ in return for effort x_i. The total value for a particular level of investment x_i in labor and 1-x_i in other pursuits is

$$V_i(x_i) = W_i(x_i) + p_i W_i(x_i) + 1 - x_i \tag{1}$$

where p_i is benefit obtained in the mating market through partner preference for wages. To keep the model simple, we have assumed that investment in other pursuits returns value $1-x_i$. The slope of the value function with respect to changes in allocation to labor is the derivative of V_i with respect to x_i, which is

$$V_i' = (1 + p_i) W_i' - 1 \tag{2}$$

where primes denote derivatives with respect to x_i. The change in value is the marginal benefit for increased labor allocation, $(1 + p_i) W_i'$, minus the marginal cost for lost opportunity in other pursuits, which is minus one in this formulation. With diminishing return on labor gains, the equilibrium occurs when marginal costs and benefits are equal, that is, when

$$\begin{aligned} W_m' &= 1/(1 + p_m) \\ W_f' &= 1/(1 + p_f). \end{aligned} \tag{3}$$

If the mating market places a higher premium on male wages than on females wages, $p_m > p_f$, then males will compete more intensely than females for wage gains by pursuing lower marginal returns, $W_m'/W_f' < 1$. This occurs because males will allocate more of their resources to obtain smaller marginal gains in wages than will females, leading to relatively higher male wages. This bias in resource

allocation may occur through greater investment in education or greater competitiveness in the workplace.

So far, we have taken mating preferences as fixed and examined how those preferences affect wages. We now couple mating markets and labor markets by allowing mating preferences to respond to the relative wages of males and females. Consider from a female's point of view the marginal benefits and costs of a preference for males with higher wages. If, among females, the current preference for males is p_m, then the marginal benefit for a slightly higher preference level is $W'_m/p_m W_f$, where the increase in wages for slightly better than average males is W'_m, the competition for better males is p_m causing preference gains to be in proportion to $1/p_m$, and gains in partner wages must be scaled by wages that females earn for themselves, W_f. We set the marginal cost for mate competition as the parameter c. The same reasoning applies to male preferences for female wages, p_f. Thus, marginal costs and benefits are equal when

$$\begin{aligned} p_m &= W'_m/cW_f \\ p_f &= W'_f/cW_m. \end{aligned} \tag{4}$$

These two equations for preferences plus the two equations (3) from above for wages provide the conditions for equilibrium under coupling between labor and mating markets. The coupling at equilibrium implies

$$\frac{W_m}{W_f} = \frac{p_m(1+p_m)}{p_f(1+p_f)}, \tag{5}$$

which predicts a positive association between the wage bias, W_m/W_f, and the preference bias, $p_m(1+p_m)/p_f(1+p_f)$.

3. Discussion

In our model, wages and preferences adjust to each other through mutual feedback. If no extrinsic force favors a bias in either wages or preferences, the system will equilibrate to unbiased wages and preferences. Biases may be caused by extrinsic factors. For example, extrinsic wage discrimination causes an initial bias in wages, the wage bias causes mating preference bias, and the mating preference bias feeds back to exacerbate wage bias (Fig. 1). Alternatively, the initial bias may come from mate choice, leading to the same sort of positive feedback and predicted association between sex-biased mating preferences and sex-biased wages.

Previous studies of sex-biased mating preferences suggest ways to test our theory of coupling between mating and labor markets. A psychological study measured the preferences of males and females for 18 different attributes of mates (Buss 1989, Buss et al. 1990). One attribute was 'good financial prospect'. In a comparison of 37 societies, the difference between the ranks of male and female preferences for financial prospect varied. In all societies, females gave a higher ranking

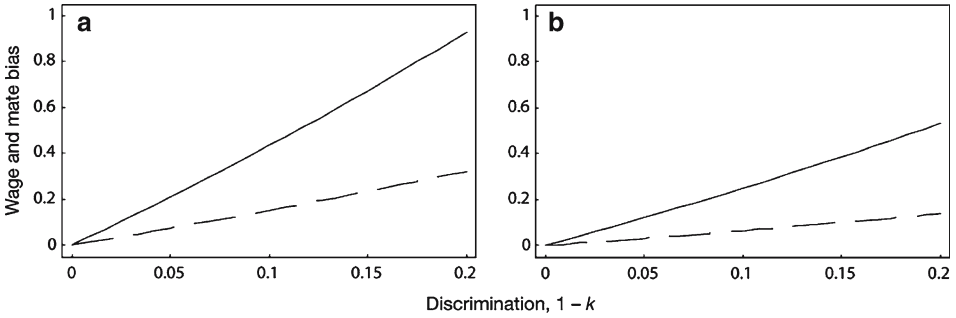

Figure 1. Initial discrimination causes wage bias, which in turn creates a mating preference bias, further exacerbating wage bias. The plots show numerical examples to illustrate these effects. Let $W_m(x_m) = x_m^a$, where $a < 1$, causing male wages, W_m, to increase at a diminishing rate with resources invested in labor, x_m. For females, let $W_f(x_f) = kx_f^a$, where $k < 1$ sets the discount in wages that females receive for the same effort, and $1–k$ measures the level of discrimination against females. Initially, no excess benefits accrue through mate choice, $p_m = p_f = 0$. Using the equilibrium conditions in equation (3), initial wage bias is $W_m/W_f = k^{a/1-a}$. The dashed lines show this initial wage bias on a $\log_2$ scale. Each unit on this logarithmic scale measures a two-fold bias. We then allowed mating preferences and wages to adjust to each other, leading to the equilibrium in equation (5), shown by the solid lines. Those solid lines illustrate both wage biases and mating biases, because at equilibrium $\log_2(W_m/W_f) = \log_2(p_m(1 + p_m)/p_f(1 + p_f))$. The increase in the solid line relative to the dashed line shows how feedback between labor and mating markets causes enhanced wage bias. a, Plots for the parameter value $a = 0.5$. b, Plots for the parameter value $a = 0.3$.

to a potential mate's financial prospects than did males. The male-female difference in ranks for financial prospects varied between 1 and 7, with an average of 3.7. We predict that an expanded study of this kind would show a positive association between sex-biased mating preference (difference in ranks) and measures of sex-biased wages.

In a psychological study based on preferences, one could for example analyze males' and females' expected future earnings stream. Future earnings are important because, to the extent that mate choice is influenced by earnings, it would most likely be some measure of future earnings stream rather than current earnings that matter most. The earnings of close relatives may provide some information about future earnings of individuals, to the extent that individuals' lifetime earnings stream correlates with earnings of family members. It would also be interesting to compare self-assessments of mate preferences with physiological responses, to measure how self-assessment of preferences differs from other ways in which to measure preferences. For example, the physiological intensity of subjects' preferences for financial prospects of potential mates could be measured in response to pictures of potential mates that have cues associated with earnings.

Another psychological study provided data on changes in mate preferences over time in the USA (Buss et al. 2001). In 1939, males ranked financial prospects of mates 17 and females ranked this attribute 13 among 18 different characteristics.

In 1996, the ranks were 13 for male preferences and 11 for female preferences. Both sexes have given increased weight to financial prospects, but the difference between the sexes has narrowed. This pattern suggests that mating preferences have adjusted to changing financial opportunities for males and females (Buss et al. 2001). As male-female differences in financial prospects change around the world, it would be interesting to follow how mating preferences change in response to those changing economic conditions.

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