Equilibria in a model with a search labour market and a matching marriage market. [1]

Roberto Bonilla. [2]

Abstract

I analyse an economy where with a search labour market and a matching marriage market. The economy is populated by homogeneous workers, firms and marriage partners (MPs). Workers simultaneously search for firms in order to work and for MPs in order to marry. Firms post wages to attract workers. MPs look for workers in order to marry. Married workers receive a pre-determined flow utility, and married MPs derive flow utility equal to the worker's earnings. This provides the link between the markets. I show that the so called married wage premium can arise from frictions in both markets.

1-Introduction

This paper analyses the equilibria in an economy where a search labour market and a matching marriage market interact. The economy is populated by ex-ante homogeneous workers, ex-ante homogenous firms, and ex-ante homogeneous marriage partners (*MP*s). Workers simultaneously search for firms in order to work and for marriage partners in order to marry. Firms post wages to attract workers; while *MPs* look for workers in order to marry. I assume that married workers receive a pre-determined flow utility; and that married *MP*s derive flow utility equal to the worker's earnings (be it wage or unemployment benefit). This provides the link between the two markets. I use noisy search in the labour market to generate a distribution

[1] JEL Code: J31

[2] Business School, Newcastle University, Newcastle upon Tyne, U.K.

Postal Address: 3rd Floor Ridley Building, Queen Victoria Road, NE1 7RU, United Kindgom. **Telephone**: 00441912228457. **e-mail:** roberto.bonilla@ncl.ac.uk

of wages offered and of wages earned[3]. In this set-up, a worker's search for a firm is analogous to a marriage partner's search for a worker, and both will use reservation wage strategies in their search efforts[4]. The decisions on reservation wages are interdependent: workers decide on their own reservation wage taking as given the marriage partners' reservation wage and the shape of the wage offer distribution. Marriage partners decide on their own reservation wage taking as given the worker's reservation wage and the shape of the distribution of wages earned.

To my knowledge, there is no other paper that analyses equilibrium in a model with two interacting frictional markets where relationships in both markets are long-term and interdependent decisions are taken by all sides of the market. I believe this to be the main theoretical contribution of this paper. Burdett, Lagos and Wright (2003,2004) present models in which workers in a frictional labour market encounter opportunities to commit a crime at a less that infinite rate, which is eventually endogenised. The workers decide on the reservation wage and on what they call the "crime" wage: workers will not commit a crime if earning more than that. A big difference is that in Burdett, Lagos and Wright (2003), it is the workers who make all the decisions, while in this paper all agents make interdependent decisions[5].

There is wide empirical evidence (and more than wide anecdotal evidence) to support the idea that labour market performance of the prospective partner

[3] The modeling of noisy search is based on Burdett and Judd (1983). I assume that when workers contact firms, they may have contacted one or two firms, with given probability strictly between 0 and 1. When firms are contacted by workers, they do not know if the worker has contacted one or two firms. This gives rise to equilibrium wage dispersion as firms balance the higher probability of a hire when offering higher wages with the lower profit given a hire is made.

[4] A marriage partner may not be willing to marry anybody earning less than a given wage.

[5] In Burdett, Lagos and Wright (2004), firms post wages, but it is still true that workers deicde on both the reservation wage and the crime wage; while in here workers must take as given the reservation wage used by MPs.

is considered when making decisions about marriage. Ginther and Zavodny (2001) find evidence that men are selected into marriage on the basis of their higher earning capabilities. They compare the wage premium among men whose marriage was triggered by a pregnancy and was therefore followed by a birth within seven months; with those whose marriage was not followed by birth. Ginther and Zavodny (2001) find that "married men with a premarital conception generally have a lower return to marriage than other men do"[6]. Gould and Paserman (2003) argue that 25% of marriage rate decline since the 1980s can be explained by the increase in male wage inequality. The argument is that wage inequality increases the option value for women to search longer for a husband[7]. Loughran (2002) models women's search for marriageable men in a similar manner as in this paper, but Loughran (2002) is a decision theory model[8], not an equilibrium model. Hence, he completely ignores the role played by workers (searching for a job) and by firms (posting wages), and of course the equilibrium consequences.

Lundberg (2005) makes a call for research into the interdependence of decisions about work and marriage. The model presented here attempts to be a theoretical contribution to one of the dimensions of such interdependence and its consequences. In particular, the paper shows that the so called "married wage premium" (or, more general, a correlation between men's wages and marital status) can in some circumstances be the equilibrium consequence of search frictions in the two markets. This is completely unrelated to the traditional explanations for a link between wages and marital status based on specialization in the labour market and on unobserved characteristics that are valuable both in the labour the marriage market [9].

The details of this paper are set out in Section 1 below. I show that three

[6] For evidence on this, see Zavodny (1998) and Marsiglio (1987).

[7] The empirical literature on the married wage premiume is extensive and mixed. It is not my intention to provide a review of it here.

[8] Which is then used to motivate the non structural estimation of the relationship between wage distribution of males and age at first marriage of females.

[9] See Becker (1991) and Nakosteen and Zimmer (1987) respectively.

pure strategy equilibria exist in the environment generally described so far, complemented by one mixed strategy equilibrium. Perhaps the most interesting equilibrium is the Very Picky Equilibrium, in which MPs reject marriage to unemployed workers and to low earners, and only marry employed, high earning workers. Notice, for this to be an equilibrium, conditions must be such that workers are willing to accept wages that render them unmarriageable. I show when the conditions hold for this to be true. In this case, the utility workers derive from marriage is particularly relevant. It affects workers' reservation wage, since the reservation wage must compensate workers for the loss of marriageability in addition to the option of continued search for better wages. This affects the distributions of wages offered and of wages earned, which in turn are crucial in the MPs decision to accept low earners for marriage or not.

I use some simplifying assumptions, the removal of which is the basis for further or ongoing research and this is discussed in the conclusion. In particular, I assume that divorce is infinitely costly and therefore never occurs, when agents accept marriage, they do so knowing that they will never get divorced. A further assumption is that single MPs enjoy a predetermined flow utility, which I call X.

Section 2 below sets up the model and the strategies for the firms, the workers and the marriage partners. Sections 3 to 5 present the pure strategy equilibria briefly described above taking arrival rates as parametric. Section 6 endogenises the arrival rates and separates the parameter space into the three pure strategy equilibria described above. Section 7 presents a mixed strategy equilibrium and Section 8 concludes. **All proofs are in the appendix**.

2-The Model.

Individual Firms and wage distributions. Firms post wages and contact workers who are either single or married. Firms can wage discriminate according to the workers' marital status. Consider the problem vis-a-vis single workers first. Each individual firm takes as given the reservation wage of unemployed-single workers (R) and the distribution of wages for single workers offered in the market $G(w)$. When an individual firm contacts a worker, the worker may have contacted only her (with probability 0.5) or one other firm (with probability 0.5). If a firm offers wage w, and worker accepts, flow productivity is p. The match destroys if the worker dies, at an exogenous rate δ. Hence, given a worker accepts the job offer, the firms discounted profits from employing that worker are $\pi(w) = \frac{p-w}{r+\delta}$. Given that a worker has been contacted, and wage w is offered, the expected profits are

$$\Pi(w) = 0.5G(w)\pi(w) + 0.5\pi(w).$$

Equal profits condition: The lowest and highest wages in the market are given by $\underline{w}$ and $\bar{w}$ respectively. Then for any wage w such that $\underline{w} \leq w \leq \bar{w}$, it must be true that $\Pi(\underline{w}) = \Pi(w)$, where $\Pi(\underline{w}) = 0.5\pi(\underline{w})$.

$$\begin{aligned} 0.5\pi(\underline{w}) &= 0.5G(w)\pi(w) + 0.5\pi(w) \\ G(w) &= \frac{-\underline{w} + w}{p - w}, \bar{w} = \frac{p + \underline{w}}{2} \end{aligned}$$

In the sections below I will eventually impose the condition that $R = \underline{w}$[10]. Notice, $G(w)$ is continuous along its support.
[11]The problem vis-a-vis married workers is analogue to the above, with the difference that the minimum and maximum wages need not be the same as for single workers. Call $\underline{w}_m$ and $\bar{w}_m$ the minimum and maximum wage respectively in the wage distribution offered to married workers. Then it is given (analogously) by $I(w)$ where:

$$I(w) = \frac{-\underline{w}_m + w}{p - w}, \bar{w}_m = \frac{p + \underline{w}_m}{2}$$

[10]Becasue of the standard argument: *i)* A wage $w < R$ will not be offered by any firm because no worker will accept it. *ii)* Assume $\underline{w} > R$, then $F(\underline{w}) = F(R) = 0$. Then any firm offering $\underline{w}$ can reduce its wage offer all the way to R and increase its expected profits.

[11]Notice $G(\bar{w}) = 1$.

Firms take as given that the reservation wage of unemployed-married workers is R_m. In the sections below, I will eventually impose the condition that $\underline{w}_m = R_m$[12]. Notice, $G(w)$ is continuous along its support. I model the labour market as a pure search market, hence firms can absorb all workers that contact her and accept her wage offer.

Workers. Workers take as given the reservation wage of MPs (T)[13], and the distribution of wages offered ($G(w)$ for singles and $I(w)$ for marrieds). Unemployed workers decide their reservation wage (singles decide on R and marrieds decide on R_m). When workers make a contact, there is a 0.5 probability that only one firm was contacted and a 0.5 probability that two firms where contacted. Hence, the distribution of wages faced by single [married] workers in their search effort is given by $F(w)$ [$H(w)$] where

$$\begin{aligned} F(w) &= 0.5G(w) + 0.5G(w)^2 \Rightarrow F(w) = \frac{(w - \underline{w})(p - \underline{w})}{2(p - w)^2} \\ H(w) &= 0.5I(w) + 0.5I(w)^2 \Rightarrow H(w) = \frac{(w - \underline{w}_m)(p - \underline{w}_m)}{2(p - w)^2} \end{aligned}$$

All workers, regardless of their marital status, receive unemployment benefit b while unemployed. When workers are married, they enjoy flow value m, regardless of their labour market status (in addition to their wage if they are employed, and to the unemployment benefit if they are unemployed). Workers contact firms at rate λ_0 when single and there is no on- the-job search. They contact MPs at rate λ_m and die at rate δ when single, whatever their employment status.

Marriage Partners (MPs). MPs take as given the distribution of wages earned (by single workers, who got their job while single), $G(w)$[14] (including the reservation wage R); they decide on their own reservation wage, T,i.e., they will not marry anybody earning less than T. When they are married to an employed worker earning w, they enjoy flow value w. When they are

[12] For reasons analogue to those exposed in footnote 8.

[13] This means marriage partners will not marry a worker earning $w < T$.

[14] Since there is no on the job search, the distribution of wages offered is the same as the distribution of wages earned.

married to an unemployed worker receiving unemployment benefit b, they enjoy flow value b[15]. *MPs* contact workers at rate η and die at rate δ when single.

When married, I assume that marriage partners and workers die simultaneously, also at rate δ. Notice that the marriage market is a matching market with non-transferable utility. The labour market is a pure search market, since firms can absorb all workers that contact her and accept her wage offer. Below I characterise the possible equilibria in this model. I term them the Very Picky Equilibrium (VP)[16], the Smitten (S) Equilibrium[17], and the Picky Equilibrium (P)[18]. In the sections below, when the subscripts vp, s or p appear on a variable, this denotes that the variable takes the value corresponding to the VP, S or P equilibrium respectively.

3-The Very Picky Equilibrium (VP).

In the VP equilibrium, unemployed workers are willing to accept wages that make them unmarriageable (which means that MPs reject marriage to some employed workers and with unemployed workers[19]).

Workers. Assume single workers decide on a reservation wage $R = R_w$. Then, following the desired properties of the VP equilibrium, I require that

$$i)R_w < T < \bar{w}, \quad ii)R_w > b$$

Condition $i)$ ensures that unemployed workers are willing to accept wages that make them unmarriageable. Condition $ii)$ ensures that the minimum

[15] *MP*s do not participate in the labour market. It is not an unrealistic assumption to think of agents that do not engage in the labour market. Even today, this is the case for women in some developing countries.

[16] Becaue *MP*s only marry employed workers earning a wage strictly higher than the workers reservation wage.

[17] Becaue *MP*s marry all workers disregarding their labour market status.

[18] Becaue *MP*s reject marriage to unemployed workers but accept all employed workers.

[19] This is not necesarilly true always. There may be reasons why a MP could prefer marriage to an unemployed worker over marriage to a low earner, but these are not built into this model. Uncertainty over the unemployed workers productiviy is an example, as this would imply uncertainty over the workers expected performance in the labour market.

wage accepted by unemployed workers is strictly higher than their unemployment benefit b[20]. If working at a wage $x < T$, the worker's payoff is given by $V_1(x)$ defined by $rV_1(x) = x - \delta V_1(x)$, since there is no expectation of marrying. If working at a wage $x \geq T$, the worker's payoff is given by $V_2(x)$ where $rV_2(x) = x + \lambda_m(V_3(x) - V_2(x)) - \delta V_2(x)$ (since λ_m is the rate at which marriageable workers meet MPs), where $V_3(x)$ is the payoff of being married and working at wage x. If working at a wage x and married, the workers payoff is given by $V_3(X)$, where $rV_3(x) = w + m - \delta V_3(x)$. The payoff of being single is given by

$$rV_0 = b + \lambda_0 \int_{\underline{w}}^{T} [\max(V_1(x), V_0) - V_0)]\, f(x)dx + \lambda_0 \int_{T}^{\bar{w}} [\max(V_2(x), V_0) - V_0]\, f(x)dx - \delta V_0 \qquad (1)$$

In equation (1), a worker faces a wage offer distribution $F(w)$. He receives b while unemployed. He contacts firms at rate λ_0. If the contacted firm offers a wage x such that $R_w < x \leq T$, then he must choose between accepting the job which makes him unmarriageable with payoff $V_1(x)$ or remaining single. If the firm offers a wage x such that $T \leq x < \bar{w}$ then the worker must choose between accepting the job which makes him marriageable with payoff $V_2(x)$ or remaining single. The worker dies at rate δ. Given a wage offer w has been received by a worker, $\frac{\partial V_1(w)}{\partial w} > 0$ and $\frac{\partial V_0}{\partial w} = 0$. Then, the standard definition of a reservation wage implies $V_1(R_w) = V_0$, $w \gtreqless R_w \Rightarrow V_1(w) \gtreqless V_0$. Hence, the worker accepts any wage $w \geq R_w$, and (1) can be written[21]:

$$rV_0 = b + \lambda_0 \int_{R_w}^{T} [V_1(x) - V_0)]\, f(x)dx + \lambda_0 \int_{T}^{\bar{w}} [V_2(x) - V_0]\, f(x)dx - \delta V_0 \quad (2)$$

[20] $R_w < b$ is not rational from the unemployed worker's point of view, and $R = b$ would lead to a qualitatively different type of equilibrium as will become clear later

[21] Considering as well that $V_2(w) > V_1(w)$

Integration by parts of (2) using $V_1(x), V_2(x), V_3(x)$ and $V_1(R_w) = V_0$ yields

$$R_w = b + \frac{\lambda_0 \lambda_m m(1 - F(T))}{(r + \partial + \lambda_m)(r + \delta)} + \lambda_0 \int_{R_w}^{\bar{w}} \frac{1 - F(x)}{r + \delta} dx$$

In the above equation, the first and third elements of the right hand side are standard: the reservation wage must compensate the worker for the loss of unemployment benefit and for the option of continued search for better wages. The second term relates to the marriage option. If the workers accept wages that make them unmarriageable, they are giving up the expected utility attached to marriageability[22]. The reservation wages must compensate them for this loss. In the limit as $r \to 0$, and using $F(w)$ as in Section 1 with $R_w = \underline{w}$ and $\bar{w} = \frac{p + \underline{w}}{2}$, this yields

$$R_w = b + \frac{k_0 k_m m \left[1 - \frac{(R_w - T)(-p + R_w)}{2(p - T)^2}\right]}{1 + k_m} - \frac{k_0 ln(2)(-p + R_w)}{2} \qquad (3)$$

where $k_i = \frac{\lambda_i}{\delta}$.

From (3), it is possible to derive the necessary results to characterise the behaviour of R_w in the range $R_w < T < \bar{w}$. The closed form solution for R_w from (3) is rather cumbersome, and is therefore relegated to the Appendix. To avoid technical complications, I will assume $m < m_a$, where $m_a = \frac{(1+k_m)(p-b)}{(k_0 ln(2)+3)k_m k_0}$. The intuition behind this condition is easier to explain after stating and explaining Proposition 1 below. In Proposition 1, I evaluate R_w in the two extremes: when $T = R_w$ (as low as it can be) and when $T = \bar{w}$ (as high as it can be); and I characterise the behaviour of $R_w(T)$ in the region $R_w(T) < T < \bar{w}$.

Proposition 1.

[22] Notice this is just the flow value of marriage (m) discounted by the relevant factors. Upon continued search, flow utility m would be enjoyed if a firm is contacted (which happens at rate λ_0) that offers a marriageable wage (which happens with probability $1 - F(T)$ given a firm has been contacted); and then a marriage partner is contacted (which happens at rate λ_m) .

$i)$ $T = R_w(T)$ implies $R_w(T) = R_1$ and $T = T_1$ where

$$R_1 = T_1 = \frac{(1 + k_m)(2b + k_0 ln(2)p) + 2k_0 k_m m}{(1 + k_m)(2 + k_0 ln(2))}$$

$ii)$ $T = \bar{w}$ implies $R_w(T) = R_2$ and $T = T_2$ where

$$R_2 = \frac{2b + k_0 ln(2)p}{2 + k_0 ln(2)} < R_1, T = T_2 = \frac{p(1 + k_0 ln(2)) + b}{2 + k_0 ln(2)} > T_1$$

$iii)$ $T_2 > T_1$ and (3) represents a downward sloping and concave line in R_w, T space in the range $R_w < T < \bar{w}$.

Figure 1 exemplifies the situation. The intuition for Figure 1 is as follows:

$i)$ If m is very high, marriage is too valuable for workers. They would *never* be willing to accept an unmarriageable wage, as that would mean giving up the prospect of enjoying m altogether.

$ii)$ Assume m is high but not so high ($m < m_a$ satisfies "m is not so high"). Hence, workers could be willing to accept a non-marriageable wage under certain conditions. Assume as well that $R_w(T) = T$. As T goes up, workers have less incentive to reject any wage $x < T$, since further search is less likely to produce a marriageable wage. This implies $R_w(T)$ goes down.

$iii)$ If m is very high, the effect of an increasing T on $R_w(T)$ is very high. Hence, as T goes up, $R_w(T)$ falls very fast. If $m \geq m_a$ as defined above, then $R_w(T)$ falls below b before $T = \bar{w}$. From then on, even as T continues increasing, equation (3) no longer describes the behaviour of R_w, as it would be irrational for workers to accept a lower reservation wage. I am avoiding this last complication by assuming $m < m_a$.

Marriage Partners. Assume MPs know workers use reservation wage $R = R_{mp}$. The properties of the VP equilibrium require

$$i) R_{mp} < T < \bar{w}, \quad ii) R_{mp} > b$$

MPs enjoy X while single[23], and they contact employed marriageable workers at rate η_{vp}. If they only accept marriage with employed workers earning

[23] There are many possible interpretations for X: Living at home, working in a low wage competitive labour market, the possibility of marrying differently skilled workers, etc. A more detailed characterisation of X is discussed in the conclusion.

$w \geq T > R_{mp}$ then their payoff is given by

$$rM_1 = X + \eta_{vp} \int_{T}^{\bar{w}} [M_2(x) - M_1]\, g(x)dx - \delta M_1 \tag{4}$$

In (4), given a contact with a single-employed worker earning $T < w < \bar{w}$, marriage occurs yielding payoff $M_2(x)$ (the payoff of an MP married to an employed worker earning wage x. The worker's wage is a random draw from $G(w)$[24]. The MP dies at rate δ. The value $M_2(x)$ is given by

$$rM_2(x) = x - \delta M_2(x) \tag{5}$$

In (5) above, if the MP is married to an employed worker, then its status will only change if death arrives, which happens at rate δ. Given a contact with a worker earning w, notice that $\frac{\delta M_2(w)}{\delta w} > 0$ and $\frac{\delta M_1}{\delta w} = 0$. Then $M_2(T) = M_1$, $M_2(T) \gtreqless M_1$ if $w \lesseqgtr T$. Integration by parts of (4) using (5) and evaluating in the limit as $r \to 0$ implies

$$T = X + \rho_{vp} \int_{T}^{\bar{w}} [1 - G(x)]\, dx$$

where $\rho_{vp} = \frac{\eta_{vp}}{\delta}$. Using $G(x)$ as above and integrating, the above can be written as

$$T = X + \rho_{vp} \left[ln \left[\frac{p - R_{mp}}{2(p - T)} \right] - 1 \right] (p - R_{mp}) + 2(p - T)) \tag{6}$$

I now characterise the behaviour of (6) when $b < R_{mp}(T) < T < \bar{w}$. Proposition 2 below lists all required information to sketch the graph of (6) in $R_{mp}(T), T$ space . Such a graph is depicted in Figure 2. To state Proposition 2, I follow the same strategy used for Proposition 1: I evaluate $R_{mp}(T)$ in the extremes where $T = R_{mp}(T)$ and when $T = \bar{w}$, and I characterise $R_{mp}(T)$ when T satisfies $R_{mp}(T) < T < \bar{w}$

Proposition 2. If $p > X$, then

[24] The distribution of wages *earned* by single-employed workers.

i) $T = R_{mp}(T)$ implies $T = T_3$, $R_{mp}(T) = R_3$, where $R_3 = T_3 = \frac{\rho_{vp}p(1-\ln(2))+X}{1+\rho_{vp}(1-\ln(2))} < \bar{w}$

ii) $T = \bar{w}$ implies $T = T_4$ and $R_{mp}(T) = R_4$, where $R_4 = -p + 2X < \bar{w}$, $T_4 = X$

iii) $R_3 > R_4, T_3 > T_4$ and (6) represents an upward sloping and convex line in $R_{mp}(T), T$ space for $R_{mp}(T) < T < \bar{w}$.

Following the results in **Proposition 2**, one can sketch the graph of (6) as in Figure 2.

An equilibrium exists if the functions $R_w(T)$ and $R_{mp}(T)$ cross while $R_w(T) < T < \bar{w}$ and $R_{mp}(T) < T < \bar{w}$. In order to state Lemma 1 below, I first define

$$X_a = \frac{p(1 + k_0 \ln(2)) + b}{2 + k_0 \ln(2)} < p$$

Lemma 1. $X = X_a$ implies $R_4 = R_2$ and $T_4 = T_2$. This implies a situation as depicted in Figure 3.

Lemma 2. As X decreases, $R_w(T)$ remains unchanged and $R_{mp}(T)$ shifts to the left. If $X = X_a - \epsilon$, $\epsilon > 0$ then the VP Equilibrium obtains. The situation is as depicted in Figure 4.

Lemma 3. $T_1 \geq T_3$ if and only if $X \leq X_b$, where

$$\begin{aligned} X_b \quad &= \quad \frac{2b\left[1 + \rho_{vp}(1 - ln(2))\right]}{2 + k_0 ln(2)} + \frac{2k_0 k_m m\left[1 + \rho_{vp}(1 - ln(2))\right]}{(2 + k_0 ln(2))(1 + k_m)} \\ &\quad + \frac{(2\rho_{vp}(ln(2) - 1) + k_0 ln(2))p}{2 + k_0 ln(2)} \end{aligned}$$

and $m < m_a \Rightarrow X_b < X_a$. In this case, the situation is as depicted in Figure 5, and the VP equilibrium does not obtain if this is the case.

Proposition 3. The VP Equilibrium obtains if $X_b \leq X < X_a$.

Following Lemmas 1-3 and by inspection of the associated Figures, if the condition in Proposition 3 hold, the situation is as depicted in Figure 4.

4-The Smitten Equilibrium (S).

As opposed to the VP equilibrium, in the S equilibrium marriage partners are willing to marry any worker, regardless of its employment status or wage earned.

Workers. The payoff of an unemployed and single worker is described by

$$rV_0 = b + \lambda_0 \int_{\underline{w}}^{\bar{w}} \left[\max(V_2(x), V_0) - V_0\right] f(x)dx + \lambda_m (V_0' - V_0) - \delta V_0 \qquad (7)$$

where V_0' is the payoff of being married and unemployed. In (7) above, the worker enjoys unemployment benefit b. Upon a contact with a firm (at rate λ_0), the worker accepts the job and is marriageable since all workers are marriageable. The distribution of wages faced by single workers is $F(w)$. At rate λ_m, an MP is contacted and marriage occurs. The worker dies at rate δ. The payoff of being married and unemployed is given by

$$rV_0' = b + m + \lambda_0 \int_{\underline{w}_m}^{\bar{w}_m} \left[\max(V_3(x), V_0) - V_0\right] h(x)dx - \delta V_0 \qquad (8)$$

In 8) above, the worker enjoys unemployment benefit b and the utility derived from marriage. Upon contact with a firm, a job is accepted and the worker becomes married and employed. The distribution of wages faced by married workers is $H(w)$. Notice, the minimum wage for married workers is given by $\underline{w}_m$, not $\underline{w}$. Arguments analogous to those applied to (1) imply (7) and (8) can be written as[25]

$$rV_0 = b + \lambda_0 \int_{R}^{\bar{w}} \left[V_2(x) - V_0\right] f(x)dx + \lambda_m (V_0' - V_0) - \delta V_0 \qquad (9)$$

$$rV_0' = b + m + \lambda_0 \int_{R_m}^{\bar{w}_m} \left[V_3(x) - V_0\right] h(x)dx - \delta V_0 \qquad (10)$$

[25] Given a wage offer w has been received by a single worker, $\frac{\partial V_1(w)}{\partial w} > 0$ and $\frac{\partial V_0}{\partial w} = 0$. Then, the standard definition of a reservation wage implies $V_1(R) = V_0$, $w \gtreqless R \Rightarrow V_1(w) \gtreqless V_0$. Given a wage offer w has been received by a married worker, $\frac{\partial V_3(w)}{\partial w} > 0$ and $\frac{\partial V_0'}{\partial w} = 0$. Then, the standard definition of a reservation wage implies $V_1(R_m) = V_0'$, $w \gtreqless R_m \Rightarrow V_3(w) \gtreqless V_0$.

[26]Integration by parts of (9) and (10), using $V_2(x)$ and $V_3(x)$, $F(w)$ with $R =\underline{\mathrm{w}}$, $\bar{\mathrm{w}}= \frac{p+\underline{\mathrm{w}}}{2}$and $H(w)$ with $R_m =\underline{\mathrm{w}}_m, \bar{w}_m = \frac{p+\underline{\mathrm{w}}_m}{2}$ yields

$$R = R_m = \frac{2b + k_0 ln(2)p}{2 + k_0 ln(2)} \tag{11}$$

Notice these two reservation wages are independent of m. This is because workers need not worry about marriageability when determining their reservation wage, since they are always marriageable. This is also the intuition for the equality $R = R_m$.

Marriage Partners. The payoff of a single MPs must be because now single MPs marry any worker met, regardless of employment status. Hence

$$rM_1 = X + \eta_s \int_R^{\bar{w}} [M_2(x) - M_1]\, g(x)dx + \eta_s^u(M_0 - M_1) - \delta M_1$$

At rate η_s an employed marriageable worker is contacted, and the distribution of wages earned is $G(w)$[27]. Marriage occurs and new MP's status is "married to employed worker earning w", with payoff $M_2(w)$ (as given by (5)above). At rate η_s^u, an unemployed worker is contacted. Marriage occurs yielding new status as "married to an unemployed worker", with payoff M_0 given by:

$$rM_0 = b + \lambda_0 \int_{R_m}^{\bar{w}_m} [M_2(x) - M(u)]\, h(x)dx - \delta M_0$$

In this equation, the MP's unemployed partner contacts a firm at rate λ_0, which offers a wage w such that $R_m \leq w \leq \bar{w}$ and distributed according to $H(w)$[28].

[26]Recall the assumption that divorce is infinitely costly. Hence, whatever wage the married worker accepts, he will remain married.

[27]The distribution of wages *earned* by single-employed workers.

[28]Because he is married. Hence, he faces wage distribution $H(w)$ (not $G(w)$) with minimum wage R_m (not R).

Integration by parts of M_0 and M_1 above, using $G(x), H(x)$,as defined before, $M_2(w)$ as in (5), and $R = \underline{w}$, $\bar{w} = \frac{p+R}{2}$ and $R_m = \underline{w}_m$, $\bar{w}_m = \frac{p+R_m}{2}$ yields

$$(r+\delta+\lambda_0)M_0 = b - \frac{\lambda_0(R_m(ln(2)-2) - ln(2)p)}{2(r+\partial)} \tag{12}$$

$$(r+\eta_s+\eta_s^u+\partial)M_1 = X + \eta_s^u M_0 + \frac{p\eta_s(1-ln(2)) + \eta_s ln(2)R}{r+\delta} \tag{13}$$

Proposition 4.

The S Equilibrium obtains if $M_0 > M_1 \Longleftrightarrow X < X_c$ where

$$X_c = \frac{2b\left[1+\rho_s(1-ln(2))\right]}{2+k_0 ln(2)} + \frac{p\left[2\rho_s(ln(2)-1) + k_0 ln(2))\right]}{2+k_0 ln(2)}$$

For further reference, notice that $X_c = X_b(m=0, \rho_s = \rho_{vp})$.

5-The Picky Equilibrium (P).

In the P equilibrium, MPs marry workers if and only if these are in employment. I construct this equilibrium by proposing that all workers and MPs use the same reservation wage, so $T = R = T_p = \frac{\rho_p p(1-\ln(2))+X}{1+\rho_p(1-\ln(2))}$. If this is true in equilibrium, then it implies $\underline{w} = T_p$. The proof of Proposition 5 below shows when no individual worker or MP has an incentive to deviate from this strategy. The problem for an MP who is single is therefore to choose a reservation wage T, assuming that the minimum wage in the distribution of earned wages[29] is given by T_p.

$$rM_{1,\underline{w}=T_p} = X + \eta_p \int_T^{\bar{w}} \left[M_2(x) - M_{1,\underline{w}=T_p}\right] g(x)dx - \delta M_1 \tag{14}$$

where $G(w)$ is as given in Section 1 but using $\underline{w} = T_p$. It is easy to show through integration by parts of (14) that $T(\underline{w} = T_p) = T_p$[30].

[29] Earned by workers who got their job while single.

[30] In fact it was done in Section 2 with the difference that Section 2 uses η_{vp}instead of η_p

An unemployed worker's problem in this environment can be presented in a way more convenient for my purposes in this section[31], as it is more familiar to the concept of a corner solution. The payoff of an unemployed worker is described by V_0 as in (2) but with $\underline{w} = T_p$. If the worker decides to accept any offer with wage $x \geq R$, then, the worker's problem is $\underset{R}{Max} \quad V_0$ subject to:

$$i) F(w) \text{ as given in Section 1}$$

$$ii) V_1(x), V_2(x) \text{ and } V_3(x) \text{ as given in Section 2}$$

$$iii) \quad R \quad \leq \quad T_p, \bar{w} = \frac{p + T_p}{2}$$

This problem is analogue to the one solved in Section 1, and therefore yields $R^* = R_w$ as in equation (3)

$$R^*(X) = b + \frac{k_0 k_m m \left[1 - \frac{(\underline{w} - T)(-p + \underline{w})}{2(p-T)^2}\right]}{1 + k_m} - \frac{k_0 ln(2)(-p + \underline{w})}{2}$$

Because in the P equilibrium $\underline{w} = T = T_p$, I impose this to get

$$R^*(X, \underline{w} = T = T_p) = b + \frac{k_0 k_m M}{1 + k_m} + \frac{k_0 ln(2)(p - X)}{2(1 + \rho_p(1 - ln(2)))} = R^e(X)$$

Before stating Proposition 5 below, it helps to recall that $R_m = \frac{2b + k_0 ln(2) p}{2 + k_0 ln(2)}$.

Proposition 5. Assume $X_{b'} < X < X_b$, where

$$X_{b'} = \frac{2b(1 + \rho_p(1 - ln(2)))}{2 + k_0 ln(2)} + \frac{p(2\rho_p(ln(2) - 1) + k_0 ln(2))}{2 + k_0 ln(2)}$$

and X_b has been defined above. Then an equilibrium exists where $R = T = T_p$.

6-Matching and Steady State.

To keep things simple, I use quadratic matching in the marriage market and cloning of single MPs. I normalise the number of single MPs to λ_m, and

[31] This is equivalent to the one used so far.

assume that a new marriage partner comes into the market every time one gets married or dies, so as to maintain that stock constant.

Workers can be in either of fives states: u_s is the total number of workers who are single and unemployed , e_s are single and employed earning a marriageable wage $w \geq T$, u_m are married and unemployed; e_m are married and employed and e_{nm} are employed and not marriageable. I assume that a worker comes into the market as single and unemployed every time a worker dies, whatever its state, and normalise so that $u_{s,i}+e_{s,i}+u_{m,i}+e_{m,i}+e_{nm,i} = 1$, where $i = vp, p, s$

Smitten Equilibrium.

Unemployed single workers. The flow in is given by those who replace dead workers (δ). The flow out is given by those workers in this stock who die, marry or find a job. Hence, steady state requires $\delta = u_{s,s}(\delta + \lambda_m + \lambda_w) \Rightarrow u_{s,s} = \frac{\delta}{\delta+\lambda_m+\lambda_w}$.

Employed single workers. The flow in is given by those workers who are unemployed and single and find a job. The flow out is given by those in this stock who die and those who marry after contacting a *MP*. Hence, the stock $e_{s,s}$ is constant if $u_{s,s}\lambda_w = e_{s,s}(\lambda_m + \delta)$, which implies $e_{s,s} = \frac{\delta}{\delta+\lambda_m+\lambda_w}\frac{\lambda_w}{\lambda_m+\delta}$.

Unemployed married workers. The flow in is given by those workers who are single and unemployed and marry after contacting a MP. The flow out is given by those in this stock who die or find a job. Hence, steady state requires $u_{s,s} = u_{m,s}(\delta + \lambda_w) \Rightarrow u_{m,s} = u_{s,s}\frac{\lambda_m}{\delta+\lambda_w} = \frac{\delta}{\delta+\lambda_m+\lambda_w}\frac{\lambda_m}{\delta+\lambda_w}$

Employed married workers. The flow in is given by those workers who are employed and single and marry after contacting a MP; and by those married and unemployed who find a job. The flow out is given by those in this stock who die. Hence, steady state requires $e_{s,s}\lambda_m + u_{m,s}\lambda_w = e_{m,s}\delta \Rightarrow e_{m,s} = e_{s,s}\frac{\lambda_m}{\delta} + \frac{u_{m,s}\lambda_w}{\delta} \Rightarrow e_{m,s} = \frac{\delta}{\delta+\lambda_m+\lambda_w}\frac{\lambda_w}{\lambda_m+\delta}\frac{\lambda_m}{\delta} + \frac{\delta}{\delta+\lambda_m+\lambda_w}\frac{\lambda_m}{\delta+\lambda_w}\frac{\lambda_w}{\delta}$

Employed non marriageable workers. All workers are marriageable in the S equilibrium, so $e_{nm,s} = 0$

Given that I use a quadratic meeting function, this means that $\eta_s^u = \frac{\delta}{\delta+\lambda_m+\lambda_w}\frac{\lambda_m}{\delta+\lambda_w} =$

$u_{s,s}$ and $\eta_s = \frac{\delta}{\delta+\lambda_m+\lambda_w}\frac{\lambda_w}{\lambda_m+\delta} = e_{s,s}$.

Very Picky Equilibrium.

The difference compared to the S equilibrium is that unemployed workers cannot get married, and not all employed workers can get married, but only those that earn $R \geq T$.

Unemployed single workers. The flow in is given by those who replace dead workers. The flow out is given by those workers in this stock who die or find a job. Hence, steady state requires $\delta = u_{s,vp}(\delta + \lambda_w) \Rightarrow u_{s,vp} = \frac{\delta}{\delta+\lambda_w}$.

Employed single workers. The flow in is given by those workers who are unemployed and single and find a job with a marriageable wage. The flow out is given by those workers in this stock who die or marry after contacting a MP. Hence, steady state requires $u_{s,vp}\lambda_w(1 - F(T)) = e_{s,vp}(\lambda_m + \delta)$ which substituting out $u_{s,vp}$ implies $e_{s,vp} = \frac{\delta}{\delta+\lambda_w}\frac{\lambda_w(1-F(T))}{\lambda_m+\delta}$.

Unemployed married workers. Unemployed workers are not marriageable in this equilibrium so $u_{m,vp} = 0$

Employed married workers. The flow in is given by those workers who are single and employed marry after contacting a MP. The flow out is given by those in this stock who die. Hence, steady state requires $e_{s,vp}\lambda_m = e_{m,vp}\delta \Rightarrow e_{m,vp} = e_{s,vp}\frac{\lambda_m}{\delta} \Rightarrow e_{m,vp} = \frac{\delta}{\delta+\lambda_w}\frac{\lambda_w(1-F(T))}{\lambda_m+\delta}\frac{\lambda_m}{\delta}$.

Employed non marriageable workers. The flow in is given by those workers who are unemployed and single and accept an job with a unmarriageable wage. The flow out is given by those workers in this stock who die. Hence, steady state requires $u_{s,vp}\lambda_w F(T) = e_{nm,vp}\delta$, which implies $e_{nm,vp} = \frac{\lambda_w F(T)}{\delta+\lambda_w}$. Again, given the quadratic meeting technology in the marriage market, this means that $\eta_{vp} = \frac{\delta}{\delta+\lambda_w}\frac{\lambda_w(1-F(T))}{\lambda_m+\delta} = e_{s,vp}$.

Lemma 4. $X = X_b$ implies $X_b = X_b(\eta_{vp} = \eta^*_{vp})$ where $\eta^*_{vp} = \frac{\delta}{\delta+\lambda_w}\frac{\lambda_w}{\lambda_m+\delta} > \eta_s$.

Picky Equilibrium.

Because in the P equilibrium $R = T$ and unemployed workers are not marriageable, all stocks are as in the VP equilibrium but with $F(T) = 0$.

The proposition below summarises the information of Propositions 3,4 and 5. I use it to introduce the next section that deals with a mixed strategy equilibrium.

Summary Proposition. For $0 < m < m_a$:

If $X_b(\eta_{vp} = \eta_{vp}^*) < X < X_a$, an equilibrium obtains where $R < T$, and $R_1 < R \leq R_2, T_3 < T \leq T_4$

If $X_{b'} < X \leq X_b(\eta_{vp} = \eta_{vp}^*)$, an equilibrium obtains where $R = T = T_3$.

If $X < X_c$, an equilibrium exists where $R = T = \frac{2b+k_0 ln(2)p}{2+k_0 ln(2)}$.

7-A mixed strategy equilibrium.

Lemma 5. Assume $0 < m < m_a$. Then $X_c < X_{b'}$.[32].

Following Lemma 5, this section shows that a mixed strategy equilibrium obtains if $X_c \leq X \leq X_{b'}$. In the mixed strategy equilibrium, MPs marry *all* employed workers and marry unemployed workers with probability γ. Hence, the value of a MP that is single is given by

$$rM_1 = X + \eta_m \int_R^{\bar{w}} [M_2(x) - M_1] g(x)dx + \eta_m^u \gamma(M_0 - M_1) - \delta M_1 \qquad (15)$$

where M_0 is value of marriage to an unemployed worker. Subscript m identifies the mixed strategy equilibrium. and η_m^u is the number of unemployed workers. M_0 is described by the following equation

$$rM_0 = b + \lambda_0 \int_{R_m}^{\bar{w}_m} [M_2(x) - M_0] h(x)dx - \delta M_0 \qquad (16)$$

[32] The intuition for this gap is as follows: Assume MPs marry all employed workers, regardless of their wage, and single unemployed workers decide on a reservation wage R based on this. Now assume that MPs start marrying only workers earning a wage $T > R$. If unemployed workers will still accept jobs at wages $w < T$, they must be compensated for the loss of marriageability. This implies that their reservation wage increases from R. Notice that the shape of the wage distribution is not affected. Hence, a higher R implies a smaller relative wage inequality. Rather than reinforcing the MPs' behaviour of marrying only high earners, this would give them further incentive to marry all employed workers, as with a smaller relative wage inequality the option of continued search is less attractive.

where $R_m = \frac{2b+k_0 ln(2)p}{2+k_0 ln(2)}$. Recall the distribution of wages offered to married employers is given by $I(x)$, which implies that the distribution of wages faced by married workers in their job search is $H(x)$. The mixing strategy is rational only if $M_1 = M_0$. Integration by parts and algebraic manipulation of (15) and (16) above shows that this occurs only if $X = X_{c'}$, where

$$X_{c'} = \frac{2b(\rho_m(1 - ln(2)) + 1)}{2 + k_0 ln(2)} + \frac{p(2\rho_m(ln(2) - 1) + k_0 ln(2))}{2 + k_0 ln(2)}$$

The steady state equations in the mixed strategy equilibrium are as follows: The stock $u_{s,m}$ remains constant if $\delta = u_{s,m}(\delta + \lambda_m\gamma + \lambda_w) \Rightarrow u_{s,m} = \frac{\delta}{\delta+\lambda_m\gamma+\lambda_w}$. The steady state equation for $e_{s,m}$ is given given by $e_{s,m} = \frac{u_{s,m}\lambda_w}{\lambda_m+\delta}$, which substituting out $u_{s,m}$ implies $e_{s,m} = \frac{\delta\lambda_w}{(\delta+\lambda_m\gamma+\lambda_w)(\lambda_m+\delta)}$ Stock $u_{m,m}$ remains constant if $u_{s,m}\lambda_m\gamma = u_{m,m}(\delta + \lambda_w)$, which means $u_{m,m} = \frac{\delta}{\delta+\lambda_m\gamma+\lambda_w}\frac{\lambda_m\gamma}{(\delta+\lambda_w)}$. Stock $e_{m,m}$ remains constant $e_{s,m}\lambda_m + u_{m,m}\lambda_w = e_{m,m}\delta \Rightarrow e_{m,m} = e_{s,m}\frac{\lambda_m}{\delta} + \frac{u_{m,m}\lambda_w}{\delta} \Rightarrow e_{m,m} = \frac{\lambda_w\lambda_m}{(\delta+\lambda_m+\lambda_w)(\lambda_m+\delta)} + \frac{\lambda_m\gamma\lambda_w}{(\delta+\lambda_m\gamma+\lambda_w)(\delta+\lambda_w)}$. In this equilibrium, $e_{nm,m} = 0$. This means that $\eta_m = \frac{\delta\lambda_w}{(\delta+\lambda_m\gamma+\lambda_w)(\lambda_m+\delta)} = e_{s,m}$.

Proposition 7. A mixed strategy equilibrium obtains if $X_c \leq X \leq X_{b'}$

8-Conclusion.

I obtain the equilibria in a model in which a search labour market and a matching marriage market interact. The economy is populated by ex-ante homogeneous workers, ex-ante homogenous firms, and ex-ante homogeneous marriage partners. Workers simultaneously search for firms in order to work and for marriage partners in order to marry. Firms post wages to attract workers; and marriage partners look for workers in order to marry. When married, I assume that workers receive a pre-determined flow utility, and that marriage partners derive utility equal to the worker's wage. I show that the so called "married wage premium" or, more generally, a correlation between men's wages and marital status, can emerge as an equilibrium result of having search frictions both in the labour and the marriage market[33]. I

[33] Not having to resort to the traditional explanations given for the existence of the

do not know of another model that analyses the equilibrium interaction of a search market (the labour market) and a matching market (the marriage market), which I see as the main theoretical contribution of the paper.

In order to obtain clean analytical results, I use some assumptions the removal of which seems interesting and is the basis of current research. For example, if divorce is allowed, the model seems to yields empirically valid predictions not only about the married wage premium, but also about the "divorced wage premium". Namely, that divorce men enjoy a wage premium smaller than married men, but still positive over never married men. When an unmarried and unemployed worker accepts an unmarriageable wage he looses the option to get married in the future (or what I have termed "marriageability"). When a married and unemployed worker accepts an unmarriageable wage he is divorced by his partner, thereby loosing marriage itself, which is more valuable than the option of a future marriage. Hence, provided both have a reservation wage lower than that of marriage partners[34], the reservation wage of married workers is higher than the reservation wage of unmarried workers, as they loose more when accepting an unmarriageable wage.

I assume that single marriage partners enjoy a predetermined flow utility, which I call X. Amongst other things, X could be interpreted as the option of marrying differently skilled workers. Preliminary research using this interpretation yields interesting insights on which type of workers should enjoy higher married wage premia. In particular, in a situation where there are differently skilled workers and high shilled workers are more likely to earn high wages, a marriage partner could accept marriage to unemployed high skill workers (expecting a high wage when the worker finds a job); but not to low skill workers employed at a wage in the low end of the distribution. Hence, a correlation exists between wages and marital status for low skill workers, but not for high skill workers.

married wage premium.

[34] which can be shown to happen in some equilibria.

9-Appendix.

Proof of Proposition 1. Taken together, statements $a) - d)$ below imply $R_w(T)$ is downward sloping when $R_w = T = R_1$, it decreases smoothly as T increases and it is always higher than b for $R_w < T < T_2$

$a)$ From (3), it follows that $R_w = b$ if $T = T_a$, where

$$T_a = \frac{-4k_m Mp + (k_m m + 2ln(2)p(1+k_m))(-p+b) + \sqrt{\Gamma}}{2(-2k_m m + ln(2)(1+k_m)(-p+b))}$$
$$\Gamma = (-Mk_m(-p+b)^2(-9k_m m + 4ln(2)(1+k_m)(-p+b))$$

Further, $T_a \geq T_2$ iff $m < m_a$ as in the body of the paper.

$b)$ Implicitly differentiating (3) implies $\frac{\delta R_w}{\delta T}$ when $R_w = T = R_1$ is $\frac{\delta R_w}{\delta T}_{(R_w=T=R_1)} = \frac{k_0 k_m M}{3k_0 k_m M + 2(1+k_m)(-p+b)}$. Further $\frac{\delta R_w}{\delta T}_{(R_w=T=R_1)} < 0$ when $m < m_a$.

$c)$ $\frac{\delta R_w}{\delta T} = 0$ if $T = 2R_w - p > \bar{w}$, and therefore not possible when $R_w < T < \bar{w}$

$d)$ $m < m_a$ implies $\Gamma > 0$ for $R_w < T < \bar{w}$. So $R_w(T)$ is a "smooth" function in that range.

Proof of Proposition 2. Items $i)$ and $ii)$ in Proposition 2 follow directly from (6). Item $iii)$ is the consequence of $a) - c)$ below:

$a)$ From (6),$\frac{\partial T}{\partial R_{mp}} > 1$ when $R_{mp} = T = R_3$. This is easy to show because

$$\frac{\partial T}{\partial R_{mp}} = \frac{(1+\rho_{vp})(-p+T) - \rho_{vp}(R_{mp} - T))}{\rho_{vp} ln \frac{(p-R_{mp})}{2(p-T)}(p-T)}$$

which evaluated at $R_{mp} = T = R_3$ is $\frac{(1+\rho_{vp})}{\rho_{vp}\ln(2)} > 1$.

$b)$ $\frac{\partial T}{\partial R_{mp}} > 0$ when $R_{mp} < T < \bar{w}$. This is easy to show because $a)$ above; because $\frac{\partial T}{\partial R_{mp}} = 0$ only if $T = \frac{p(1+\rho_{vp})+\rho_{vp}R_{mp}}{1+2k_\tau} > \frac{(p+R_{mp})}{2} = \bar{w}$; and $\frac{\partial T}{\partial R_{mp}}$ exists when $R_{mp} < T < \bar{w} = \frac{p+R_{mp}}{2}$.

$c)$$\frac{[\partial T]^2}{\partial^2 R_{mp}} = \frac{A_1 + \rho_{vp}(p+R_{mp}) + p - T - 2\rho_{vp}T)}{\rho_{vp}\left[ln(\frac{(p-R_{mp})}{2(p-T)})(p-T)\right]^2}$ where $A_1 = ln(\frac{(p-R_{mp})}{2(p-T)})\rho_{vp}(p-R_{mp})$.Hence $\frac{[\partial T]^2}{\partial^2 R_{mp}} > 0$ iff

$$A_1 > A_2 = -\rho_{vp}(p+R_{mp}) - p + T + 2\rho_{vp}T.$$

Since (6) can be rewritten as $A_1 = R_{mp} - X - \rho_{vp}(p - 2T + R)$ it is easy to show that as long as $p > X$ and (6) holds, then $A_1 > A_2$ which implies $\frac{[\partial T]^2}{\partial^2 R_{mp}} > 0$

Proof of Lemma 1. Follows immediately from solving the equations $R_4 = R_2$ and $T_4 = T_2$.

Proof of Lemma 2. From inspection (6) it follows that $\frac{\partial R_w}{\partial X} = 0$. From implicit differentiation of (6) it follows that

(a) $\frac{\partial R_{mp}}{\partial X} = \frac{1}{\rho_{vp} ln(\left[\frac{(p-R)}{2(p-R_{mp})}\right]}$, and $\frac{\partial R_{mp}}{\partial X} < 0$ if $R_{mp} < T < \bar{w}$. (b) $\frac{\partial T}{\partial X} = \frac{(p-Rm)}{(1+\rho_{vp})(p-Rm)+\rho_{vp}(R-Rm)}$, and $\frac{\partial T}{\partial X} > 0$ if $R_{mp} < T < \bar{w}$. (c) $\frac{\partial T_4}{\partial X} = 1 > 0$. Statements $(a) - (c)$ above imply that as X declines, the graph of $R_{mp}(T)$ in the R_{mp}, T space shifts to the left. Starting at $X = X_a$, a small enough decline in X yields a situation as depicted in Figure 4.

Proof of Lemma 3. *Follows directly by using T_1 and T_3.*

Proof of Proposition 3. *Follows immediately from Lemmas 1-3.*

Proof of Proposition 4. Follows immediately from equations (12) and (13). For further reference, notice that $X_c = X_b(m = 0, \rho_s = \rho_{vp})$.

Proof of Proposition 5. It is straightforward to show that the optimal reservation wage chosen by an MP is $T(\underline{w}= T_p) = T_p$. I must also show that MPs do not have an incentive to marry unemployed workers. Because the relevant distribution of wages faced married unemployed workers is $H(x)$ the value of marriage to an unemployed worker is given by $rM_0 = b + \lambda_0 \int_{R_m}^{\bar{w}_m} [M_2(x) - M_0]\, h(x)dx - \delta M_0$, where $R_m = \frac{2b+k_0 ln(2)p}{2+k_0 ln(2)}$. Simple manipulation of $M_{1,\underline{w}=T_p}$ and of M_0 shows that $M_{1,\underline{w}=T_p} \geq M_0$ if and only if $X \geq X_{b\prime}$ as in Proposition 5. Now consider the problem of an unemployed worker as described in this subsection. I first obtain R^* and evaluate it when $\underline{w}= T = T_p$ to obtain $R^*(X, \underline{w} = T = T_p) = R^e(X)$. It is easy to show that $R^e(X)$ is downward sloping and continuous in the range $X_{b\prime} \leq X < p$. Also, one can show that $R^e(X_b) = T_p$. Hence, for $X \geq X_b$ we have $R = R^e(X) \leq T_p$, and the equilibrium breaks. For $X < X_b$, then $R^e(X) > T_p$, so workers reach a corner solution where $R = T_p$.

Proof of Lemma 4. $X = X_b$ implies $T_1 = T_3 = R_3 = R_1$. Hence, in equilibrium, $T = R$ and $F(T) = 0$; and this implies $\eta_{vp} = \eta^*_{vp}$.

Proof of Lemma 5. Take $X_b(\eta_{vp} = \eta^*_{vp})$ and X_c as given in Lemma 4 and Proposition 4 respectively. Assume for a moment that $\eta_s = \eta^*_{vp}$. Then $X_c = X_b(m = 0) < X_b(m > 0)$. Further $\frac{\partial X_c}{\partial \eta_s} > 0$ and $\eta_s < \eta^*_{vp}$. This necessarily implies that $X_c < X_b(\eta_{vp} = \eta^*_{vp})$ for $m \geq 0$.

Proof of Proposition 7. It is easy to show that *i)* $\gamma = 0$ implies $\eta_m = \eta^*_p$ which implies $X_{c'} = X_{b'}$; *ii)* $\gamma = 1$ implies $\eta_m = \eta_s$ which implies $X_{c'} = X_c$; and that *iii)* $\frac{\delta X_{c'}}{\partial \gamma} < 0$.

10-References

Becker, G.,1991 A Treatise of the Family. Cambridge, Harvard University Press

Burdett, K., Judd, K, 1983. Equilibrium Price Dispersion. Econometrica 51, No. 4, 955-969.

Burdett, K., Lagos, R., Wright, R, 2003. Crime, Inequality and Unemployment. The American Economic Review 93, No. 5, 1764-1777.

Burdett, K., Lagos, R., Wright, R., 2004. An on-the-job search model of Crime, Inequality and Unemployment. International Economic Review 45, No 3, 681-706.

Ginther, D., Madelin, Z., 2001. Is the male marriage premium due to selection? The effect of shotgun weddings on the return to marriage. Journal of Population Economics 14, (2), 313-328.

Loughran, D., 2002. The Effect of Male Wage Inequality on Female Age at First Marriage. The Review of Economics and Statistics 84, No.2, 237-250.

Lundberg, S., 2005. Men and Islands: Dealing with the Family in Empirical Labour Economics. Labour Economics 12, 591-612.

Marsiglio, W., 1987. Adolescent Fathers in the United States: Their Initial Living Arrangements, Marital Experience and Educational Outcomes. Family Planning Perspectives 19 (6), 240-251.

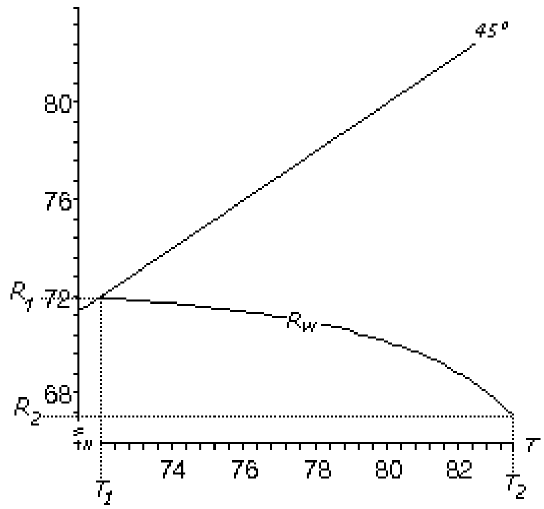

Fig. 1: R_w when $R_w < T < \bar{w}$

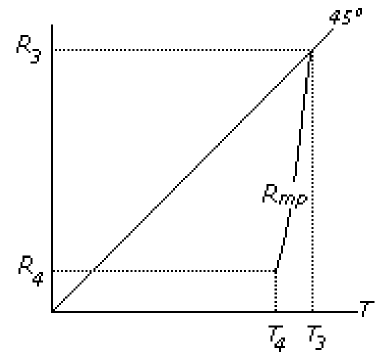

Fig. 2: R_{mp} when $R_{mp} < T < \bar{w}$.

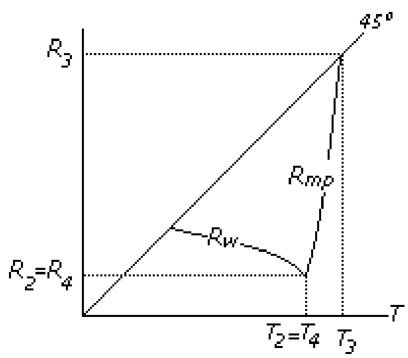

Fig. 3: R_w and R_{mp} when $X = X_a$

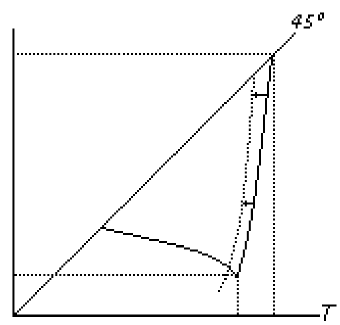

Fig. 4: R_w and R_{mp} when $X = X_a - \epsilon$

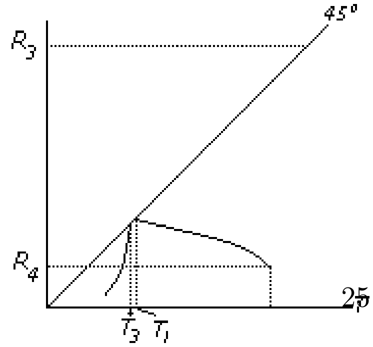

Fig. 5: R_w and R_{mp} when $X < X_b < X_a$